

No. 1
ELECTRONIC SWITCHING SYSTEM
“(2 WIRE)”
PLANT TRAINING COURSE
No. 90

TRAINEE MANUAL



The Pacific Telephone & Telegraph Company
American Telephone & Telegraph Company

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A Note About This Document

This book, No. 1 Electronic Switching System (2 Wire), Plant Training Course No. 90, came from the private library of Joybubbles (born Josef Carl Engressia, Jr., 1949-2007), the blind phone phreak of some renown. It is unknown where he obtained it but it was likely photocopied by a contact of his within AT&T or Pacific Bell.

When Joybubbles passed away much of his library went to Phil Lapsley. These documents were eventually given to Sam Etler for safekeeping and digitization purposes.

Feel free to distribute this document widely. However, as a tribute to Joybubbles, please leave this note attached.

-- Sam Etler, 2012-01-16

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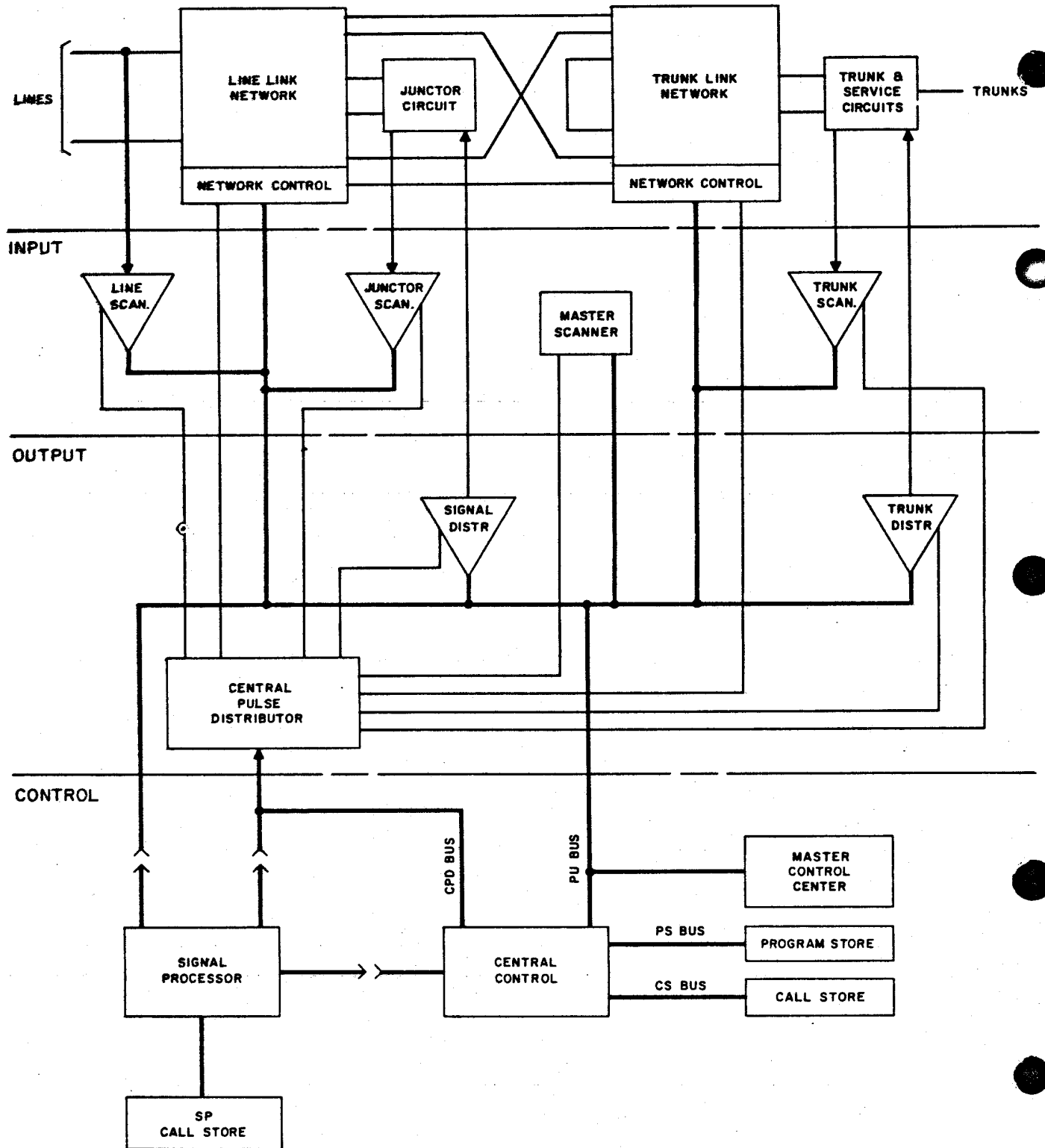
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GENERAL DESCRIPTION

SWITCHING NETWORK



I GENERAL DESCRIPTION . . .

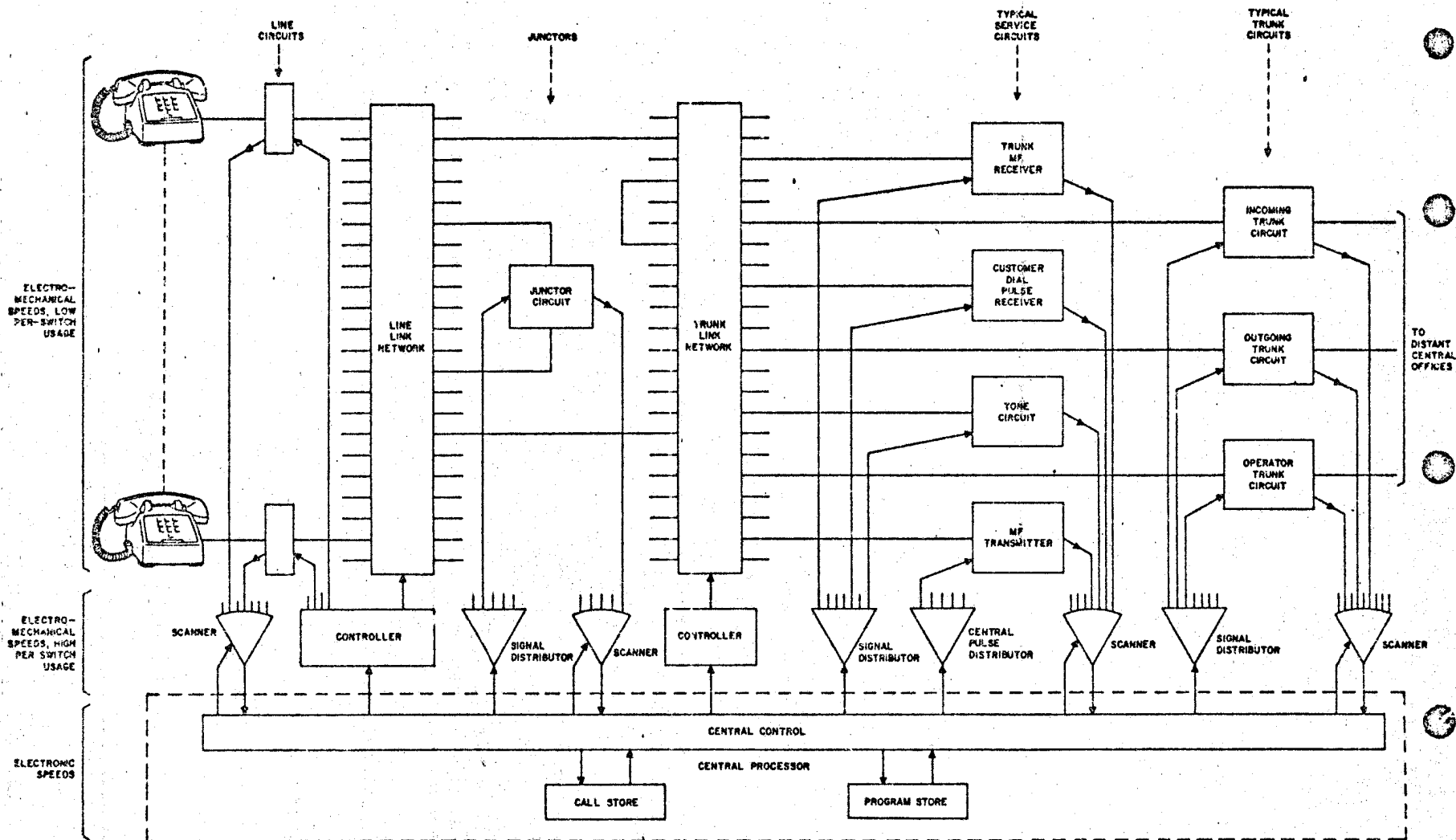
The basic concept of No. 1 ESS is that of a high speed electronic central processor operating with a stored program to control the actions of the central office on a time-sharing basis. The switching network provides the means for making interconnections between the lines and trunks to be served by the system and also provides access to the various service circuits required in handling telephone calls.

All information processing is handled by a central processor consisting of Central Control and the temporary and semi-permanent memories. The temporary memory is used for storage of the transient information required in processing calls, such as the digits dialed by the subscriber or the busy and idle states of lines and trunks. The semi-permanent memory contains the stored program and translation information. The Central Control consists of wired logic for performing information processing operations.

Input information for the central processor is provided by Scanners connected to various points in the system. These include the lines and trunks: The Scanners are directed periodically to the lines and trunks to detect service requests and dialed digits. The information obtained in these periodic scans is processed and the results stored in temporary memory.

The distributor is used to dispense the output information from the central processor. The distributor is composed of two types; the Central Pulse Distributor and the Signal Distributor.

The Central Pulse Distributor is all electronic and is used for high speed actions. The Signal Distributor makes use of a relay tree to perform slower speed actions.



Block Diagram Showing Relations, Between Junctor, Trunk, and Service Circuits and the Rest of No. 1 ESS

The actual switching network is a mechanical device which is electronically controlled. The crosspoints are ferreed switches and are operated or released by the Network Controllers in each line, trunk, or junctor switch frame.

The service circuits, such as, Touch-Tone (TT) receivers, MF transmitters, ringing supplies, etc., are not permanently wired to any one customer line or trunk circuit. Instead they are shared by all circuits having a need for one. They are connected to the client circuit by the switching network.

The individual units are connected to the central control via a common bus system.

Changes in types of service, features, the adding of new subscribers, etc. are made via changes in the program rather than physical wiring changes.

Maintenance people are given access to the machine by teletypewriter circuits and a Master Control Center.

CUSTOMER TO SUBSCRIBER CALL IN SAME ESS MACHINE

<u>Originating Customer</u>	<u>Machine Operations</u>	<u>Terminating End</u>
Picks up hand set	Detects an origination. Determines that customer has TT set. Connects customer to TT receiver. Gives customer dial tone from TT receiver.	
Hears dial tone. Dials first digit.	Detects first digit pulsed. Removes dial tone. Stores first digit. Checks first digit for "0" or some special code.	
Hears no dial tone. Continues dialing digits.	Detects and stores each digit. Continues to check for routing, special codes, abandon dial, etc.	
Dials last digit.	Detects last digit has been pulsed. Idles TT receiver so it can be used by other clients. Determines number pulsed is served by this machine. Determines called number is idle. Finds and reserves a talking path to the called number from call- ing number. Determines type of ringing required.	
Hears audible ring	Connects ring to called line. Connects audible ring to calling line.	Telephone rings.
	Detects called party answered. Removes ring from called line. Removes audible ring from calling line. Establishes the re- served talking path.	Answered telephone

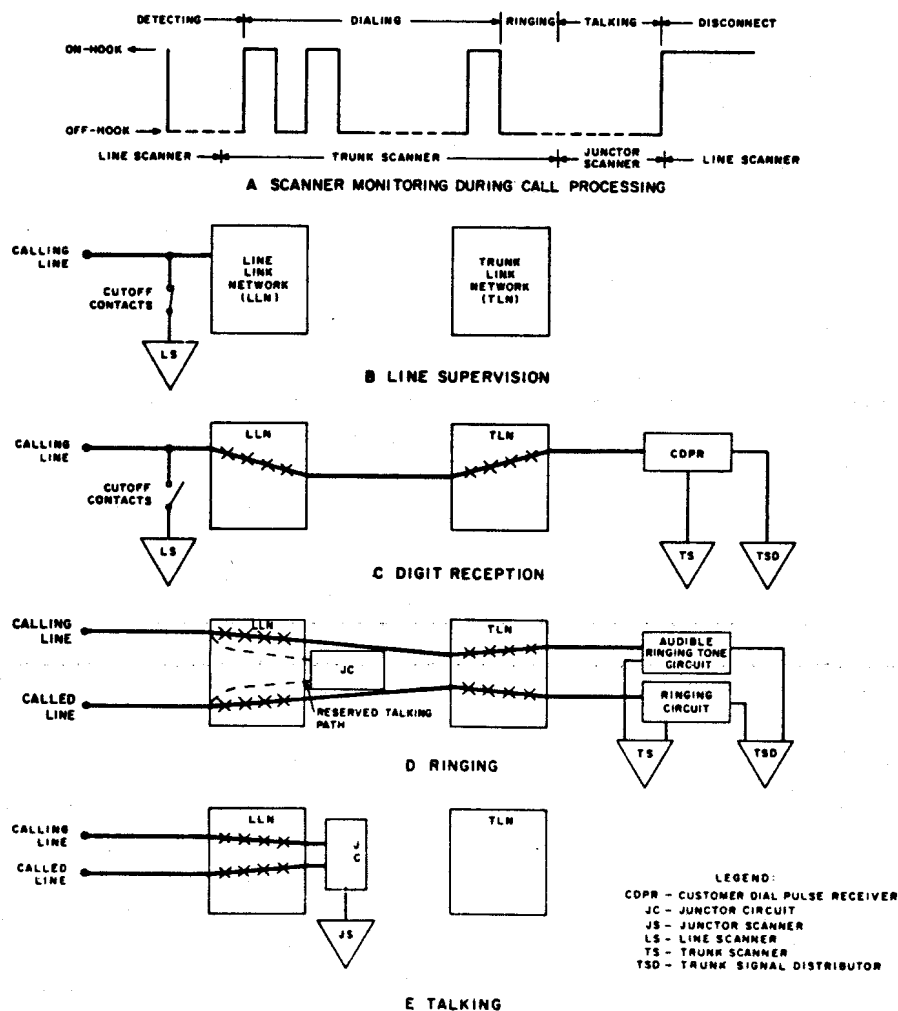
ESTABLISHING A CONNECTION . . .

A call placed by a subscriber will actually have many connections made and released in the process of serving him. The chart shows an example of such a call.

The chart has been divided into three columns. The first column outlines what the originating customer does and hears. The middle column lists the actions the ESS machine must do and the third lists the results as seen and heard at the terminating end.

In this example we have assumed that our customer is calling another subscriber served by the same ESS machine.

You will note the large number of connections made for this one call. Remember that the machine is working on many such calls at any one time and is spending very little time on any one operation. This is all possible because of its extremely high speed of operation.



Typical Connections for an Intraswitch Call

II DESIGN FEATURES . . .

- A. The No. 1 ESS machine is a standard 2-wire local exchange serving office type with metropolitan-oriented service features. It is designed to provide all the services now available in No. 5 Crossbar plus many new features.

- B. The present office capacity of the system is 65,536 line terminations. (32,768 lines if in a 2 to 1 concentration switching ratio.) There are a maximum of 16,384 trunks and service circuits available in a 1 to 1 trunk switching ratio.

- C. Customer lines . . .
 - 1. Dial pulse
 - 2. Touch Tone
 - 3. Manual
 - 4. Types of service . . .
 - a. FR and Business
 - b. Coin
 - c. TWX
 - d. PBX
 - e. Centrex

- D. Interoffice trunks . . .
 - 1. MF signaling
 - 2. D.P. signaling
 - 3. PCI
 - 4. Revertive

II DESIGN FEATURES (Cont.) . . .

- E. Line Link Network (2 to 1 ratio) . . .
 - 1. A full LLN = 2048 lines
 - 2. 512 lines per frame
 - 3. 16 LLN's maximum per office

- F. Directory Numbers . . .
 - 1. Office codes maximum = 32
 - 2. 128 number groups maximum
 - 3. Directory number per number group = 1000

- G. Service Features . . .
 - 1. Routing changes
 - 2. Access to other networks (Centrex)
 - 3. Features being provided . . .
 - a. Conference Calling
 - b. Speed Calling
 - c. Call Transfer
 - d. Call Waiting

III SWITCHING NETWORKS . . .

- A. Customer lines terminate on Line Link Networks, Interoffice Trunks and Service Circuits terminate on Trunk Link Networks.

III SWITCHING NETWORKS (Cont.) . . .

- B. A completed call through the Network involves 2-four stage, 2-wire switching paths. These switching paths are interconnected by a junctor circuit for line to line calls or a wired junctor for line to trunk and trunk to trunk calls.
- C. Trunk Link Network . . .
 - 1. Full TLN comprised of 2048 terminations
 - 2. Capacity of 8 trunk switch frames per TLN
 - 3. Maximum 16 TLN's per office
- D. Frames in network . . .
 - 1. Universal Trunk Frame . . .
 - a. Consists of a basic 2 bay frame and a supplementary 1 bay frame
 - b. May terminate a maximum of 256 trunks and/or service circuits. (considering each plug in unit may have up to two circuits)
 - c. Trunk Circuit Plug-in Units (dual circuit type) . . .
 - 1. Two scan points available per circuit. Usually used for supervision of both parties.
 - 2. 3 signal distributor points per circuit. Sets up different relay configurations for outpulsing, talking, etc.
 - 3. Contains a 512 point scanner
 - 2. Junctor Frame . . .
 - a. Similar to UT frame
 - b. 256 circuits with self contained SD and scanner.
 - c. Used to supply battery both ways in a line to line call.

III SWITCHING NETWORKS (Cont.) . . .

D. Frames in network (Cont.) . . .

3. Trunk Switch Frame . . .

- a. Has 2 switching stage connected by "A" links . . .
 - 1. The switch stages are comprised of 8x8 ferreed switches. Each cross point has 2 contacts for the 2-wire path.
- b. Has 256 network terminations which may be cross-connected to UT or miscellaneous trunk circuits.
- c. Has 256 "B" link terminations to the trunk junctor switching frame on a 1 to 1 concentration ratio.
- d. Contains logic circuitry, relays, and a pulser to establish a talking path through the frame under control of CC.

4. Junctor Switch Frame . . .

- a. Contains same switching and logic control as in TSF. Two junctor switching stages are connected by C links.
- b. Has 256 B link terminations to TSF's
- c. Has 256 terminations to juncctors (J-links)
- d. Has bipolar ferreeds for FCG test and no-test connections

5. Junctor Grouping Frame . . .

- a. Composed of modules. The number of modules varies with size of office.
- b. A module is a 2' 2" frame divided into 9 vertical files with 8 horizontal shelves.
- c. Plugs and jacks are used to establish the wire junctor patterns. The plug and jack feature permits flexibility for office growth and for rapid change of traffic redistribution when required. Each plug and jack has 32 contacts.

III SWITCHING NETWORKS (Cont.) . . .

D. Frames in network (Cont.) . . .

5. Junctor Grouping Frame (Cont.) . . .

- d. One vertical file has enough plugs and jacks to terminate half of a TLN - 512 junctors (2-wires each).

6. Other Frames . . .

a. Supplementary Signal Distributor . . .

- 1. Supplies operate and release relay current to miscellaneous trunks and special circuits.

- 2. Maximum of 1024 SD points

b. Miscellaneous Trunk Frames . . .

- 1. SXS incoming trunks

- 2. Service circuits

- 3. Relay operation depends on SSD, extended points from junctor or UT frames.

- 4. Scan points are in the master scanner

c. Ringing and tone

d. Recorded announcement

E. Service Circuits . . .

- 1. Pulsing transmitter and receiver circuits

- 2. Test circuits

- 3. Coin circuits, etc.

F. Local Test Board and Operator Access to Lines . . .

- 1. Dial access to lines via network for testing.

- 2. Busy lines monitored via no-test vertical in junctor switching frames.

IV NETWORK CALL - INTRAOFFICE . . .

A. Cyclic operation . . .

1. CC never stops even if no requests for service exist.
2. CC requests a new instruction from program store normally every 5.5 usec.
3. All lines and trunks are scanned at periodic rates if only to determine there are no requests.
4. CC also tests itself and other units.

B. We will describe basic operation of the system for an intraoffice call . . .

1. CC scans lines every 200 msec by interrogating line scanner ferroids.
2. When customer goes off-hook, current flows through ferrod control windings. Off hook is discovered by CC on next scan.
3. CC consults call store for line busy-idle information.
4. CS remembers the busy-idle status of equipment. Sleeve leads are used for this function in other telephone systems.
5. Line is idle in memory so CC recognizes off-hook as call origination and updates busy-idle bit.
6. CC knows the scanner ferrod address and goes to translation area in PS to find . . .
 - a. If line is allowed to originate.
 - b. Class of service
 - c. Dial pulse or touch tone customer
 - d. Any special services
7. CC consults CS memory for an idle CDPR (assume a DP customer) and searches memory for idle network path.
8. CC sends network orders over PU address bus to establish path through network from customer to CDPR.

IV NETWORK CALL - INTRAOFFICE (Cont.) . . .

B. We will describe basic operation of the system for an intraoffice call (Cont.) . . .

9. Digit reception . . .

- a. CC sends an order to SD operating a relay in the receiver to furnish dial tone.
- b. CC now detects dial pulses by scanning the CDPR ferrod every 10 msec and stores them in CS.
- c. When first dial pulse is received, dial tone is removed.
- d. A digit is complete when no dial pulses have been received for approximately 120 msec.

10. Digit analysis . . .

- a. When all digits have been received, CC uses the dialed number to locate equipment translation of the called line in program store.
- b. CC checks if called number is busy by checking busy-idle bit.
- c. CC then searches network map for talking path.
- d. Reserves talking path by marking busy in the network map.

11. Ringing . . .

- a. CC sets up path from calling party to audible ringing tone.
- b. CC sets up path from ringing circuit to called line.
- c. When called party answers, CC releases the connections to power ring and audible ring.

12. Talking . . .

- a. CC establishes talking path previously reserved in memory.

IV NETWORK CALL - INTRAOFFICE (Cont.) . . .

B. We will describe basic operation of the system for an intraoffice call (Cont.) . . .

12. Talking (Cont.) . . .

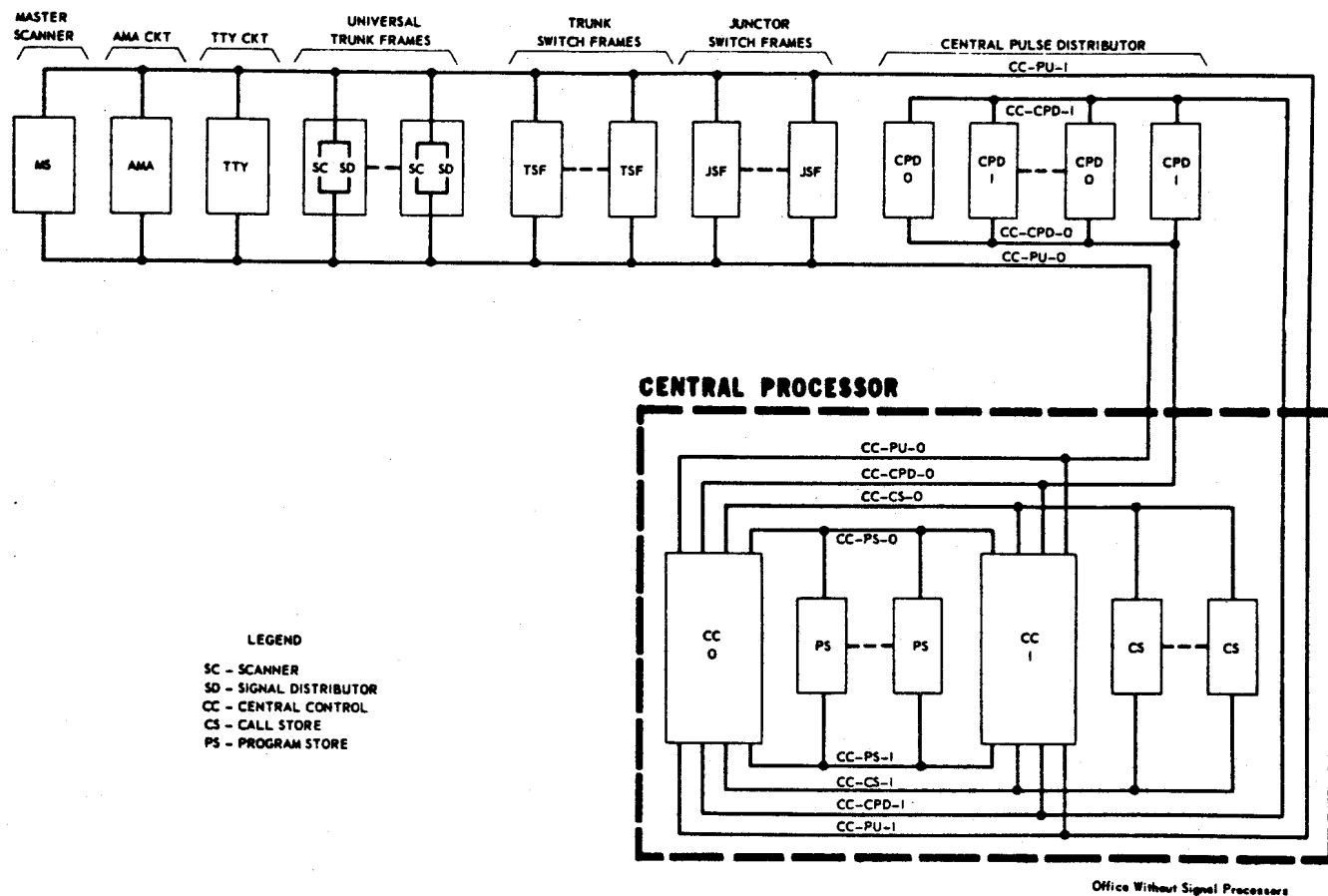
- b. Operates cut-through relays in junctor circuits by SD points.
- c. Both lines are still supervised by junctor scanner every 100 msec looking for a disconnect.

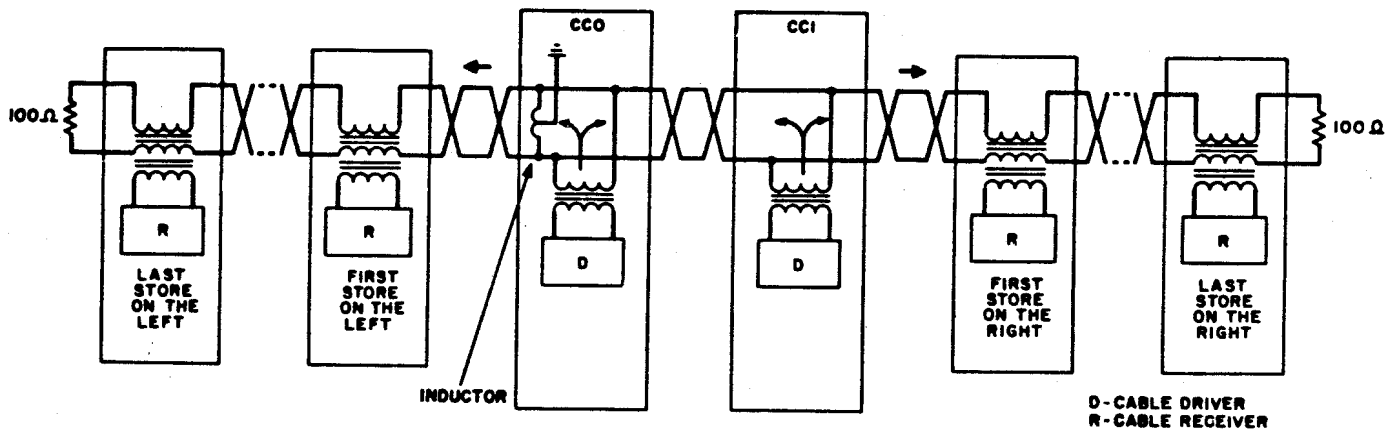
13. When disconnect occurs . . .

- a. Junctor circuit relays released by same SD points.
- b. Network map is updated to idle path used.
- c. Lines are scanned every 200 msec looking for new origination.

MAJOR BUS SYSTEMS IN A NO. 1 ESS OFFICE

- Central Control - Program Store
- Central Control - Call Store
- Central Control - Peripheral Units
- Central Control - Central Pulse Distributor



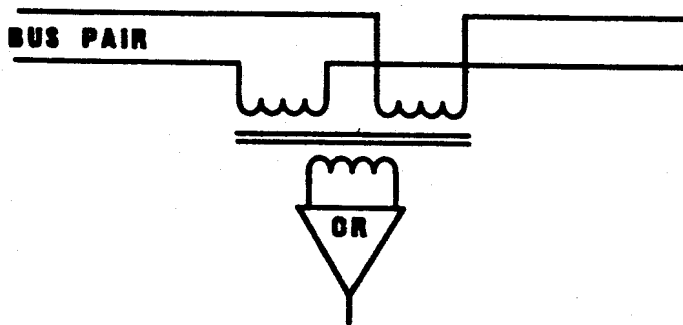


Typical Bus Pair

Input-Output connectors for a bus . . .

• Input

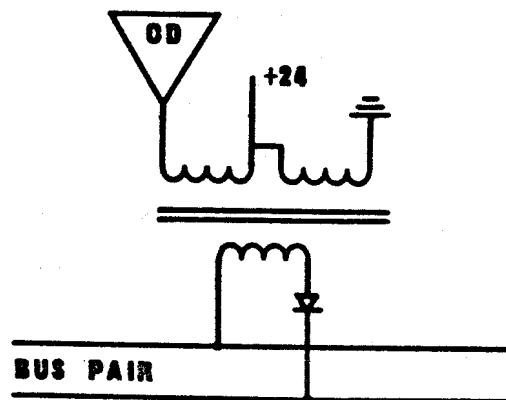
Cable Receiving Transformers pick information off the bus. Cable Receivers amplify the bus pulses.



SIGNAL IS REMOVED FROM BUS BY MEANS OF SERIES TRANSFORMERS

• Output

Cable drivers amplify signals from within the unit. Cable driver output transformers are used to put information on bus pairs.



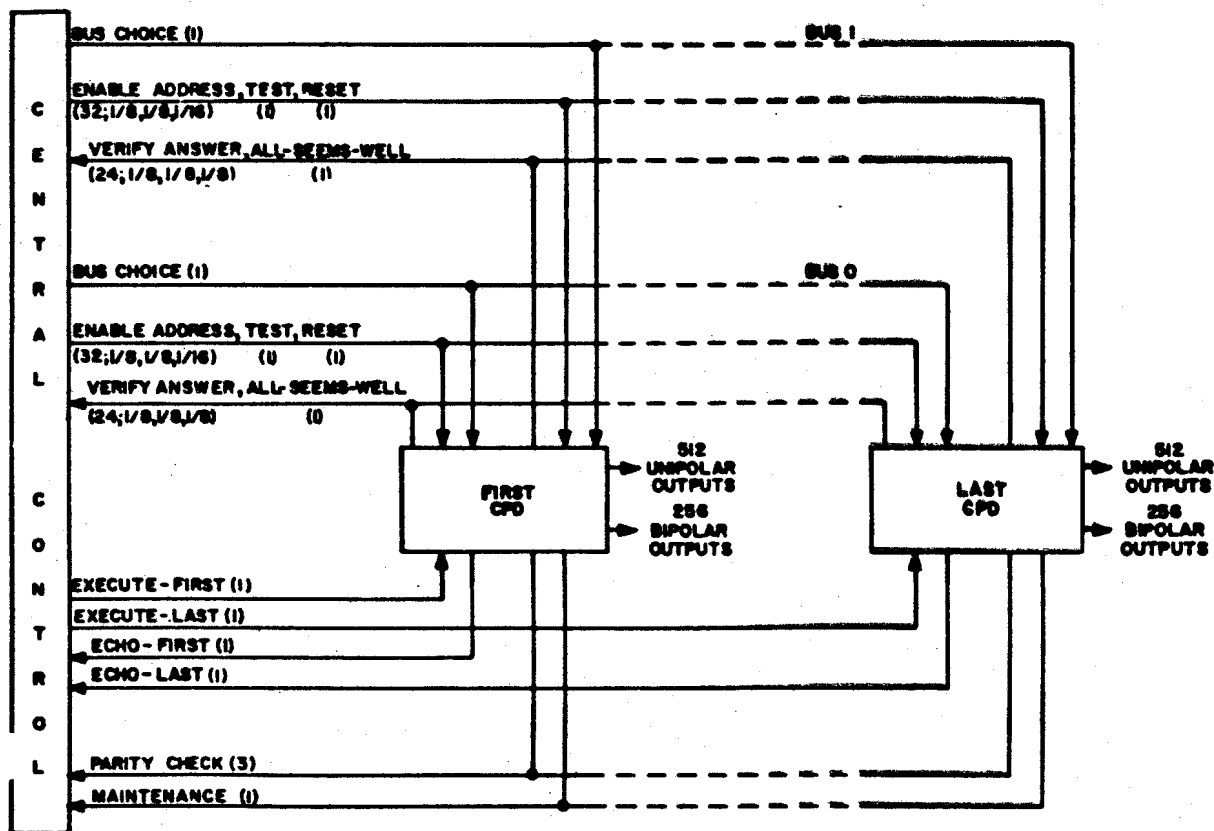
SIGNAL IS BRIDGED ON TO THE BUS WHEN TRANSMITTING

BUS FEATURES . . .

- . Each bus is fully duplicated
- . Signal characteristics
 - . 100 to 110 milliamperes pulses
 - . 0.5 microsecond pulse width
- . Electrical bus characteristics
 - . Balanced to ground at the center
 - . 26 Gauge twisted pair
 - . 100 ohm terminations at each end
 - . Series cable receivers
 - . Loss is 10 db per 1000 feet
 - . Delay is 2 microseconds per 1000 feet
 - . Center tapped inductor to bleed off longitudinals
 - . Driven from center by cable driver
 - . Length limited by allowable delay

THERE ARE TWO METHODS OF ENABLING UNITS TO RECEIVE INFORMATION FROM A BUS . . .

- . Transmission of an unique name code on the bus
 - . Only the units which can match their assigned name code to that transmitted can receive the information.
 - . Used to enable Program Stores and Call Stores.
- . Send an enable pulse over a private pair from the Central Pulse Distributor to one particular unit
 - . Only the unit enabled can receive the information.
 - . Used to enable Peripheral Units



Communication Between Central Control and Central Pulse Distributors

LEADS BETWEEN CENTRAL CONTROL AND
CENTRAL PULSE DISTRIBUTOR

Number of Leads		Function
To CPD	From CPD	
32		CPD enable address
1		Bus choice
1		Reset lead
1		Test lead
1		We-really-mean-it enable signal
	3	* Parity check
	1	* Maintenance
	24	Verify answer
	1	All-seems-well signal
36	29	* Not duplicated

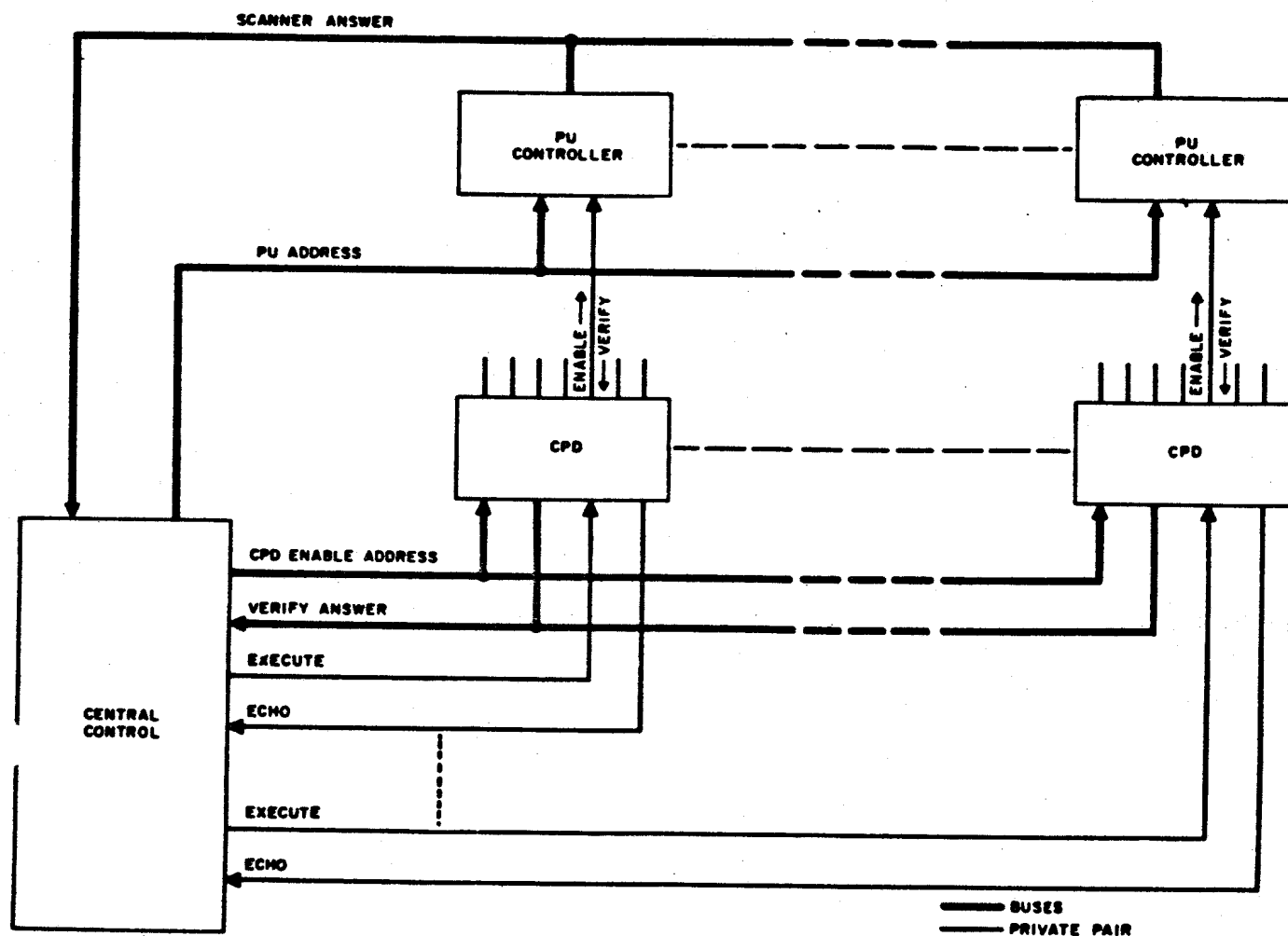
CENTRAL CONTROL - CENTRAL PULSE DISTRIBUTOR BUS SYSTEM . . .

- . Consists of busses common to all CPD's and private pairs to and from each CPD.
 - . From CC's to CPD's
 - . Enable Address Bus
 - . Execute pair
 - . From CPD's to CC's
 - . Verify Answer Bus
 - . Execute Echo Pair
 - . Parity Check Bus
 - . Maintenance Bus

Used to send address of peripheral unit to be enabled to CPD and to verify that the correct CPD has received this address and that the proper peripheral unit has responded.

PRIVATE LEADS

From	To	Function	Quantity
CC	CPD	Execute signal to controller	One per CPD
CPD	CC	Execute echo signal to central control	One per CPD
CPD	PU PS CS	Enable signal to controller	Two per controller
CPD	MS MCC CC	We-really-mean-it signal	One per unit listed



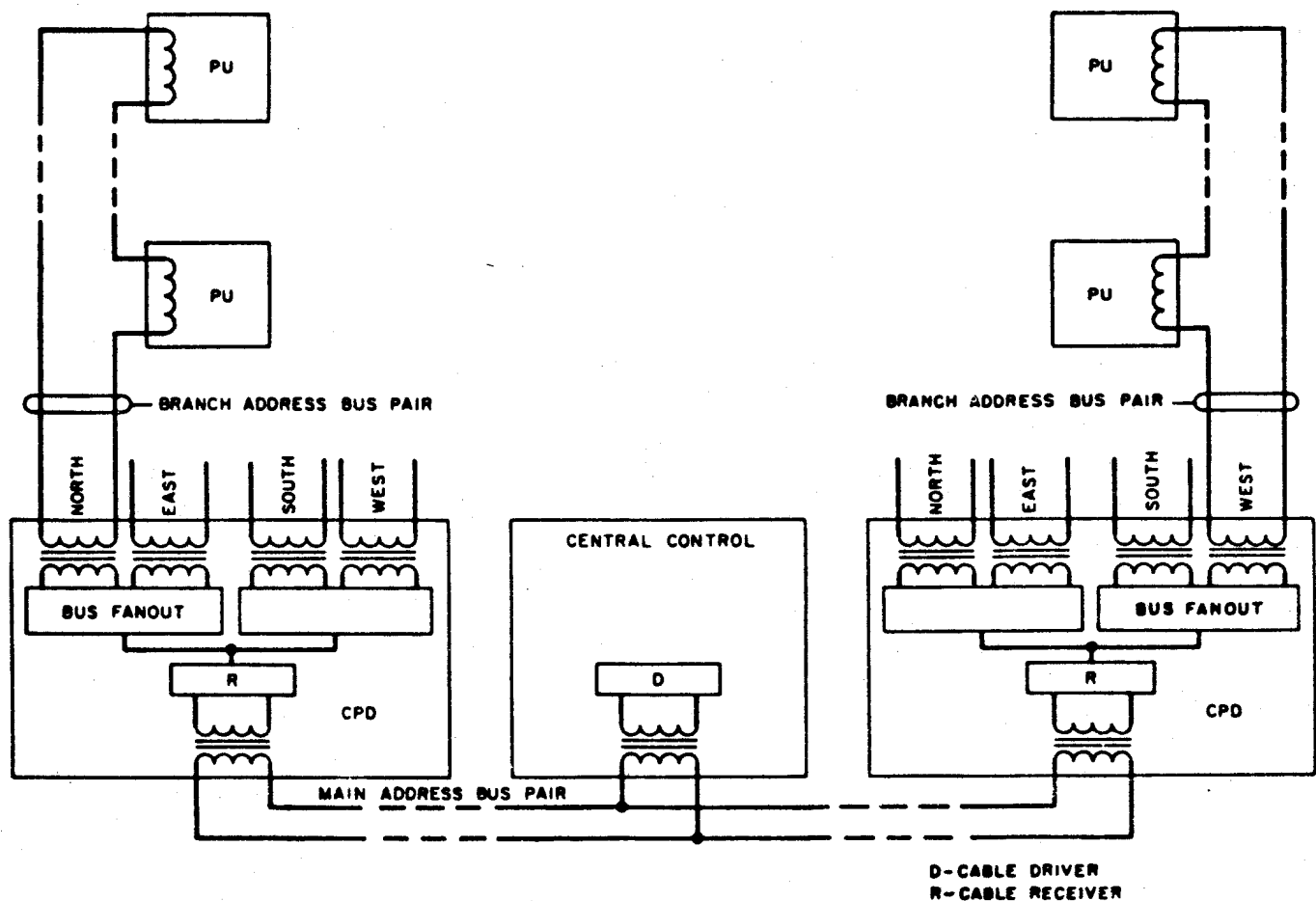
Simplified Peripheral Unit Bus System

**LEADS BETWEEN CENTRAL CONTROL AND
PERIPHERAL UNITS VIA CENTRAL PULSE DISTRIBUTOR**

Number of Leads		Function
To PU	From PU	
36		PU address
2	16	Control leads
	1	Scanner answer
	17	All-seems-well signal
38		

CENTRAL CONTROL - PERIPHERAL UNIT BUS SYSTEM . . .

- . Consists of two fully duplicated buses:
 - . Peripheral Unit Address Bus
 - . Scanner Answer Bus
- . Peripheral Unit Address Buses are fanned out at the central Pulse Distributors
 - . Delay limits establish this requirement.
 - . Up to four parallel buses can be provided.
- . Scanner Answer Buses fanned in at Central Pulse Distributors
 - . Considerations similar to those for fanout.



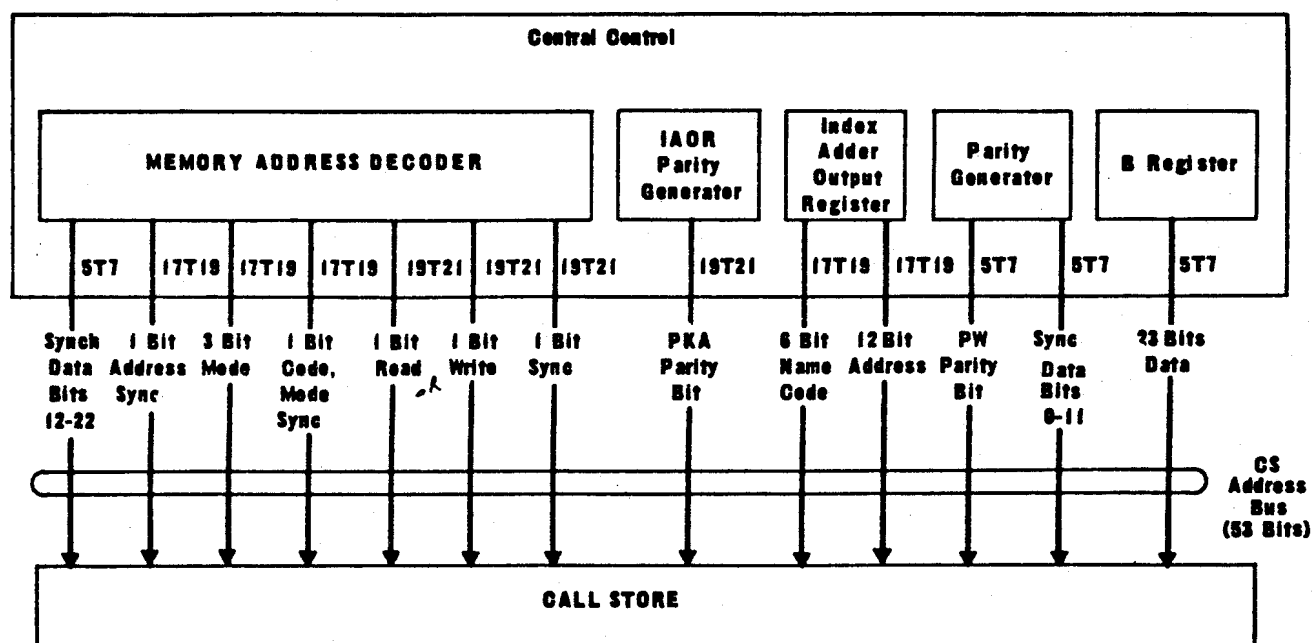
Basic Fan-Out Scheme

BUS LEADS BETWEEN CENTRAL CONTROL AND CALL STORES

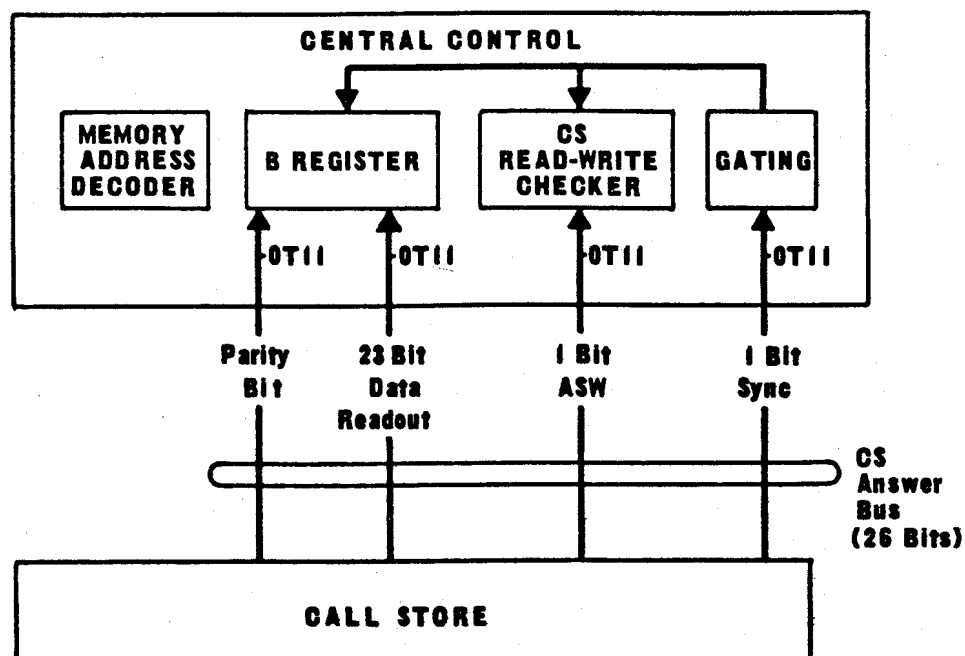
Number of Leads		Function
To CS	From CS	
1		Synchronizing signal for coded enable and mode
6		Name code (for enabling)
3		Mode of operation
1		Synchronizing signal for address
12		Address
1		Synchronizing signal for read, write, parity
1		Read command
1		Write command
1		Parity check over code and address (PK A BIT)
	1	Synchronizing signal for readout word
	24	Readout word (includes 1 Parity Bit)
	1	All-seems-well signal
1		Synchronizing signal for first 12 bits of write-in word
1		Synchronizing signal for other bits
24		Word to be written
53	26	

CENTRAL CONTROL - CALL STORE BUS SYSTEM . . .

Central control to call store . . .



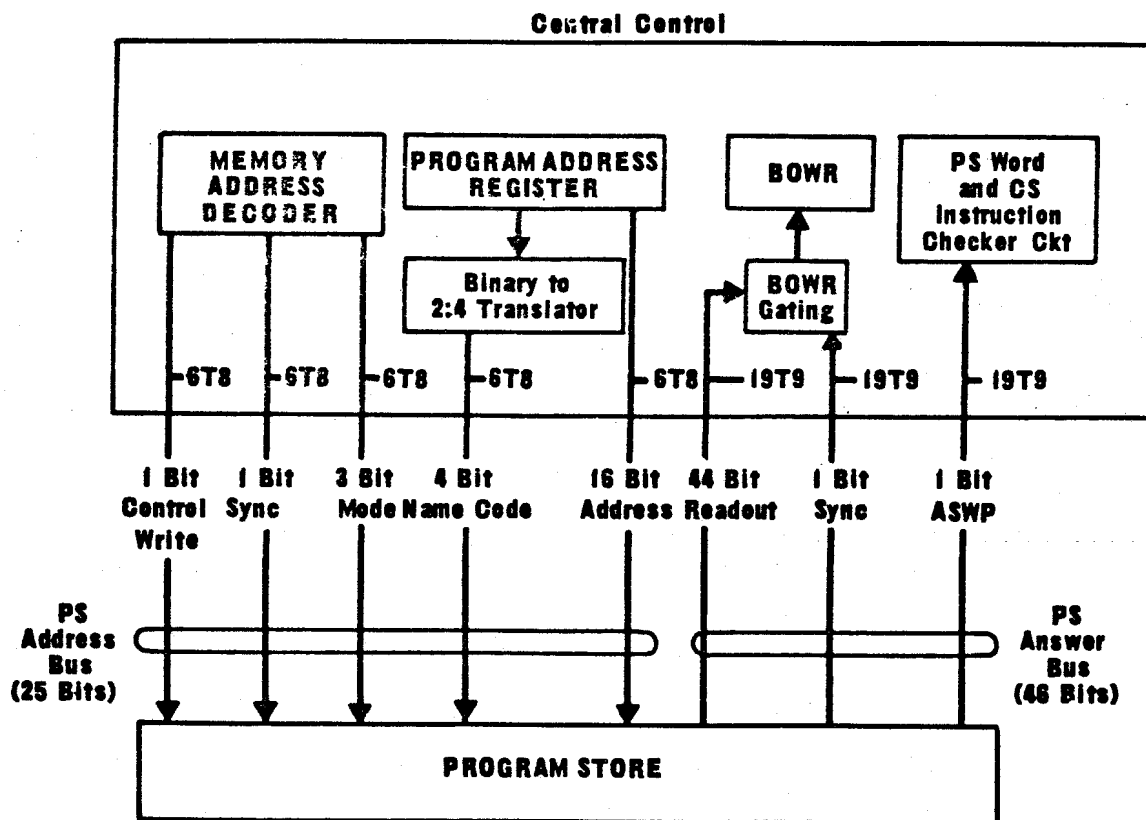
Call store to central control . . .



**BUS LEADS BETWEEN CENTRAL CONTROL AND
PROGRAM STORES**

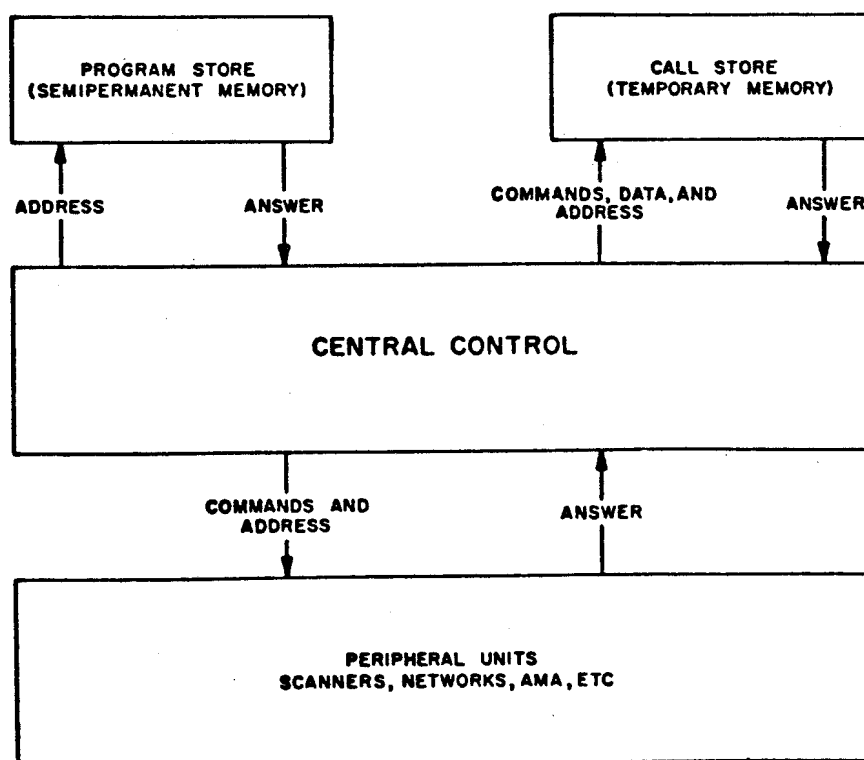
Number of Leads		Function
To PS	From PS	
1		Synchronizing signal for coded enable and mode
4		Name code (for enabling)
3		Mode of operation
1		Control write command
16		Address
	1	Synchronizing signal for readout word
	44	Readout word
	1	All-seems-well signal
25	46	

CENTRAL CONTROL - PROGRAM STORE BUS SYSTEM . . .

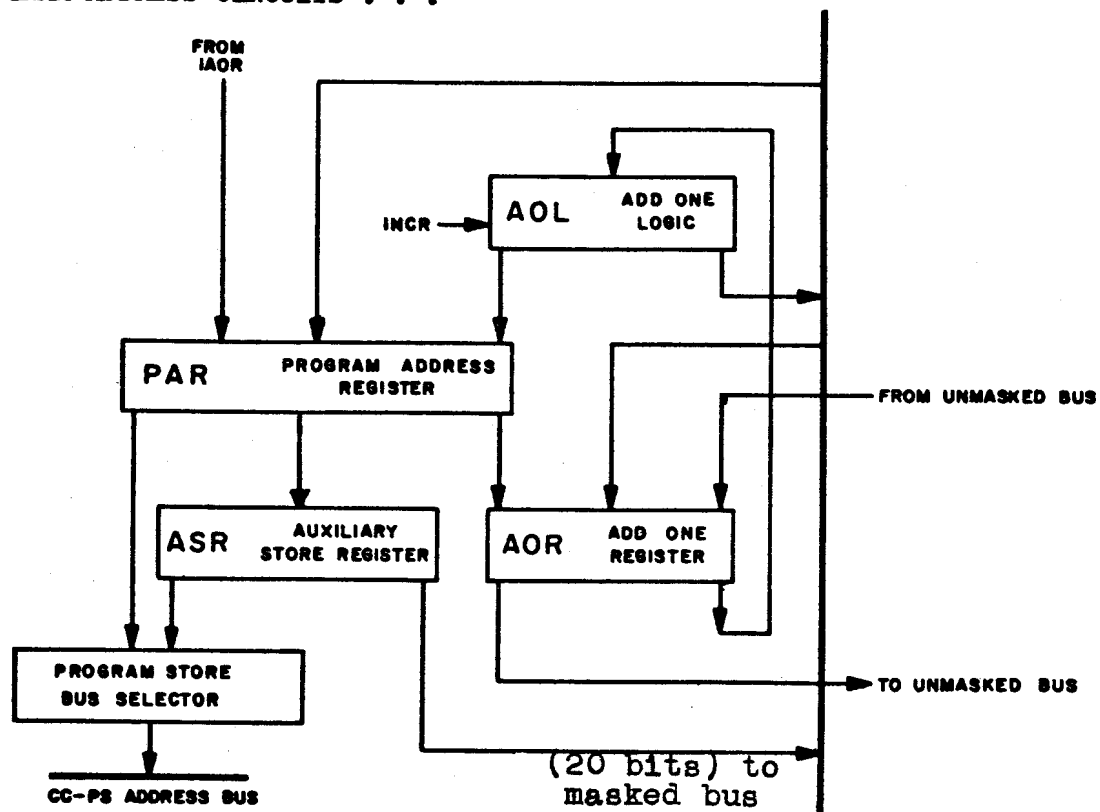


CENTRAL CONTROL (CC) . . .

- . Primary information processing unit
- . Addresses and commands originate from it
- . All answers return to it
- . Executes (one at a time) many different types of basic instructions
- . Requests instructions from program store every 5.5 M sec.



PROGRAM ADDRESS CIRCUITS . . .

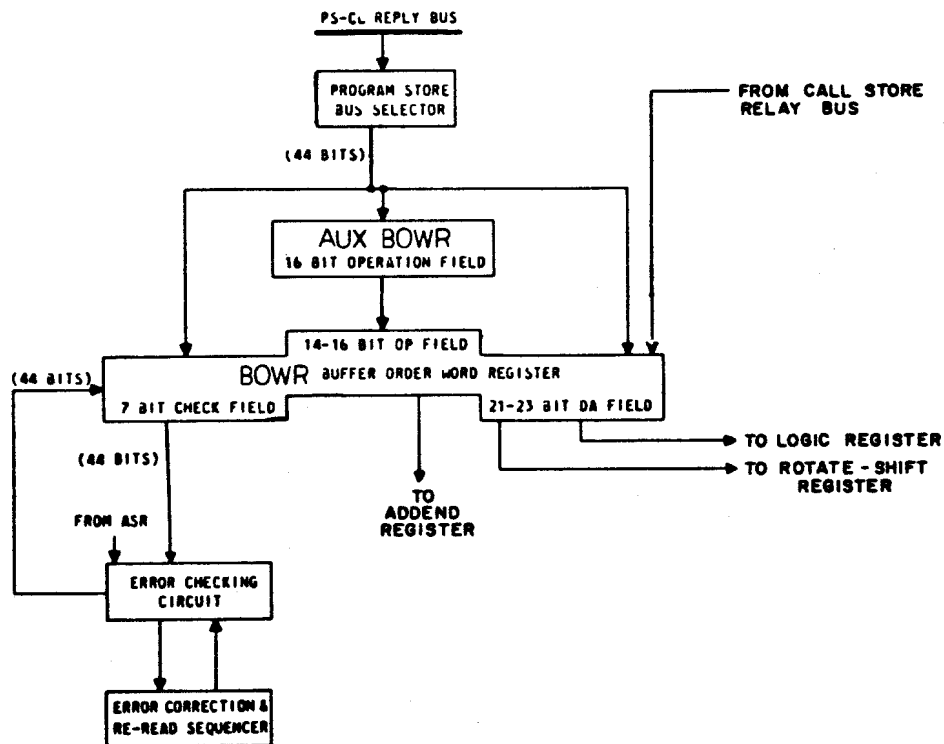
NOTES



PROGRAM ADDRESS CIRCUITS . . .

- . Program address register (PAR):
 - . Source of addresses for program store
 - . 20 Bit register
 - . Initial address for program store is placed in PAR by IAOR
 - . Normal addresses are then received from Add One Logic circuit
 - . On transfer orders the return address is stored in "J" register via AOR and unmasked bus
- . Add one register (AOR):
 - . Used when program store address is to be incremented by one (normal operation)
 - . Used to address call store programs via AOL, masked bus, and IAOR
 - . Used to increment by one, the contents of an index register
- . Add one logic (AOL):
 - . Provides the function of incrementing by one, any 23 bit number stored in AOR (See 3-58)
 - . Normally used to provide sequential addresses for program store
- . Auxiliary storage register (ASR):
 - . Stores the last address from PAR while PAR receives the next address
 - . Used for rereading
 - . 20 bit register

DATA INPUTS FROM PROGRAM STORE . . .

NOTES

 DATA INPUTS FROM PROGRAM STORE . . .

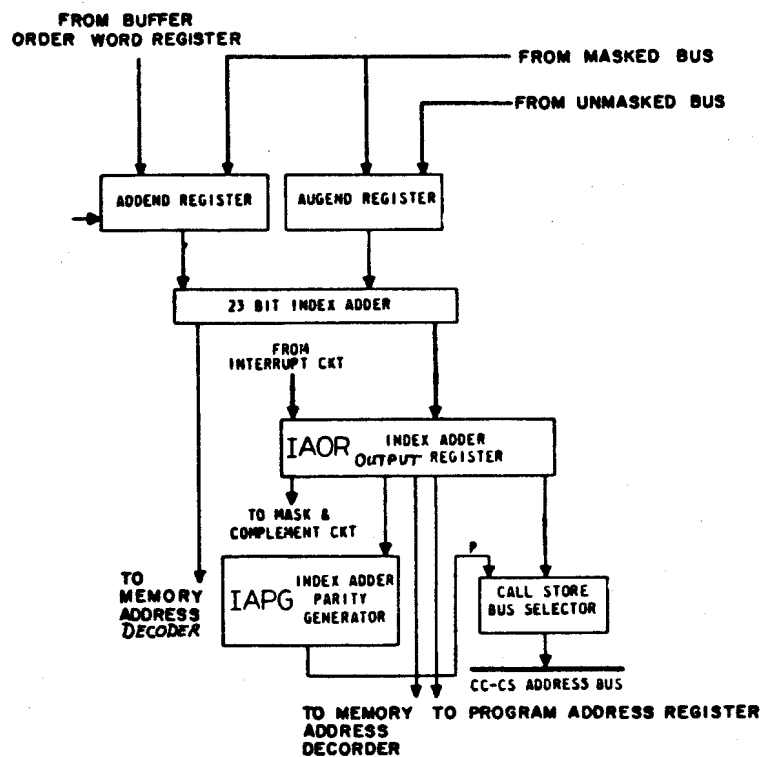
. Buffer order word register (BOWR):

- . Contains instructions, addresses or data which was received from program store
- . During the first cycle the BOWR controls indexing, transferring and memory addressing via the BOWD (See Instruction Decoders)
- . After indexing, the instruction portion of the work in BOWR is sent to OWR
- . BOWR is made available for the next work from program store

. Auxiliary BOWR (AUX BOWR):

- . Stores the operation field of a word from program store until BOWR completes indexing of previous instruction

INDEX ADDER SYSTEM . . .

NOTES

 INDEX ADDER SYSTEM . . .

Used to:

- . Modify data with the contents of a register
- . Modify address with the contents of a register
- . Add the contents of two registers

Index addend register (IADR):

- . Normally receives its input from BOWR
- . Receives its input from register specified in the Operation field when adding register to register

Index augend register (IAUR):

- . Receives input from register specified in RM field (index register)

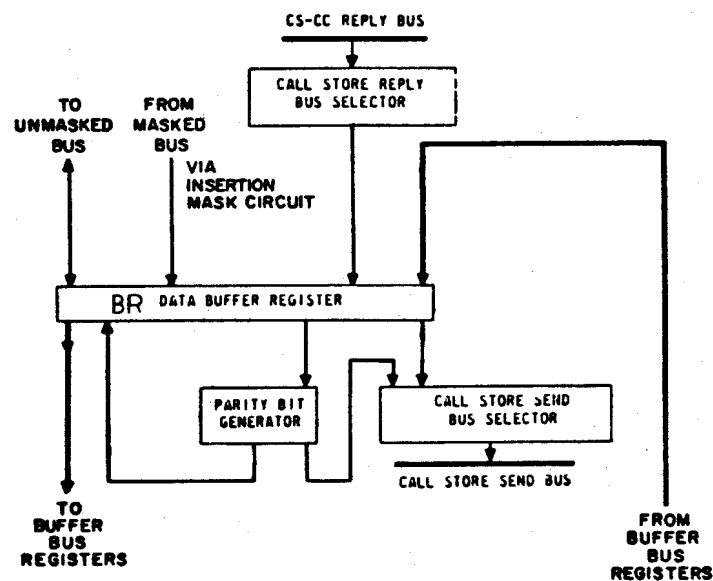
Index adder:

- . Adds contents of IADR and IAUR

Index adder output register (IAOR):

- . Stores the results of indexing
- . Word is called the DAR
- . Source of call store addresses
- . Source of program addresses on transfers

BUFFER REGISTER



REGISTERS . . .

CC has eight general purpose registers and a Buffer Bus group of registers.

The eight registers generally receive inputs from the masked bus and send outputs to the unmasked bus.

All but the Logic Register (of the eight) may be used for indexing.

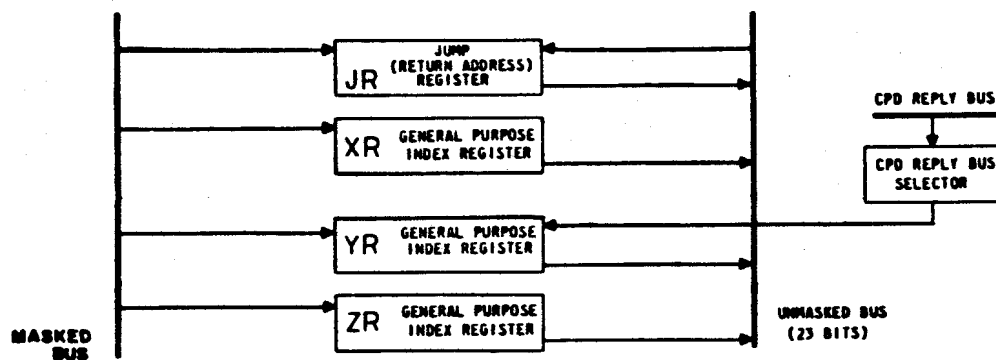
The eight registers are as follows:

← Buffer Register (BR)

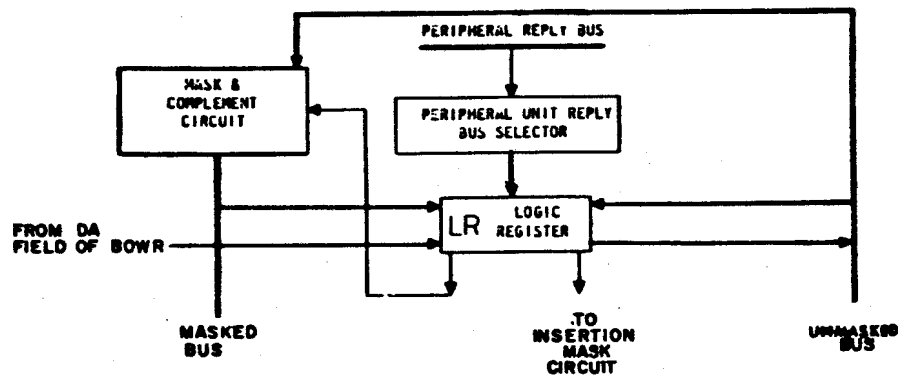
Receives inputs from and sends outputs to call store and the buffer bus system of registers.

REGISTERS . . .

JR, XR, YR, ZR REGISTER ...

NOTES

"L" REGISTER ...



 JUMP REGISTER (JR) . . .

- . Stores next sequential address on a transfer with "J" option instruction.

- . X Register . . .

- Has no special function

- . Y Register . . .

- 24 Bit register

- Receives 24 bit CPD verify answer

- . Z Register . . .

- Source of transfer address on combined instructions

- (Specifically TCGMX, TAULM and TAUMK)

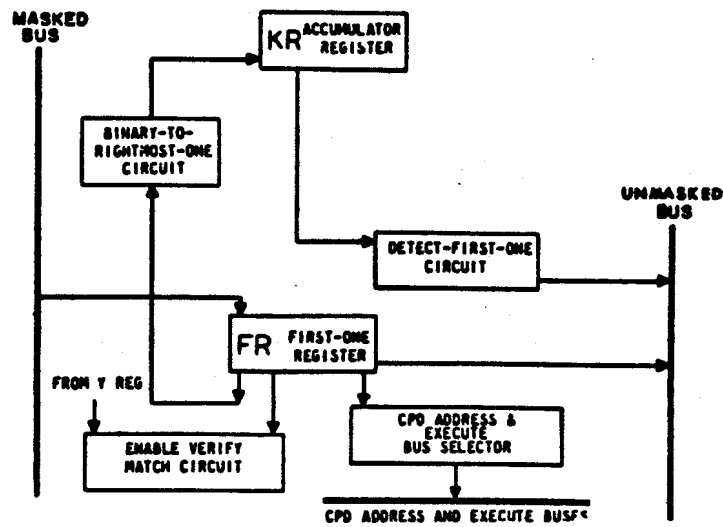
 LOGIC REGISTER (LR) . . .

- . Source of masking words

- . L00 to L15 store scanner results

REGISTERS . . .

FIRST ONE . . .



CPD POINT	FUNCTION OF ASSOCIATED FLIP/FLOP	BINARY ADDRESS IN F REGISTER																							
		GROUP			ROW			COLUMN			PAIR			CPD	HALF	MMI	DON'T CARE								
		22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
BL1R BL1S BL2R BL2S BL3R BL3S PBAR PBAS PBOR PBUS	ALLOWS ACTIVE CC TO ADDRESS CPD ALLOWS STANDBY CC TO ADDRESS CPD ALLOWS ACTIVE CC TO ADDRESS PU ALLOWS STANDBY CC TO ADDRESS PU SEE NOTE 313.A SEE NOTE 313.B PROGRAM STORE BUS 0 IS ACTIVE PROGRAM STORE BUS 1 IS ACTIVE ACTIVE CC SENDS ON ACTIVE PS BUS ACTIVE CC SENDS ON BOTH PS BUSES	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1									
PSTR PSTS CBAR CBAS CBOR CBOS CBTR CBTS AMR AUS	STANDBY PS BUS IS NOT IN TROUBLE STANDBY PS BUS IS MARKED IN TROUBLE CALL STORE BUS 0 IS ACTIVE CALL STORE BUS 1 IS ACTIVE ACTIVE CC SENDS ON ACTIVE CS BUS ACTIVE CC SENDS ON BOTH CS BUSES STANDBY CS BUS IS NOT IN TROUBLE STANDBY CS BUS IS MARKED IN TROUBLE CENTRAL CONTROL 0 IS ACTIVE CENTRAL CONTROL 1 IS ACTIVE				0	1	0	1	1	0															
TCCR TCCS BIR BIS VR VS BR BS CCO CWR CCO CWS	STANDBY CC IS NOT IN TROUBLE STANDBY CC IS MARKED IN TROUBLE ERROR SIGNALS ARE CROSS CONNECTED ERROR SIGNALS ARE NOT CROSS CONNECTED INHIBITS CC MATCHING ALLOWS MATCHING TO OCCUR IF SETUP NONE MATCHES BUFFER REGISTER AT 10T16 RECEIVE CONTROL WORDS FROM CS BUS 0 RECEIVE CONTROL WORDS FROM CS BUS 1							1	0	0						0									
CC1 CWR CC1 CWS CCO CWCW CCO CWCW CC1 CWCW CC1 CWCW CCO PSTR CCO PSTS CC1 PSTR CC1 PSTS	RECEIVE CONTROL WORDS FROM CS BUS 0 RECEIVE CONTROL WORDS FROM CS BUS 1 NONE ALLOWS CONTROL WRITING IF STOPPED NONE ALLOWS CONTROL WRITING IF STOPPED NONE SPECIAL PS TEST MODE IF STANDBY NONE SPECIAL PS TEST MODE IF STANDBY							0	1	0															
CCO INMAR CCO INMAS CC1 INMAR CC1 INMAS CCO REALTR CCO REALTS CC1 REALTR CC1 REALTS	NONE INHIBITS WRITING INTO BB REGISTERS NONE INHIBITS WRITING INTO BB REGISTERS NONE RESET EMERGENCY ACTION LONG TIMER NONE RESET EMERGENCY ACTION LONG TIMER	1	1	1	0	1	0	0	1	1	0	0	0	0	0	1	1								

← FIRST ONE REGISTER (FR):

Has many special uses as shown below:

F Reg. Bit

Function

FROO

Used in MCLF instruction

FROO-FRO4

Store location of rightmost one of word in K register

FRO7-FRO9

Used to select P.U. translator

FRO9

FRO8

FRO7

1

0

0

Trunk & Junctor
Sw. Bay

1

1

0

Signal Distributor

1

1

1

Scanner

FRO7-FRO9

Used to select peripheral unit binary address

0

0

0

Short Binary

0

0

1

Long Binary

FRO7-FRO9

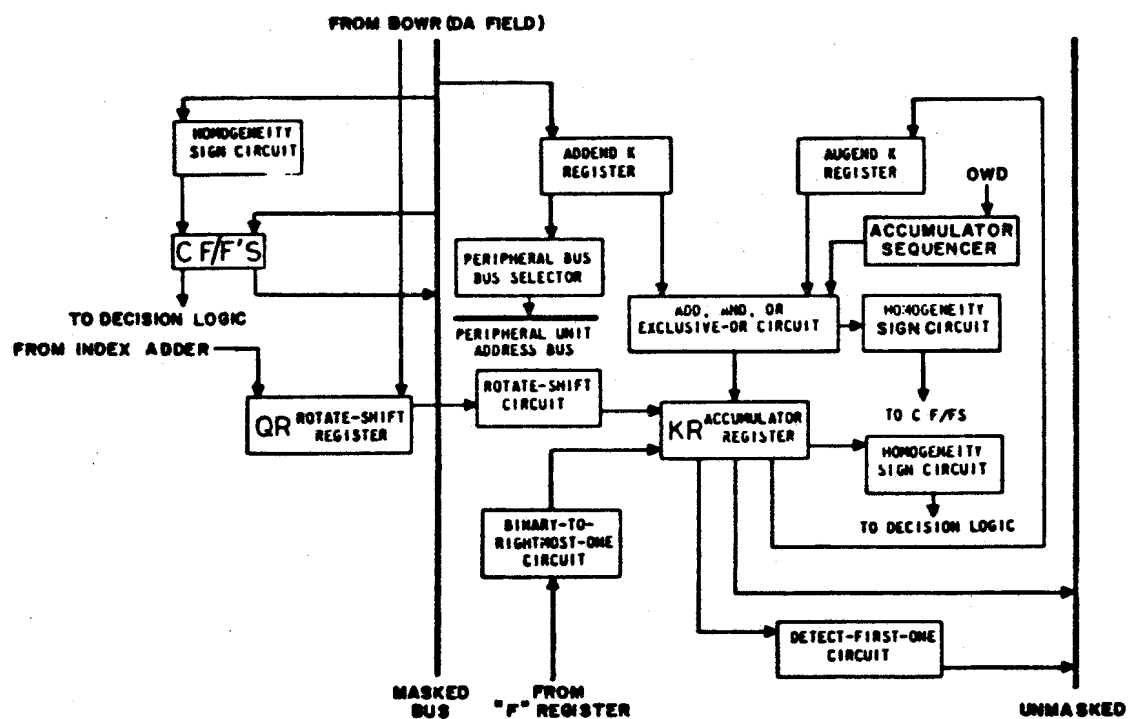
Select CPD long binary address (101)

← FRO7-FR22

Addresses CPD according to chart
(See CD 1A105 Page 93)

REGISTERS

ACCUMULATOR SYSTEM

NOTES

← ACCUMULATOR REGISTER (KR) AND ARITHMETIC SYSTEM . . .

- . Addend K Register (ADK)
 - . Input register in arithmetic system
 - . Output connected to arithmetic logic circuits
 - . Source of part of long Binary-To-CPD test addresses
 - . Used by translators to develop peripheral unit addresses
 - . 24th Bit of register (if used) is parity for long/short binary address translation
- . Augend K Register (AUK) . . .
 - . Input is from K register
 - . Holds word while arithmetic operations are being done
- . Accumulator Register (KR) . . .
 - . Output register for arithmetic system
 - . Contents may be shifted or rotated
 - . Used with ADKR to form long binary address for CPD
 - . Used with ADKR to form long binary address for PU
- . Q Register (QR) . . .
 - . Stores information to operate rotate shift functions
 - . Shifting Operation
 - The bits in the K register are shifted left or right
 - 0's are inserted in vacated end spaces
 - Bits shifted past left or right end of K register are lost

REGISTERS . . .

Rotate operation . . .

OP DA RM LCJ
Q 3

Rotate all bits in the K Register 3 places to the left

K Register (Initial)



K Register (After Rotate)



SHIFT OPERATION . . .

Shift operation . . . $\frac{OP}{N}$ $\frac{DA}{3}$ RM LCJ

Shift all bits in the K Register 3 places to the left.

K Register (Initial)



K Register (After Shift)

NOTES

0's inserted

REGISTERS . . .

. Q Register (Cont'd.)

. Rotating Operation

The bits in the K register are rotated left or right

Bits passing the left end of the K register are reinserted in the right end on a left rotate. Right rotate actions are similar.

- . The contents of the Q register determines the number of places the bits are shifted or rotated.
- . Rotate-Shift circuit controls rotating or shifting.

First One Detector . . .

- . Circuit detects first one in KR and stores its location in FR
- . The detected "one" may or may not be then set to a zero

Homogeneity Sign Circuit . . .

- . Checks if word KR is all "1's" or "0's"

C Flip-Flops . . .

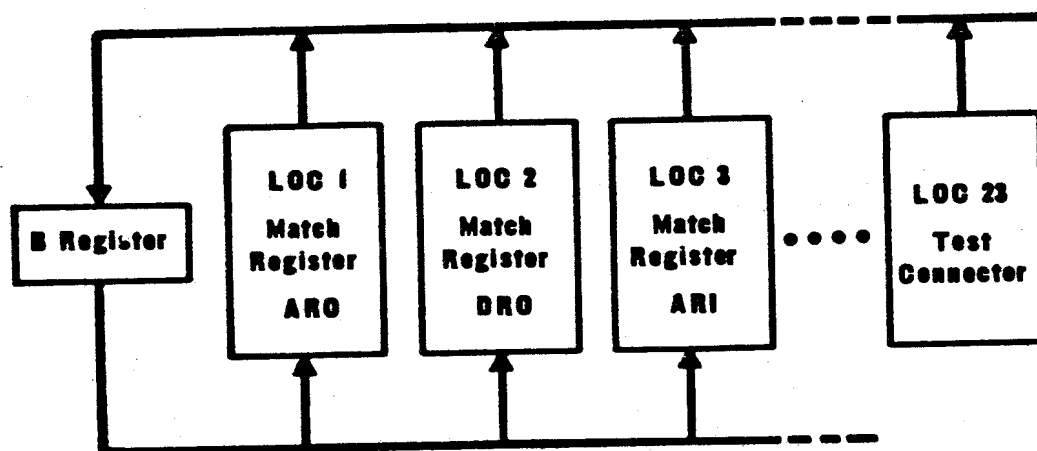
- . Connected to the masked bus and the ADD and KR circuit
- . The CH Flip-Flop is set if the word on the masked bus or in logic circuit contains all 0's or all 1's
- . Bit position 22 of a data word is called the sign bit
 - . Bit 22 = 1, negative word
 - . Bit 22 = 0, positive word
- . The CS Flip-Flop stores the sign bit of the word on the masked bus.

Accumulator Sequencer

- . Controls various arithmetic operations within the accumulator system

REGISTERS . . .

The Buffer Bus Registers . . .

NOTES

REGISTERS . . .

The Buffer Bus Registers . . .

General . . .

- . Consist of 23 groups of flip-flops. 2⁴ FF each Group.
- . Treated as though they were memory locations in the Call Store.
- . May be read by orders such as MX AA where AA is a Buffer Bus Register address.
- . Some may be written into by orders such as XM AA.
- . Access is provided through B Register.
- . Typical Functions
 - . Selection of PS, CS, and PU Buses
 - . Monitoring of PS and CS errors.
- . Symbolic address for a Buffer Bus Register as listed in the programs is "B8".

LAC 20 PEST CONTROL FLIP-FLOPS (PEST)
DMS - INHIBITS H-LEVEL INTERRUPT ON J-LEVEL
ZAP - INHIBITS S-HALLISSECOND INTERRUPTS
DECC - INHIBITS CC INTERRUPT SOURCE INTERRUPTS
ICSP - INHIBITS CS RESEAL FAILURE INTERRUPTS
ISPW - INHIBITS PS RESEAL FAILURE INTERRUPTS
ISMT - INHIBITS SIGNAL PROCESSOR A TROUBLE INTERRUPTS
ISMP - INHIBITS SIGNAL PROCESSOR B TROUBLE INTERRUPTS
ISPC - INHIBITS PERIPHERAL UNIT EXTERNAL ERROR INTERRUPTS
ISPE - INHIBITS PERIPHERAL UNIT INTERNAL ERROR INTERRUPTS
IMSI - INHIBITS ALL INTERRUPTS BELOW F LEVEL
ISPA - INHIBITS SIGNAL PROCESSOR A INTERRUPTS
ISPB - INHIBITS SIGNAL PROCESSOR B INTERRUPTS
ISPM - INHIBITS SIGNAL PROCESSOR C INTERRUPTS

LAC 21 INTERRUPT LEVEL ACTIVITY FLIP-FLOPS (LAMP)
LAA - INTERRUPT LEVEL A
LAB - INTERRUPT LEVEL B
LAC - INTERRUPT LEVEL C
LAD - INTERRUPT LEVEL D
LAE - INTERRUPT LEVEL E
LAF - INTERRUPT LEVEL F
LAG - INTERRUPT LEVEL G
LAH - INTERRUPT LEVEL H
LAJ - INTERRUPT LEVEL J
LAK - INTERRUPT LEVEL K
LAM - SET WHEN INTERRUPT OCCURS

CSPS - CS ENDS OCCURRED DURING WRITE OPERATION

LAC 22 MASTER CONTROL CENTER FLIP-FLOPS (MCCF)
MCMO - MCC KEY A
MCMB - MCC KEY B
MCMD - MCC KEY C
MCME - MCC KEY D
MCMF - MCC KEY E
MCMG - MCC KEY F
MCMH - ASSOCIATED WITH INTERRUPT ON TEST MAGN
MCMI - ASSOCIATED WITH TEST CONNECTION FOR EXTERNAL USE
MCMJ - MCC OVERIDE OF CC CONTROL FLIP-FLOPS
MCMK - MCC OVERIDE OF PS BUS CONTROL FLIP-FLOPS
MCMN - MCC OVERIDE OF MCF FLIP-FLOPS

[illegible]

L B C	REGISTER ADDRESS	DB	FLIP-FLOP GROUP NAME	F. S.	BUFFER BUS POSITIONS																												TEST CONN
					23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0					
1	2048-9 4000-1	ARO	EXTERNAL MATCH REG-0	83	ARO-23 RMC %	ARO-22 RMC	ARO-21 RMC	ARO-20 RMC	ARO-19 RMC	ARO-18 RMC	ARO-17 RMC	ARO-16 RMC	ARO-15 RMC	ARO-14 RMC	ARO-13 RMC	ARO-12 RMC	ARO-11 RMC	ARO-10 RMC	ARO-9 RMC	ARO-8 RMC	ARO-7 RMC	ARO-6 RMC	ARO-5 RMC	ARO-4 RMC	ARO-3 RMC	ARO-2 RMC	ARO-1 RMC	ARO-0 RMC	226- 10				
2	2050-1 4002-3	DRO	INTERNAL MATCH REG-0	83	DRO-23 RMC %	DRO-22 RMC	DRO-21 RMC	DRO-20 RMC	DRO-19 RMC	DRO-18 RMC	DRO-17 RMC	DRO-16 RMC	DRO-15 RMC	DRO-14 RMC	DRO-13 RMC	DRO-12 RMC	DRO-11 RMC	DRO-10 RMC	DRO-9 RMC	DRO-8 RMC	DRO-7 RMC	DRO-6 RMC	DRO-5 RMC	DRO-4 RMC	DRO-3 RMC	DRO-2 RMC	DRO-1 RMC	DRO-0 RMC	226- 25				
3	2052-3 4004-5	ARI	EXTERNAL MATCH REG-1	84	ARI-23 RMC %	ARI-22 RMC	ARI-21 RMC	ARI-20 RMC	ARI-19 RMC	ARI-18 RMC	ARI-17 RMC	ARI-16 RMC	ARI-15 RMC	ARI-14 RMC	ARI-13 RMC	ARI-12 RMC	ARI-11 RMC	ARI-10 RMC	ARI-9 RMC	ARI-8 RMC	ARI-7 RMC	ARI-6 RMC	ARI-5 RMC	ARI-4 RMC	ARI-3 RMC	ARI-2 RMC	ARI-1 RMC	ARI-0 RMC	224- 35				
4	2054-5 4006-7	ORI	INTERNAL MATCH REG-1	84	ORI-23 RMC %	ORI-22 RMC	ORI-21 RMC	ORI-20 RMC	ORI-19 RMC	ORI-18 RMC	ORI-17 RMC	ORI-16 RMC	ORI-15 RMC	ORI-14 RMC	ORI-13 RMC	ORI-12 RMC	ORI-11 RMC	ORI-10 RMC	ORI-9 RMC	ORI-8 RMC	ORI-7 RMC	ORI-6 RMC	ORI-5 RMC	ORI-4 RMC	ORI-3 RMC	ORI-2 RMC	ORI-1 RMC	ORI-0 RMC	228- 35				
5	2056-7 4010-1	MACR*	MATCH CONTROL REG	85			EETO RMC	RTOC W	SHTO RMC	PCTO RMC	ISTO RMC	ITOI RMC	TOCR-5 RMC	TOCR-4 RMC	TOCR-3 RMC	TOCR-2 RMC	TOCR-1 RMC	TOCR-0 RMC	T1-1 RMC	T1-0 RMC	T0-1 RMC	T0-0 RMC	P1-2 RMC	P1-1 RMC	P1-0 RMC	PO-2 RMC	PO-1 RMC	PO-0 RMC	228- 43				
6	2058-9 4012-3	MOCR	MATCH MODE CONTROL REG	85													F RMC	E RMC	HM RMC	I RMC	IC RMC	TR RMC	PB RMC	CB RMC	TD RMC	MS RMC	Y RMC	X RMC	314-				
7	2060-1 4014-5	MACF	MATCH CYCLE CONTROL FLIP-FLOPS	95		MHP RMC	MHC RMC		MC-1 RMC	MC-0 RMC	EC RMC	RE RMC	WR RMC	PU RMC	M1 R	M0 R													324- 05				
8	2062-3 4016-7	CSTF	PCPD CONTROLLED STATUS FLIP-FLOPS	75							OL3 R	INMA R	PST R	B-TS R	V-BIT R	DI R	OL2 R	OL1 R	CWC R	CW R	COT R	CBA R	CBO R	PBT R	PBA R	PBO R	ICC R	AU R	314- 37				
9	2064-5 4020-1	PBCF	PERIPHERAL BUS CONTROL FLIP-FLOPS	80		SC00 R	SCBA R	CPDB R	CDMB R	CDMA R	PBMB R	PBMA R	FINH R	SR R															318- 36				
10	2066-7 4022-3	PUMS	PERIPHERAL UNIT MAINT SUMMARY	78		ASWS R	Y23 R	PCC R	PCB R	PCA R	MCE R	ASWCPD R	EXBR-7 R	EXBR-6 R	EXBR-5 R	EXBR-4 R	EXBR-3 R	EXBR-2 R	EXBR-1 R	EXBR-0 R	EXAR-7 R	EXAR-6 R	EXAR-5 R	EXAR-4 R	EXAR-3 R	EXAR-2 R	EXAR-1 R	EXAR-0 R	232- 41				
11	2068-9 4024-5	SESA	STORE ERROR SUMMARY-A	78															X23 R	PFC R	ASWC-1 R	ASWC-0 R	PF R	DBE R	ADE R	ASWPF-1 R	ASWPF-0 R	324- 35					
12	2070-1 4026-7	SECF	STORE ERROR COUNTER FLIP-FLOPS	78		CEOV R	CSEC-4 R	CSEC-3 R	CSEC-2 R	CSEC-1 R	CSEC-0 R	2EOV R	PS2EC-4 R	PS2EC-3 R	PS2EC-2 R	PS2EC-1 R	PS2EC-0 R	1EOV R	PS1EC-4 R	PS1EC-3 R	PS1EC-2 R	PS1EC-1 R	PS1EC-0 R		RCSEC R	RPS2EC R	RPS1EC R	318- 42					
13	2072-3 4030-1	MSCF	MSEC CLOCK STATE FLIP-FLOPS	89												CL12 R	CL11 R	CL10 R	CL09 R	CL08 													

REGISTER MACR IS ACTUALLY SPLIT INTO TWO REGISTERS FOR WRITING ACCESS.
ADDRESS 2056 GATES BITS 0-9 OF BR INTO BITS 0-9 OF MACR
ADDRESS 2057 GATES BITS 10-21 OF BR INTO BITS 10-21 OF MACR
EMMS ORDER GATES BITS 0-21 OF BR INTO 0-21 OF MACR
READING WITH EITHER ADDRESS 2056 OR 2057 GATES ALL 22 BITS FROM MACR TO BR.

FF NAME	SD CLS	SDT CLS	DESCRIPTION
SPHSTP01	10		SETS P/P STOPS IN THE STOPS C.C. ONCE STARTING C.C. NO ACCEPT IN GOOD ALL P.L.S. MEMBERS TERMINATION OF STOPS.
SPHSTP02			IF SET - TECH WAS TROUBLE (SEE NOTE 302)
SPHSTP03	11		SETS P/P HALL. HALL (202) TO INTERMPT LOCALIZATION (P.L.S.) MEMBERS ACCESS FOR ALL LEVELS EXCEPT 1 WHICH IS A (C.C.) PROGRAM ADDRESS AND IS MODIFIED TO A P.L.S. ADDRESS BY ADDRESS (770000) TO IT. (USED WHEN TESTING THE INTERMPT SYSTEM)
SPHSTP04	5		S.P. 0 COMMUNITY INTERMPT LEVEL 1 (SEE NOTE 1)
SPHSTP05	2		S.P. 0 COMMUNITY INTERMPT WORK (NOT AN INTERMPT SOURCE) (SEE NOTE 302)
SPHSTP06	7		S.P. 0 COMMUNITY TRUNKLE INTERMPT LEVEL 1 (SEE NOTE 302)
SPHSTP07	5		S.P. 0 COMMUNITY INTERMPT LEVEL 1 (SEE NOTE 302)
SPHSTP08			S.P. 0 COMMUNITY INTERMPT WORK (NOT AN INTERMPT SOURCE) (SEE NOTE 302)
SPHSTP09	0		S.P. 0 COMMUNITY TRUNKLE INTERMPT LEVEL 1 (SEE NOTE 302)
SPHSTP10	16		0 SCANNER AUGER NOT EXPECTED. 1 SCANNER AUGER EXPECTED. PERFORMING AUGER ALING EXECUTED. CONTROLLED BY END
STPH001	0		SETS P/P STOPS WHICH STOPS DATA PROCESSING IN A COMMUNITY SP'S.
STPH002	2		SETS P/P STOPS WHICH STOPS DATA PROCESSING IN 0 COMMUNITY SP'S.
STPH003	1		SETS P/P STOPS WHICH STARTS DATA PROCESSING IN A COMMUNITY SP'S.
STPH004	3		SETS P/P STOPS WHICH STARTS DATA PROCESSING IN 0 COMMUNITY SP'S.
STPH005	6		SETS 5 MILLISECOND CLOCK IN STOPS C.C. (LINKED TO OTHER C.C.) ALSO SETS HALL INTERMPT SOURCES.

PT	MODE	IN	OUT	DESCRIPTION
PS1EC-0	THRU	20	20	CALL STATE COUNTER, INCREMENT (INPUT FROM CALL STATE DEKAD SEQUENCER) (SEE NOTE 30A)
PS1EC-1	THRU	21	21	
PS1EC-2	THRU	22	22	
PS1EC-3	THRU	23	23	
PS1EC-4	THRU	24	24	
PS1EC-5	THRU	25	25	
PS1EC-6	THRU	26	26	
PS1EC-7	THRU	27	27	
PS1EC-8	THRU	28	28	
PS1EC-9	THRU	29	29	
PS1EC-10	THRU	30	30	
PS1EC-11	THRU	31	31	
PS1EC-12	THRU	32	32	
PS1EC-13	THRU	33	33	
PS1EC-14	THRU	34	34	
PS1EC-15	THRU	35	35	
PS1EC-16	THRU	36	36	
PS1EC-17	THRU	37	37	
PS1EC-18	THRU	38	38	
PS1EC-19	THRU	39	39	
PS1EC-20	THRU	40	40	
PS1EC-21	THRU	41	41	
PS1EC-22	THRU	42	42	
PS1EC-23	THRU	43	43	
PS1EC-24	THRU	44	44	
PS1EC-25	THRU	45	45	
PS1EC-26	THRU	46	46	
PS1EC-27	THRU	47	47	
PS1EC-28	THRU	48	48	
PS1EC-29	THRU	49	49	
PS1EC-30	THRU	50	50	
PS1EC-31	THRU	51	51	
PS1EC-32	THRU	52	52	
PS1EC-33	THRU	53	53	
PS1EC-34	THRU	54	54	
PS1EC-35	THRU	55	55	
PS1EC-36	THRU	56	56	
PS1EC-37	THRU	57	57	
PS1EC-38	THRU	58	58	
PS1EC-39	THRU	59	59	
PS1EC-40	THRU	60	60	
PS1EC-41	THRU	61	61	
PS1EC-42	THRU	62	62	
PS1EC-43	THRU	63	63	
PS1EC-44	THRU	64	64	
PS1EC-45	THRU	65	65	
PS1EC-46	THRU	66	66	
PS1EC-47	THRU	67	67	
PS1EC-48	THRU	68	68	
PS1EC-49	THRU	69	69	
PS1EC-50	THRU	70	70	
PS1EC-51	THRU	71	71	
PS1EC-52	THRU	72	72	
PS1EC-53	THRU	73	73	
PS1EC-54	THRU	74	74	
PS1EC-55	THRU	75	75	
PS1EC-56	THRU	76	76	
PS1EC-57	THRU	77	77	
PS1EC-58	THRU	78	78	
PS1EC-59	THRU	79	79	
PS1EC-60	THRU	80	80	
PS1EC-61	THRU	81	81	
PS1EC-62	THRU	82	82	
PS1EC-63	THRU	83	83	
PS1EC-64	THRU	84	84	
PS1EC-65	THRU	85	85	
PS1EC-66	THRU	86	86	
PS1EC-67	THRU	87	87	
PS1EC-68	THRU	88	88	
PS1EC-69	THRU	89	89	
PS1EC-70	THRU	90	90	
PS1EC-71	THRU	91	91	
PS1EC-72	THRU	92	92	
PS1EC-73	THRU	93	93	
PS1EC-74	THRU	94	94	
PS1EC-75	THRU	95	95	
PS1EC-76	THRU	96	96	
PS1EC-77	THRU	97	97	
PS1EC-78	THRU	98	98	
PS1EC-79	THRU	99	99	
PS1EC-80	THRU	100	100	
PS1EC-81	THRU	101	101	
PS1EC-82	THRU	102	102	
PS1EC-83	THRU	103	103	
PS1EC-84	THRU	104	104	
PS1EC-85	THRU	105	105	
PS1EC-86	THRU	106	106	
PS1EC-87	THRU	107	107	
PS1EC-88	THRU	108	108	
PS1EC-89	THRU	109	109	
PS1EC-90	THRU	110	110	
PS1EC-91	THRU	111	111	
PS1EC-92	THRU	112	112	
PS1EC-93	THRU	113	113	
PS1EC-94	THRU	114	114	
PS1EC-95	THRU	115	115	
PS1EC-96	THRU	116	116	
PS1EC-97	THRU	117	117	
PS1EC-98	THRU	118	118	
PS1EC-99	THRU	119	119	
PS1EC-100	THRU	120	120	
PS1EC-101	THRU	121	121	
PS1EC-102	THRU	122	122	
PS1EC-103	THRU	123	123	
PS1EC-104	THRU	124	124	
PS1EC-105	THRU	125	125	
PS1EC-106	THRU	126	126	
PS1EC-107	THRU	127	127	
PS1EC-108	THRU	128	128	
PS1EC-109	THRU	129	129	
PS1EC-110	THRU	130	130	
PS1EC-111	THRU	131	131	
PS1EC-112	THRU	132	132	
PS1EC-113	THRU	133	133	
PS1EC-114	THRU	134	134	
PS1EC-115	THRU	135	135	
PS1EC-116	THRU	136	136	
PS1EC-117	THRU	137	137	
PS1EC-118	THRU	138	138	
PS1EC-119	THRU	139	139	
PS1EC-120	THRU	140	140	
PS1EC-121	THRU	141	141	
PS1EC-122	THRU	142	142	
PS1EC-123	THRU	143	143	
PS1EC-124	THRU	144	144	
PS1EC-125	THRU	145	145	
PS1EC-126	THRU	146	146	
PS1EC-127	THRU	147	147	
PS1EC-128	THRU	148	148	
PS1EC-129	THRU	149	149	
PS1EC-130	THRU	150	150	
PS1EC-131	THRU	151	151	
PS1EC-132	THRU	152	152	
PS1EC-133	THRU	153	153	
PS1EC-134	THRU	154	154	
PS1EC-135	THRU	155	155	
PS1EC-136	THRU	156	156	
PS1EC-137	THRU	157	157	
PS1EC-138	THRU	158	158	
PS1EC-139	THRU	159	159	
PS1EC-140	THRU	160	160	
PS1EC-141	THRU	161	161	
PS1EC-142	THRU	162	162	
PS1EC-143	THRU	163	163	
PS1EC-144	THRU	164	164	
PS1EC-145	THRU	165	165	
PS1EC-146	THRU	166	166	
PS1EC-147	THRU	167	167	
PS1EC-148	THRU	168	168	
PS1EC-149	THRU	169	169	
PS1EC-150	THRU	170	170	
PS1EC-151	THRU	171	171	
PS1EC-152	THRU	172	172	
PS1EC-153	THRU	173	173	
PS1EC-154	THRU	174	174	
PS1EC-155	THRU	175	175	
PS1EC-156	THRU	176	176	
PS1EC-157	THRU	177	177	
PS1EC-158	THRU	178	178	
PS1EC-159	THRU	179	179	
PS1EC-160	THRU	180	180	
PS1EC-161	THRU	181	181	
PS1EC-162	THRU	182	182	
PS1EC-163	THRU	183	183	
PS1EC-164	THRU	184	184	
PS1EC-165	THRU	185	185	
PS1EC-166	THRU	186	186	
PS1EC-167	THRU	187	187	
PS1EC-168	THRU	188	188	
PS1EC-169	THRU	189	189	
PS1EC-170	THRU	190	190	
PS1EC-171	THRU	191	191	
PS1EC-172	THRU	192	192	
PS1EC-173	THRU	193	193	
PS1EC-174	THRU	194	194	
PS1EC-175	THRU	195	195	
PS1EC-176	THRU	196	196	
PS1EC-177	THRU	197	197	
PS1EC-178	THRU	198	198	
PS1EC-179	THRU	199	199	
PS1EC-180	THRU	200	200	
PS1EC-181	THRU	201	201	
PS1EC-182	THRU	202	202	
PS1EC-183	THRU	203	203	
PS1EC-184	THRU	204	204	
PS1EC-185	THRU	205	205	
PS1EC-186	THRU	206	206	
PS1EC-187	THRU	207	207	
PS1EC-188	THRU	208	208	
PS1EC-189	THRU	209	209	
PS1EC-190	THRU	210	210	
PS1EC-191	THRU	211	211	
PS1EC-192	THRU	212	212	
PS1EC-193	THRU	213	213	
PS1EC-194	THRU	214	214	
PS1EC-195	THRU	215	215	
PS1EC-196	THRU	216	216	
PS1EC-197	THRU	217	217	
PS1EC-198	THRU	218	218	
PS1EC-199	THRU	219	219	
PS1EC-200	THRU	220	220	
PS1EC-201	THRU	221	221	
PS1EC-202	THRU	222	222	
PS1EC-203	THRU	223	223	
PS1EC-204	THRU	224	224	
PS1EC-205	THRU	225	225	
PS1EC-206	THRU	226	226	
PS1EC-207	THRU	227	227	
PS1EC-208	THRU	228	228	
PS1EC-209	THRU	229	229	
PS1EC-210	THRU	230	230	
PS1EC-211	THRU	231	231	
PS1EC-212	THRU	232	232	
PS1EC-213	THRU	233	233	
PS1EC-214	THRU	234	234	
PS1EC-215	THRU	235	235	
PS1EC-216	THRU	236	236	
PS1EC-217	THRU	237	237	
PS1EC-218	THRU	238	238	
PS1EC-219	THRU	239	239	
PS1EC-220	THRU	240	240	
PS1EC-221	THRU	241	241	
PS1EC-222	THRU	242	242	
PS1EC-223	THRU	243	243	
PS1EC-224	THRU	244	244	
PS1EC-225	THRU	245	245	
PS1EC-226	THRU	246	246	
PS1EC-227	THRU	247	247	
PS1EC-228	THRU	248	248	
PS1EC-229	THRU	249	249	
PS1EC-230	THRU	250	250	
PS1EC-231	THRU	251	251	
PS1EC-232	THRU	252	252	
PS1EC-233	THRU	253	253	
PS1EC-234	THRU	254	254	
PS1EC-235	THRU	255	255	
PS1EC-236	THRU	256	256	
PS1EC-237	THRU	257	257	
PS1EC-238	THRU	258	258	
PS1EC-239	THRU	259	259	
PS1EC-240	THRU	260	260	
PS1EC-241	THRU	261	261	
PS1EC-242	THRU	262	262	
PS1EC-243	THRU	263	263	
PS1EC-244	THRU	264	264	
PS1EC-245	THRU	265	265	
PS1EC-246	THRU	266	266	
PS1EC-247	THRU	267	267	
PS1EC-248	THRU	268	268	
PS1EC-249	THRU	269	269	
PS1EC-250	THRU	270	270	
PS1EC-251	THRU	271	271	
PS1EC-252	THRU	272	272	
PS1EC-253	THRU	273	273	
PS1EC-254	THRU	274	274	
PS1EC-255	THRU	275	275	
PS1EC-256	THRU	276	276	
PS1EC-257	THRU	277	277	
PS1EC-258	THRU	278	278	
PS1EC-259	THRU	279	279	
PS1EC-260	THRU	280	280	
PS1EC-261	THRU	281	281	
PS1EC-262	THRU	282	282	
PS1EC-263	THRU	283	283	
PS1EC-264	THRU	284	284	
PS1EC-265	THRU	285	285	
PS1EC-266	THRU	286	286	
PS1EC-267	THRU	287	287	
PS1EC-268	THRU	288	288	
PS1EC-269	THRU	289	289	
PS1EC-270	THRU	290	290	
PS1EC-271	THRU	291	291	
PS1EC-272	THRU	292	292	
PS1EC-273	THRU	293	293	
PS1EC-274	THRU	294	294	
PS1EC-275	THRU	295	295	
PS1EC-276	THRU	296	296	
PS1EC-277	THRU	297	297	
PS1EC-278	THRU	298	298	
PS1EC-279	THRU	299	299	
PS1EC-280	THRU	300	300	
PS1EC-281	THRU	301	301	
PS1EC-282	THRU	302	302	
PS1EC-283	THRU	303	303	
PS1EC-284	THRU	304	304	
PS1EC-285	THRU	305	305	
PS1EC-286	THRU	306	306	
PS1EC-287	THRU	307	307	
PS1EC-288	THRU	308	308	
PS1EC-289	THRU	309	309	
PS1EC-290	THRU	310	310	
PS1EC-291	THRU	311	311	
PS1EC-292	THRU	312	312	

TP NAME	TS NO	EXT PROB	DESCRIPTION
00	0000	2	• 0 BITMATCH SAMPLING ON SHAPPOINT MODE IS NOT REQUESTED. • 1 INITIATES ALL MATCH GATING UNLESS A ONE-CYCLE SHAPPOINT MODE SAMPLING MATCH IS TAKING PLACE.
00	0001	12	• 1 BITMATCH 0 HAS BITMATCHED
01	0001	13	• 1 BITMATCH 1 HAS BITMATCHED
00.1	0100	10	• 0 ACTIVE CC CAN SEND CHANNEL ADDRESS. • 1 STANDBY CC CAN SEND CHANNEL ADDRESS. EXTERNAL RESET INPUT IS HIGH BIT OF 7-POSITIONS REGISTER.
00.2	0101	11	• 0 ACTIVE CC CAN SEND PERIPHERAL ADDRESS. • 1 STANDBY CC CAN SEND PERIPHERAL ADDRESS. EXTERNAL RESET INPUT IS HIGH BIT OF 7-POSITIONS REGISTER.
00.3	0101	17	• 0 ACTIVE CC SENDS ADDRESS ON BOTH CHANNELS. CC'S RECEIVE ADDRESS AND SPECIFIED BY THE CHANNELS. CHANNELS ARE CONTROLLED BY MAINTENANCE INSTRUCTIONS. • 1 THIS SELECTION FOR MAINTENANCE AND CC INSTRUCTIONS IS MAINTAINED THE SAME AS FOR NORMAL INSTRUCTIONS.
00	0101	5	• 1 PMA IS TO BE MATCHED IN A SINGLE POINT MODE. (SEE NOTE 3020)
00A	0101	3	• 0 ACTIVE CC SENDS AND RECEIVES ON BUS 0. • 1 ACTIVE CC SENDS AND RECEIVES ON BUS 1. (SEE NOTE 303A)
00AA	0101	16	• 0 PMA, PMA, PMA, PMA AND 0,2 ARE USED TO SELECT THE PERIPHERAL ADDRESS BUS MODE. • 1 THIS SELECTION FOR MAINTENANCE AND CC INSTRUCTIONS IS MAINTAINED THE SAME AS FOR NORMAL INSTRUCTIONS.
000	0101	2	• 0 CC'S SEND AND RECEIVE UNDER CONTROL OF PMA P/T. • 1 ACTIVE CC SENDS ON BOTH PHASES. (SEE NOTE 303A)
001	0101	4	• 1 STANDBY CC RECEIVES ON SAME BUS AS ACTIVE CC. (SEE NOTE 303A)
000	0101	18	• 1 PARITY CHECK - GROUP 0 ON • 1 PARITY CHECK - GROUP 1 ON • 1 PARITY CHECK - GROUP 2 ON • 1 PARITY CHECK - GROUP 3 ON
000	0101	19	• 1 PARITY CHECK - GROUP 0 ON • 1 PARITY CHECK - GROUP 1 ON • 1 PARITY CHECK - GROUP 2 ON • 1 PARITY CHECK - GROUP 3 ON
000	0101	20	• 1 PARITY CHECK - GROUP 0 ON • 1 PARITY CHECK - GROUP 1 ON • 1 PARITY CHECK - GROUP 2 ON • 1 PARITY CHECK - GROUP 3 ON
000	0101	10	• 1 SET-UP IS BEING USED UNDER PROGRAM CONTROL OF 11 SET-UP SHOULD BE RESET. (SEE NOTE 3020)
000	0101	20	• 1 PERIPHERAL SEQUENCE THROUGH WRITE SCAN POINTS. THESE ARE NOT INTERRUPT SOURCES. (SEE NOTE 303A)
00	0101	4	• 1 SINGLE ERROR (SEE NOTE 303A)
000	0101	7	• 1 PARITY FAILURE OF C.S. WORD. CALL STORM ERROR SUMMARY P/T'S (SEE NOTE 303A)
000	0101	15	• 1 MOVES CONTENTS OF ADDRESS REGISTER TO CC BY PULSING THE SCAN GATE.
000	0101	6	• 1 P.S. RELOAD FAILURE INTERRUPT (SEE NOTE 303A)
000	0101	15	• 1 ALLOWS USE OF STANDBY CC TO TEST PROGRAM STORES WITH A SPECIAL TEST SET.

PT NAME	NO REQ	BIT POS	DESCRIPTION
J5	0015	1	J 5 RULLINCOMM INTERRUPT, LEVEL 1 : (SEE NOTE 0001)
L00		0	INTERMPT LEVELS A,B,C,D,E,F,G,H,I AND J ARE USED BY THE INTERRUPT SEQUENCER (SEE NOTE 0001)
L00		1	
L00		2	
L00		3	
L00		4	
L00		5	
L00		6	
L00		7	
L00		8	
L00		9	
L10	0015	10	END CYCLE TIMOUT-DRIIVE SCAN POINTS (SEE NOTE 0001)
REC-9 THRU REC-15	0020	0	THESE BITS ARE CONTROLLED BY BITS 17 THRU 23. THEY ARE USED FOR AUTO INHIBIT ON PROGRAM BLOCK CONTING AS DIRECTED BY BIT 23. IF BIT 23 = 1, BITS 0- 22 ARE TO BE USED FOR PROGRAM BLOCK CONTING. IF BIT 23 = 0, BITS 0-22 ARE TO BE USED AS AUTO. AN INPUT TO THIS REGISTER IS BROUGHT OUT TO A TEST CON- NECTION FOR USE WITH THE 1 CNT.
REC21	0015	0	REC INITIATED INTERRUPT ALSO CAN BE SET ON CLP ORDER ON TEST CONSOLE
REC	0006	17	(L12700 - REC1) = MATERIAL CURRENT EXCESS (L12700 - REC1) = NO MATERIAL CURRENT
REC11	0017	23	1 INHIBITS LEVEL W.J. AND A INTER- RUPT AND STOPS THE SP FOR ONE CYCLE FOLLOWING ISSUED REC1 ON HILL.
RC-0	0017	18	BITS OF MATCH CYCLE COUNTED
RC-1	0017	19	(SEE NOTE 0001)
RC0-0		12	THESE BITS ARE CONTROLLED FROM PROGRAM INTERMPT LETS LOCATED AT THE REC.
RC0-1	0017	17	THESE ARE READ BY AN REC INTERRUPT PRO- GRAM TO DETERMINE THE DESIRED LEVEL OF INTERMPT. ZERO-SEVEN CORRESPONDS TO INTERMPT LEVELS 0-7 RESPECTIVELY.
RC0-2		18	SPECIAL POINTS BROUGHT OUT TO TEST CONNECTION
RC0-3	0015	3	INHIBITION ZERO INTERRUPT
RC011	0015	4	INHIBITION ONE INTERRUPT
RC	0017	21	(L12711) (REC1) RECEIVE FROM CALL STORE BUS 0 ON (L12711) (F11) (REC1) RECEIVE FROM CALL STORE BUS 1 ON USED FOR MAINTENANCE AND CONTROL, WARD INSTRUCTIONS.
RC0	0017	22	(L12711) (RC0-1) (REC1) RECEIVE FROM PROGRAM STORE BUS 0 ON (L12711) (F11) (RC0-1) (REC1) RECEIVE FROM PROGRAM STORE BUS 1 ON (L12711) (F11) (REC1) USED FOR MAINTENANCE AND CONTROL, WARD INSTRUCTIONS.

ALPHABETICALLY LISTED DESCRIPTION OF BUFFER BUS FF

FF NAME	NO REG	BIT POS	DESCRIPTION
TEC	CSIF	1	= 1 STANDBY C.C. IS MARKED IN TROUBLE
TEC	MAIS	14	TEST CONSOLE LEVEL 6 (SEE NOTE 3020)
THRU	MAIS	8	THRU
TC-23	MAIS	23	THRU
TO	MOCA	5	NOT USED BUT FLIP-FLOP STILL EXISTS (SEE NOTE 3020)
TO	MOCA	6	= 1 TRANSFER RECORD MODE IS BEING USED. (SEE NOTE 3020)
TRI	MAIS	12	TRANSFER RECORD INTERRUPT LEVEL 6. (SEE NOTE 3020)
TO-0	MAIS	6	DEFINES TIME OF MATCH FOR MATCH CIRCUIT ZERO IN NODES PMS, DM, PM.
TO-1	MAIS	7	DEF. DPCS, DPCS.
TOCA-0	MAIS	10	TIMOUT COUNTER REGISTER (TOCR) IS SET TO THE NUMBER OF CYCLES THAT WILL ELAPSE BEFORE A TIMEOUT WILL OCCUR.
TOCA-5	MAIS	15	A. IF A SEQUENCING CIRCUIT IS WING-UP (NORMAL MODE) B. IF A PREDETERMINED NUMBER OF CYCLES IS EXCEEDED WHEN EXECUTING SHORT SEGMENTS OF PROGRAM. C. WHEN A PREDETERMINED POINT IN A PROGRAM HAS BEEN REACHED IN A SAMPLE MATCH MODE.
TI-0	MAIS	8	DEFINES TIME OF MATCH FOR MATCH CIRCUIT ONE IN NODES PMS, DM, PM.
TI-1	MAIS	9	DPCS, DPCS.
TI-0	CSIF	13	= 0 WHENEVER MATCH MODES ARE CHANGED (I.E., MODIFY THE CONTENTS OF MATCH OR MATCH) = 1 SYNCHRONIZES THE MATCHING CIRCUITRY AFTER A MODE CHANGE OR MISMATCH OCCURS.
MA	MAIS	15	F/F SET ON WRITE ORDERS. (SEE NOTE 3020)
A	MOCA	0	= 0 LOOKING FOR A MATCH. = 1 LOOKING FOR A MISMATCH. (SEE NOTE 3020)
X2-0	MAIS	0	BIT 23 OF ADDRESS REGISTER. DR161-MAIS AS PART OF OVER BITS 0-22 OR DR. USED IN P.U. SHORT BINARY ADDRESS.
Y	MOCA	1	= 0 MATCH ON A ROUTINE BASIS. = 1 MATCH ON A DIRECTED BASIS. I.E., POINTS AND TIME ARE SPECIFIED BY THE MATCH P & T BITS (SEE NOTE 3020)

FF NAME	NO REG	BIT POS	DESCRIPTION
Y3	PMS	21	ONLY ACCESS TO BIT 23 OF Y REGISTER. (NEEDS FOR CPU ENABLE VERIFY.)
Y0V	SECF	10	PROGRAM STORE SINGLE ERROR COUNTER. INCREMENT INPUTS FROM ERROR CONNECTION SEQUENCES. SEE NOTE 3020
Y0V	SECF	16	PROGRAM STORE DOUBLE ERROR COUNTER. INCREMENT INPUTS FROM ERROR CONNECTION SEQUENCES. SEE NOTE 3020

3020. INPUTS FROM ERROR DETECTION AND CONNECTION OUT. INPUTS GATED ON INTERRUPT REQUEST OR ON MAINTENANCE ORDERS. IF PMSV OR CSIF IS SET EXTERNAL INPUT IS BLOCKED TO BITS 0-7 ON NORMAL INSTRUCTIONS.

3020. THESE DEFINITIONS SHOULD NOT BE TAKEN TO LITERALLY, FOR ACTUAL SETTING OF BITS IN THIS REGISTER FOR EACH MATCH MODE CONSULT NOTE 307.

3020. USE CSIF IF DESIRED TO RESET ALL COUNTERS

3020. THERE IS NO WRITING ACCESS TO BIT POSITIONS 3-22. THEREFORE AN EXEM MAY BE USED TO RESET ALL COUNTERS.

3020. WHEN WRITING INTO 4042/3, WHEREVER THERE IS A "1" IN THE BIT THE CORRESPONDING BIT OF LOCATION 10 IS RESET. WHEN THERE IS A "0" THE BIT IS UNCHANGED. CONTROL WORD WRITE IS THE SAME.

3020. EXTERNAL INPUTS ARE FROM THE MAINTENANCE DECKERS. THESE INPUTS ARE ONLY APPLICABLE IF THE IC BIT OF THE MOCA IS RESET.

3020. WHEN WRITING INTO 4044/5 WHEREVER THERE IS A "1" IN THE BIT THE CORRESPONDING BIT OF LOCATION 19 IS RESET. WHERE THERE IS A "0" THE BIT IS UNCHANGED. CONTROL WORD WRITE IS THE SAME.

3020. WHEN WRITING INTO 4050/1 WHEREVER THERE IS A "1" IN THE BIT THE CORRESPONDING BIT OF LOCATION 21 IS RESET. WHERE THERE IS A "0" THE BIT IS UNCHANGED.

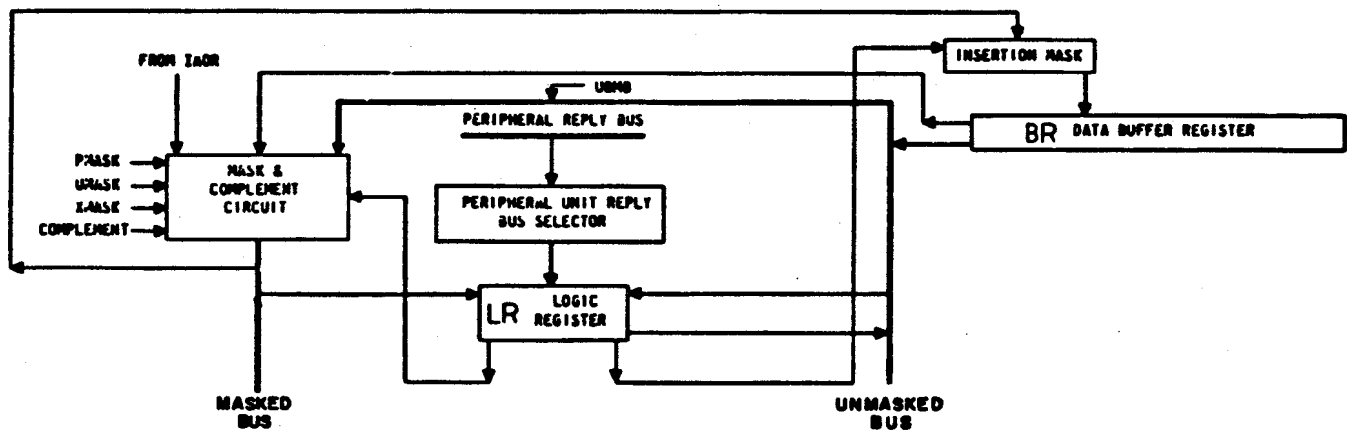
3020. PROGRAM STORE BUS CONTROL F/F'S PMS, DM, PM, PNT, OLS AND MAP. SEE CO-1A105 SYSTEM A PAR. 1.50.

3020. THESE BITS INDICATE WHETHER OR NOT A VALID R, T, AND Z SELECTION HAS BEEN MADE AT THE CPU.

3020. Y0V, Y0V, CSIF ARE OVERFLOW BITS WHICH ARE SET WHEN THEIR RESPECTIVE COUNTERS REACH MAXIMUM VALUE (Y0V 11111) THE OVERFLOW BIT REMAINS SET UNTIL RESET BY PROGRAM.

3020. ADDRESS 4010 WRITES INTO BIT POS 0-9
ADDRESS 4011 WRITES INTO BIT POS 10-21
EMMS WRITES INTO BITS 0-21
READING IS NORMAL

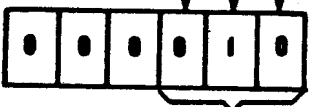
MASKING . . .



PRODUCT MASKING - PL OPTION

Information
to be MaskedContents of
L Register

Masked Information



Bits Wanted

- Mask has 1's in Bit Positions that are wanted
- Mask used is present contents of L register

INSERTION MASKING - EL OPTION

Bits to be
Inserted into B Register

Information

L Register
ContentsOriginal Contents
of B RegisterFinal Contents
of B RegisterInserted
Bits

MASKING . . .

- . Requires an additional field in the instruction format called the LCJ field.

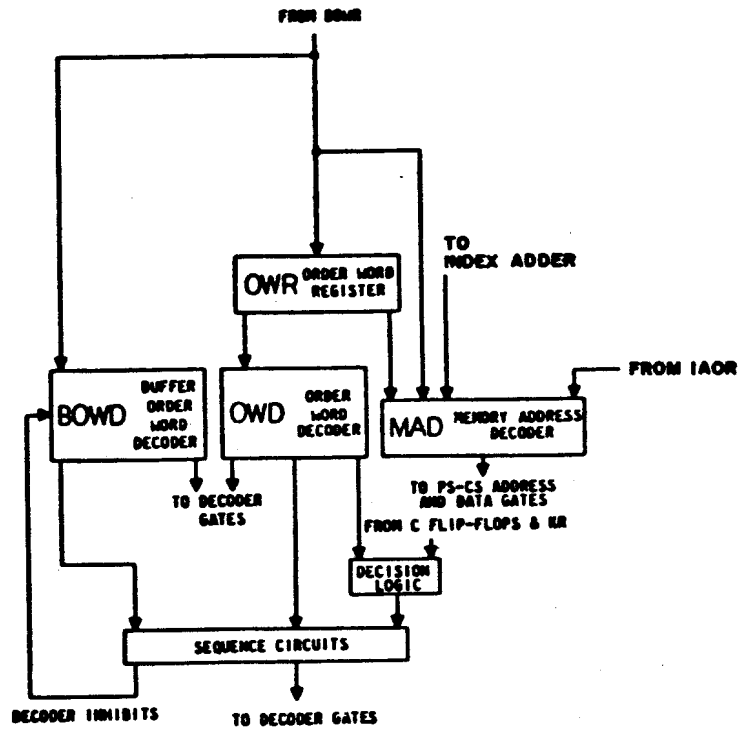
INSERTION MASKING . . .

- . Permits insertion of certain information bits into the word in the B Register without disturbing any other bits.
- . Permits more efficient use of Call Store memory by permitting "packing" of data.
- . Requires an additional functional block of hardware called the Insertion Mask.

PRODUCT MASKING . . .

- . Permits the system to perform bit data processing.
- . Requires additional hardware in the Central Control.

INSTRUCTION DECODER CIRCUITS . . .

NOTES

INSTRUCTION DECODER CIRCUITS . . .

- . Buffer Order Word Decoder controls the gating associated with indexing operations.
- . Order Word Decoder controls the gating associated with the execution of an instruction.
- ← . Memory Address Decoder controls the gating associated with Memory operations.
- . Determines whether an address pertains to the Call Store or Program Store.
- . Controls the gating associated with Program Store communications.
- . Controls the gating associated with Call Store communications.

MEMORY ADDRESS RANGES

A. COLUMN GIVES NUMBER OF MACHINE CYCLES REQUIRED FOR EXECUTION.

B. 4 READS BIT NOT USED FOR ADDRESS.

C. PROGRAM STORE WORD IS 64 BITS 143-10, 143-137 PARITY AND ADDRESSING, 136-10 DATA.

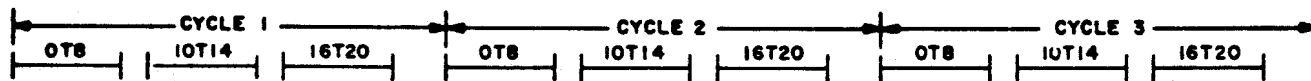
RIGHT HALF PROGRAM STORE ADDRESSING 122-10 TO DESTINATION REGISTER.

LEFT HALF ADDRESSING 136, 0, 0, 0, 0, 0, 0, 0, 121, 122, 136-123 TO DESTINATION REGISTER.

LEFT HALF ADDRESSING 143-137, 121, 122, 136-123 TO DESTINATION REGISTER.

ADDRESS RANGE	BINARY LIMITS OF ADDRESS RANGE																					OPERATION WITH NORMAL MEMORY READING (INCLUDES RMCS & RMPP ORDERS)	NOTE 315.4	OPERATION WITH NORMAL MEMORY WRITING (INCLUDES RMWP & RMPP ORDERS)	NOTE 315.4
	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0				
1 SPECIAL I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	ALL ZEROS GATED TO BR22-BRO & DESTINATION REGISTER. NO READING/S PERFORMED.	1	SOURCE REGISTER GATED TO BR22-BRO PARITY TO BR23. NO WRITING OCCURS.	1
2 SPECIAL II	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	BR23-BRO UNCHANGED. BR22-BRO GATED TO DESTINATION REGISTER. NO READING/S PERFORMED.	1	SAME AS RANGE 1	1
3 BUFFER BUS REGISTERS	0	0	0	0	0	0	0	0	0	0	1	4	4	4	4	0	0	0	0	0	0	BR BUS REGISTER GATED TO BR22-BRO. BR22-BRO GATED TO DESTINATION REGISTER. NO READING/S.	1	SOURCE REGISTER GATED TO BR22-BRO & BR BUS REGISTER. ADDRESS BIT 0 GATED TO BR OPS BIT 23. ROUND TRIP PARITY TO BR23. NO READING/S.	1
4 SPECIAL III	0	0	0	0	0	0	0	0	0	1	4	4	4	4	1	0	1	1	1	0	0	SAME AS RANGE 1	1	SAME AS RANGE 1	1
5 CENTRAL CONTROL CALL STORES	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	DATA, ROUND TRIP PARITY, & ASMC RETURNED TO CC. BR22-BRO GATED TO DESTINATION REGISTER. READING/S BASED ON CHECK OF PARITY & ASMC.	1,2	SOURCE REGISTER GATED TO BR22-BRO & ADDRESSED STORE. ROUND TRIP PARITY TO BR23 & ADDRESSED STORE. READING/S BASED ON CHECK OF ASMC.	1,2
6 A COMMUNITY SP CALL STORES	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	SAME AS RANGE 5	2,4	SAME AS RANGE 5	1,2
7 B COMMUNITY SP CALL STORES	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	SAME AS RANGE 5	2,4	SAME AS RANGE 5	1,2
8 A COMMUNITY SIGNAL PROCESSORS	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	DATA & ASMC RETURNED TO CC. BR23 RESET. BR22-BRO GATED TO DESTINATION REGISTER. READING/S BASED ON CHECK OF ASMC.	2,4	SAME AS RANGE 5	1,2
9 B COMMUNITY SIGNAL PROCESSORS	0	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	SAME AS RANGE 8	2,4	SAME AS RANGE 5	1,2
10 STANDBY CENTRAL CONTROL	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	ALL ZEROS GATED TO BR22-BRO & DESTINATION REGISTER. NO ASMC CAUSES REREAD FAILURE.	2	SAME AS RANGE 1 EXCEPT ADDRESS GATED TO CALL STORE ADDRESS BUS.	1
11 PROGRAM STORE (RIGHT HALF)	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	READING ACCEPTED AFTER POSSIBLE READING/S AND/OR CORRECTION. BR22 UNCHANGED. RIGHT HALF GATED TO BR22-BRO AND DESTINATION REGISTER.	3,4,5	SOURCE REGISTER GATED TO BR22-BRO. ROUND TRIP PARITY TO BR23. NO WRITING OCCURS. PROGRAM STORE ADDRESSES BUS NOT ADDRESSED.	1
12 BAC CALL STORES	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	SAME AS RANGE 5	1,2	SAME AS RANGE 5	1,2
13 PROGRAM STORE (LEFT HALF)	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	READING ACCEPTED AFTER POSSIBLE READING/S AND/OR CORRECTION. BR23 UNCHANGED. LEFT HALF GATED TO BR22-BRO AND DESTINATION REGISTER.	3,4,5	SAME AS RANGE 11	1

INSTRUCTION PHASES . . .

NOTES

t_1
ADDRESS TO PS

t_2
WORD IS RECEIVED
FROM PS.

t_2
A FIELD AND INDEX REGISTER
ARE GATED TO INDEX ADDER.

t_3
INDEX REGISTER MODIFICATION
IS CARRIED OUT.

t_4
ADDRESS IN IAOR IS SENT TO CS FOR
READING OR WRITING

t_5
IAOR IS GATED TO SOME REGISTER VIA MASK AND
COMPLEMENT CIRCUIT, OR SOME REGISTER IS
GATED VIA MASK AND COMPLEMENT AND INSERTION
MASK CIRCUITS TO B REGISTER AND CALL STORE

t_6
READOUT FROM CS IS GATED VIA MASK
AND COMPLEMENT CIRCUIT TO SOME REGISTER.

Instruction Phases . . .

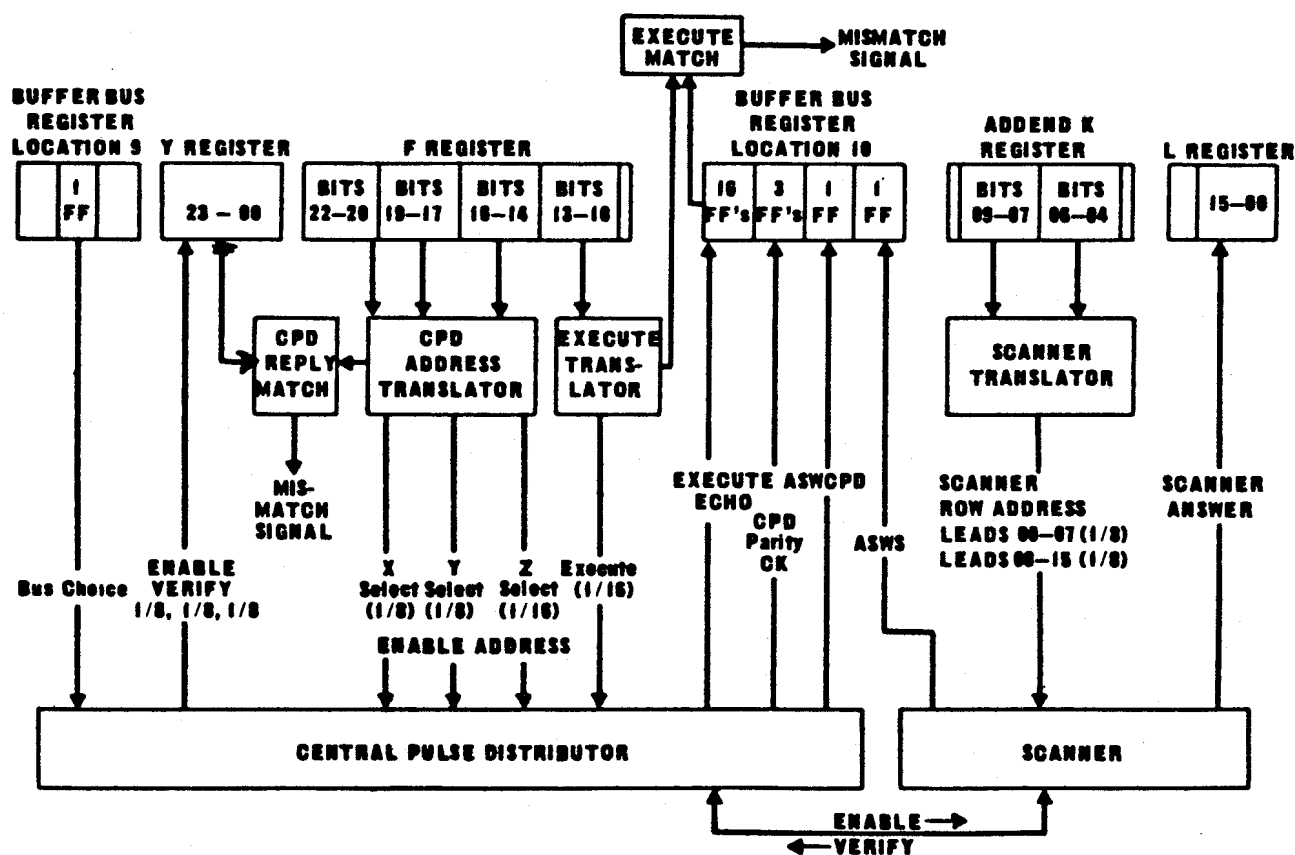
- . Central Control Processing of an Instruction may be divided into three phases.
- . Each phase normally requires one central control cycle (5.5 microseconds).
- . Cycle 1 - Central Control sends instruction address to the program store.
- . Cycle 2 - Indexing of the instruction.
- . Cycle 3 - Execution of the instruction.

Example of Instruction Phases . . .

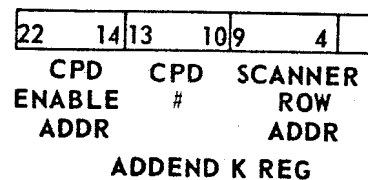
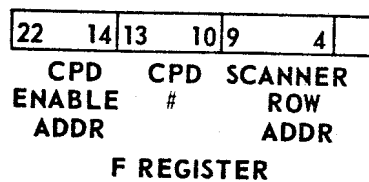
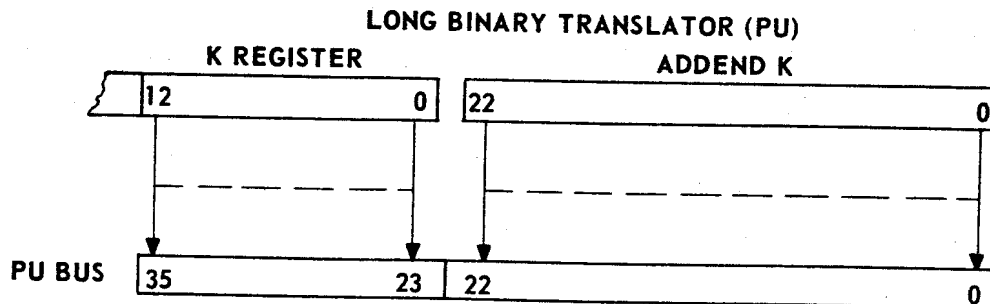
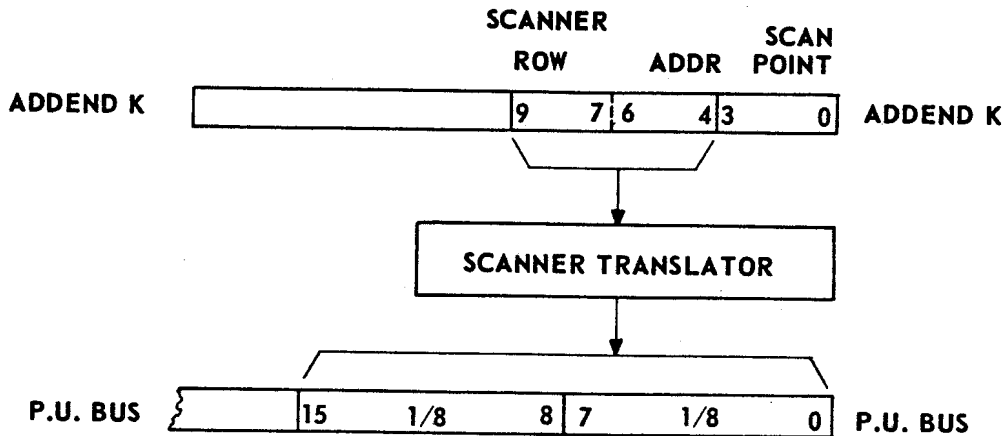
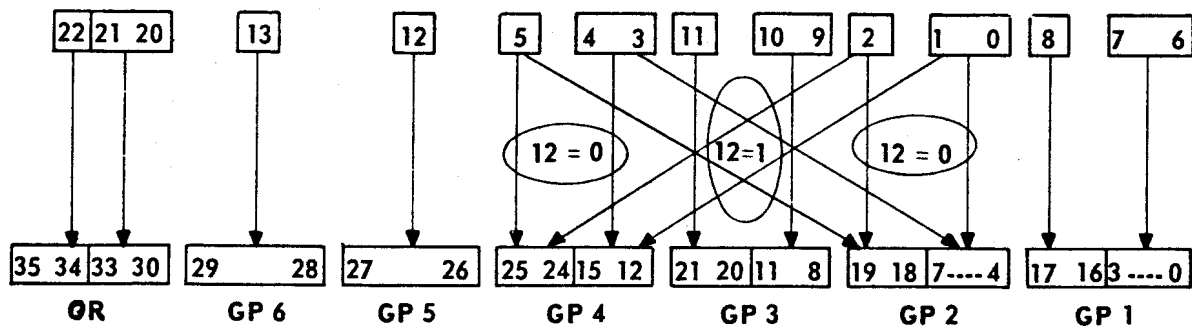
Cycle	Central Control Actions
← 1 - Addressing program store	Send address BB to program store Receive instruction from program store
2 - Indexing	Add the contents of the DA field (AA) to the contents of the Y register
3 - Execution	Send resultant address to call store Call store readout received in B register B register contents gated to bus and then to X register

Location	Operation	DA	RM
BB	MX	AA	Y

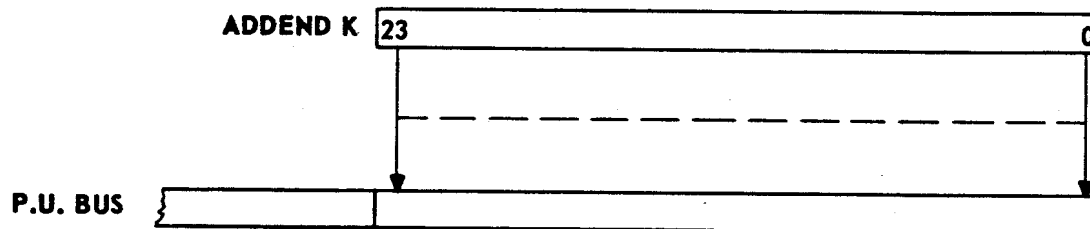
CENTRAL CONTROL COMMUNICATION WITH MASTER SCANNER



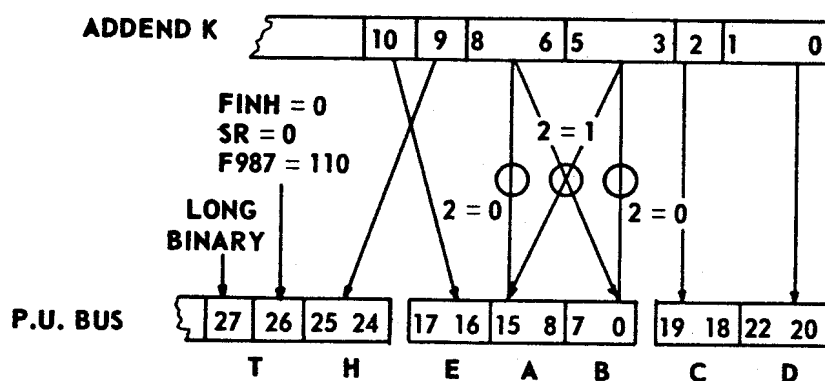
TRUNK AND JUNCTOR SWITCHING FRAME TRANSLATOR



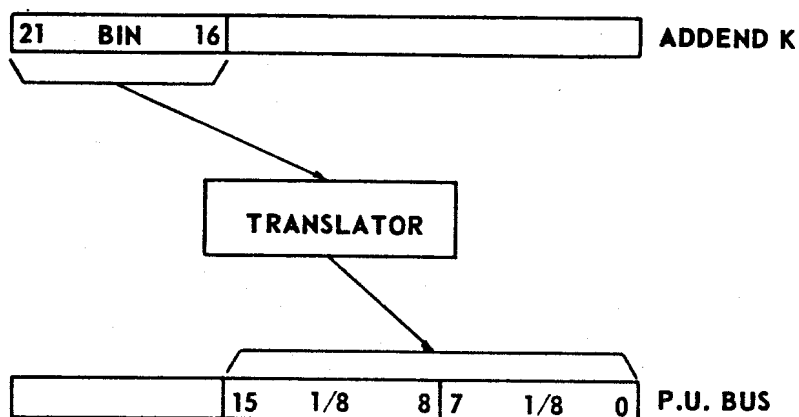
SHORT BINARY TRANSLATOR



UNIVERSAL SIGNAL DISTRIBUTOR TRANSLATION



SKEW SCANNER TRANSLATOR



SEQUENCE CIRCUITS . . .

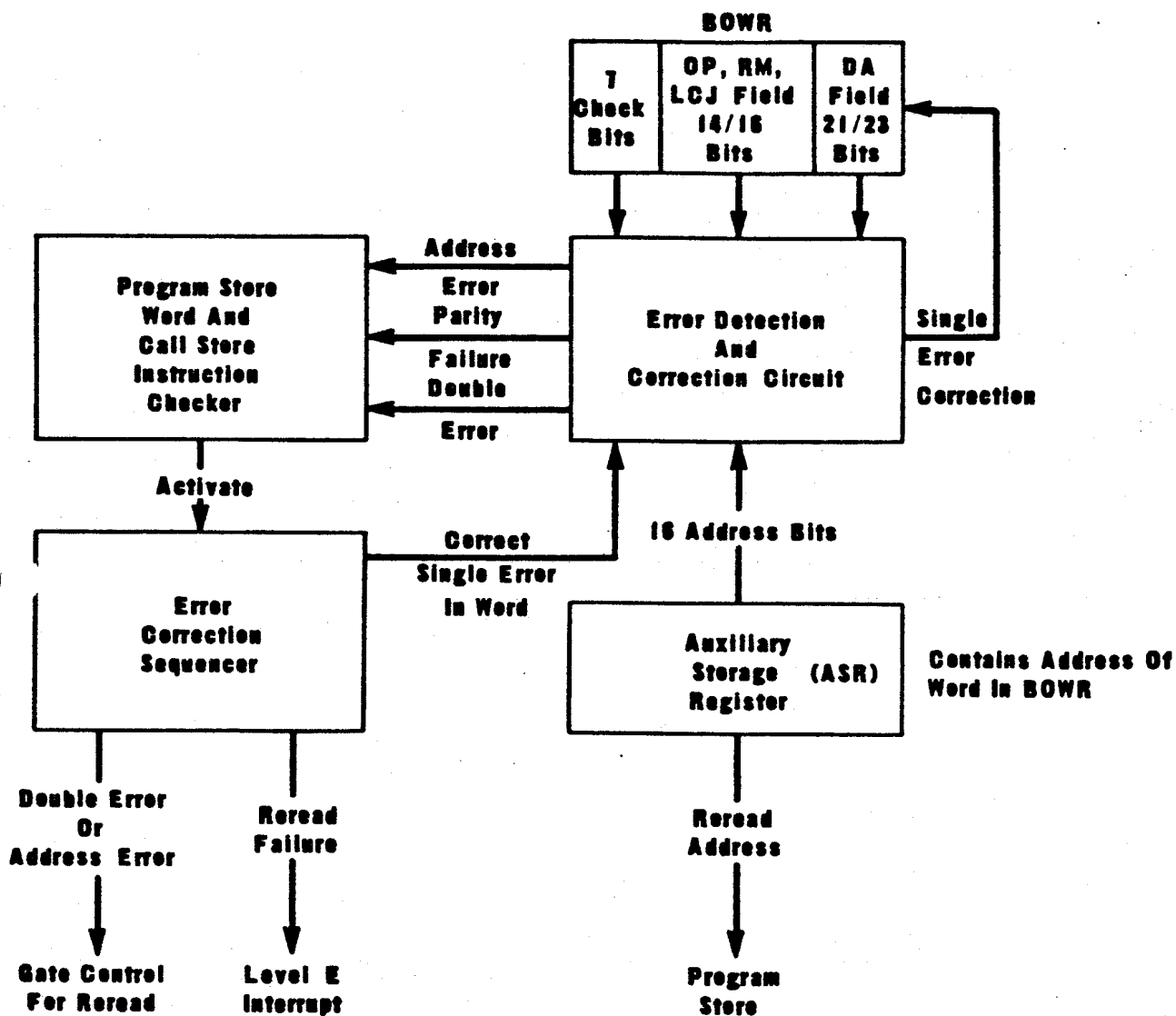
General . . .

- . Activated by one of the decoders (BOWD, OWD, MAD).
- . Increase the number of cycles to process an instruction.
- . Inhibit and release the decoders at appropriate times.
- . Provide special gating functions required during the extra cycles that the Decoders are inhibited.

Types . . .

- . Error Correction Sequencer
- . Read-Write Sequencer
- . Transfer Sequencer
- . Call Store Reread Sequencer
- . Start-Stop Sequencer
- . Call Store Program Sequencer
- . Go-Back-To Normal Sequencer
- . Peripheral Sequencer
- . Interrupt Sequencer
- . Signal Processor Lockout Sequencer
- . Signal Processor Sequencer

ERROR CORRECTION SEQUENCER . . .



SEQUENCERS . . .

Error Correction Sequencer . . .

- . Correcting errors in Program Store Communications
 - . Error signals indicating one of the following are sent to error correction sequencer via the Program Store word and Call Store Instruction Checker
 - . Address error
 - . Overall parity failure
 - . Double error
- . Error correction sequencer controls gating for the follow
 - . Single error in word in BOWR is corrected
 - . Double error or address errors cause a rereading
 - . During rereads CC operations are suspended by inhibiting the BOWD, OWD and MAD

Read-Write Sequencer . . .

- . Reading data from the Program Store . . .
 - . The Memory Address Decoder determines that the address pertains to the Program Store
 - . The Data word will be brought into the BOWR
 - . The Read-Write Sequencer controls the reading operation until the data is moved from the BOWR to the B Register.
- . Controls data reading from the Program Store.
- . Used for Maintenance Instructions which interrogate the Program Store.
- . Used for Program Store Control Read and Control Write Instructions
- . Three phase operation is interrupted until the instruction is processed.

SEQUENCERS . . .

Transfer Sequencer . . .

- . Activated on all Transfer Instructions
- . Suspends overlap operations until the new instruction is brought into the BOWR.
- . Resets OWR so that OWD has no instruction to execute.

Call Store Reread Sequencer . . .

- . Rereads call store on PW parity failure or ASWC failure on read operations.
- . Rewrites call store on ASWC failure on write operations.

Start-Stop Sequencer . . .

- . The active Central Control can test the Off-line Central Control
 - . Active CC stops off-line cc
 - . Starting address of test program placed in PAR of Off-line CC
 - . Off-line CC is restarted
- . Start-Stop Sequencer provides the means of stopping and later restarting the Off-line Central Control
 - . Clock pulse not disabled in Off-line CC
 - . Other sequence circuits are inhibited
 - . Instruction in OWR of Off-line CC is executed.
No instructions are aborted
 - . Sequential lockout of other sequencers

SEQUENCERS . . .

Call Store Program Sequencer . . .

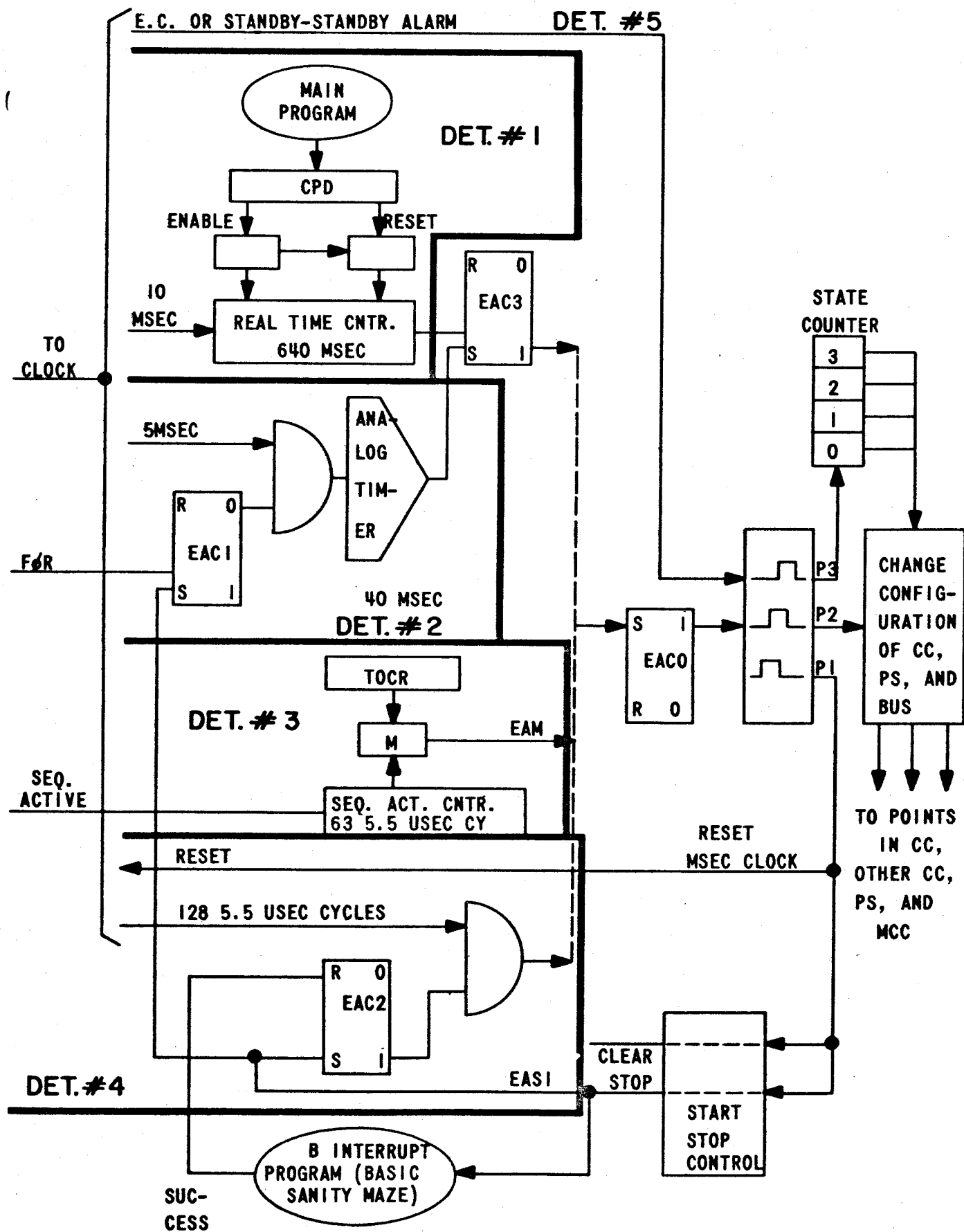
- . Used to read instructions from Call Store
- . Activated by the Transfer Sequencer when program control is transferred to a Call Store address
- . Remains active for three cycles
- . Performs two Call Store reading operations
- . Assembles the Call Store words in the BOWR
- . Controls the checking of the word in the BOWR

Go-Back-to-Normal Sequencer . . .

- . Used to return control to an interrupted program
- . Activated by EGBN instruction
- . Returns the C flip-flops, Auxiliary Storage Register and B register to their condition at the time of interrupt
- . Gates the address of the interrupted program to the Program Store
- . Resets Interrupt Level Activity flip-flop

Peripheral Sequencer . . .

- . Used when Input-Output instructions are being executed
- . Decoders treat I/O orders as single cycle instructions
- . Peripheral sequencer controls gating of addresses to CPD
- . Peripheral sequencer controls gating of addresses to peripheral units and provides for resetting of registers and gating of information returned from CPD or Peripheral units.



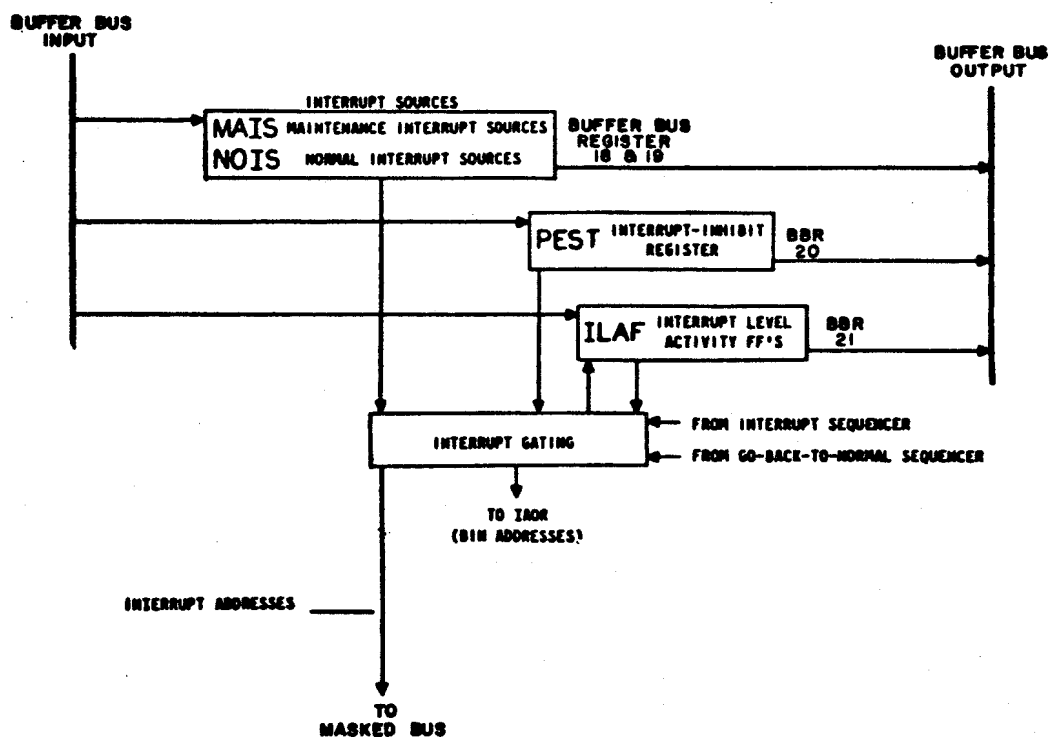
EAC0, C1, C2, & C3 = CONTROL FF'S
 P1, P2, & P3 = EA GEN. CLOCK
 PULSES

SEQUENCERS . . .

Interrupt Sequencer . . .

- . Used to transfer program control to another program
- . There are 10 priority levels of interrupt
- . Called in by setting an interrupt level flip-flop
- . Stores the contents of:
 - . B Register
 - . Auxiliary Storage Register
 - . C Flip-Flops
- . Transfers control to the new program
- . Sets interrupt level activity flip-flop

INTERRUPT SYSTEM AND SEQUENCER . . .



CD 4

COMPOSITE DIAGRAM OF ERROR DETECTION AND CORRECTION

THE UNIVERSITY OF CHICAGO PRESS

[illegible]

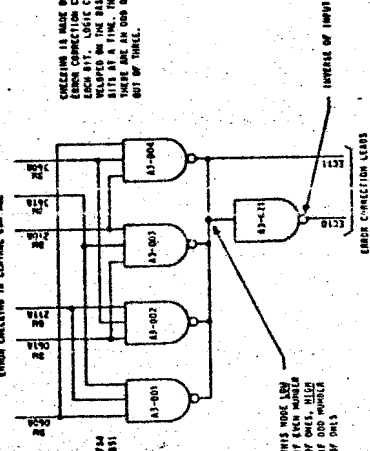
INFORMATION BITS OF PROGRAM LOGS

[illegible]

PROGRAM FORT WORTH OF A BITE SHOWS IN BINARY FORM

100

1900 CURED IN COTTON FABRIC



CHECKING IS MADE ON A BASIS OF THE ERROR CORRECTION CHARACTERISTICS OF EACH BIT. LOGIC CIRCUITS ARE DEVELOPED ON THE BASIS OF CHECKING THREE BITS AT A TIME. THIS WILL DETERMINE IF THERE ARE AN ODD OR EVEN NUMBER OF ONES OUT OF THREE.

THIS WOOD LEAF
IF EVEN NUMBER
IF ODDS, HIGH
IF ODD NUMBER
IF ODDS

SAV37 4011216802 8200

COMBINATIONS OF THESE LOGIC CIRCUITS ARE LEADS WILL DEVELOP FOR C-COR 9 LEADS. THESE ARE THE CONNECTION LEADS. A NUMERICAL VALUE IS GIVEN TO EACH FOR LEAD IS FOLLOWS:

CON 0 - 1
CON 1 - 2
CON 2 - 4
CON 3 - 8
CON 5 - 8
CON 6 - 16
CON 8 - 16

2-61-020

ELECTRONIC SWITCHING SYSTEMS

ASUL TELEPHONE LABORATORIES

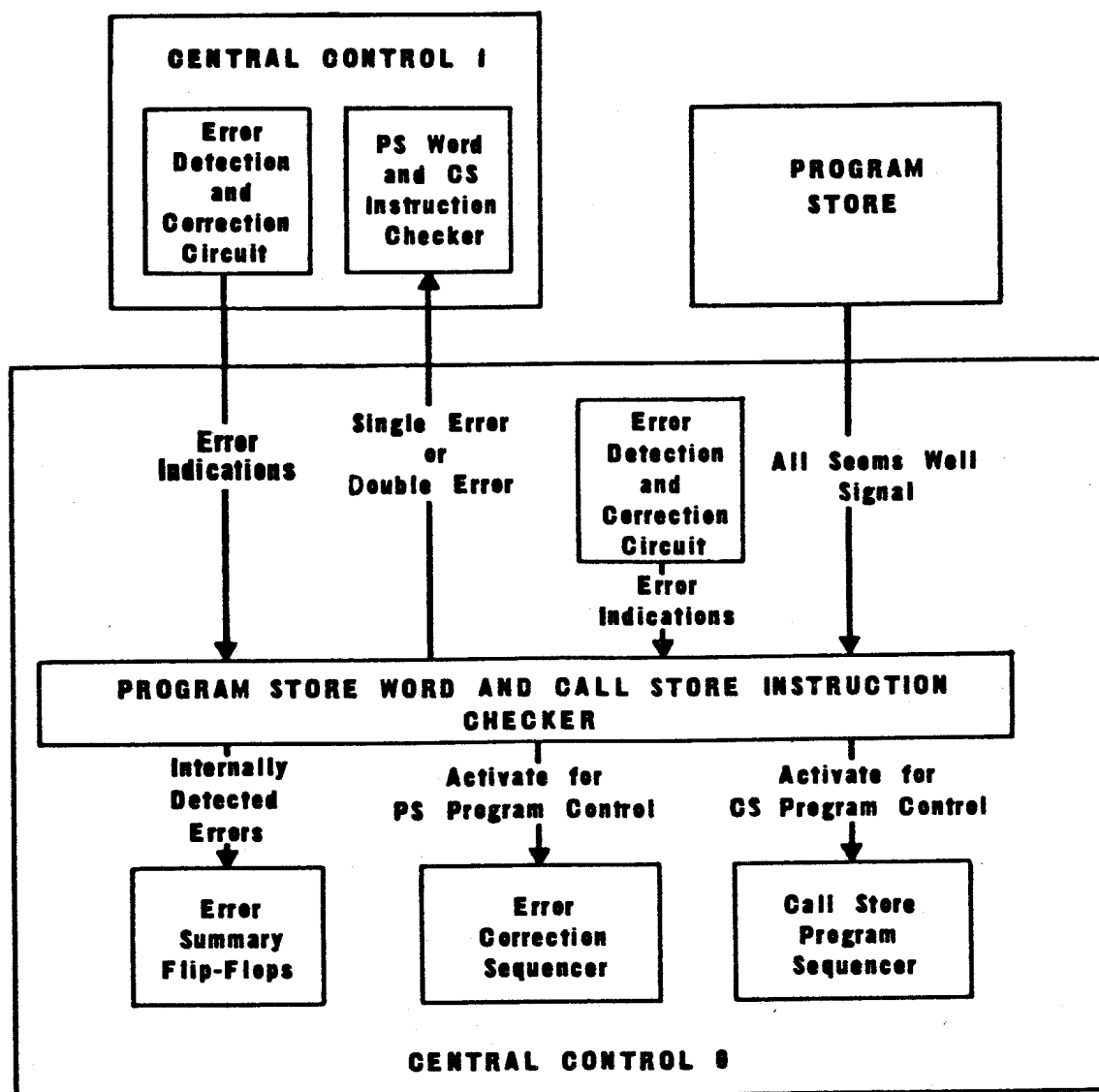
ERROR CORRECTION AND DETECTION FOR PROGRAM STORE AND CALL STORE WORDS . . .

The Program Store Word and Call Store Instruction Checker . . .

- . Intermediary between error detection and correction circuit and various sequencer circuits
- . Activates sequencer when no ASWP signal received

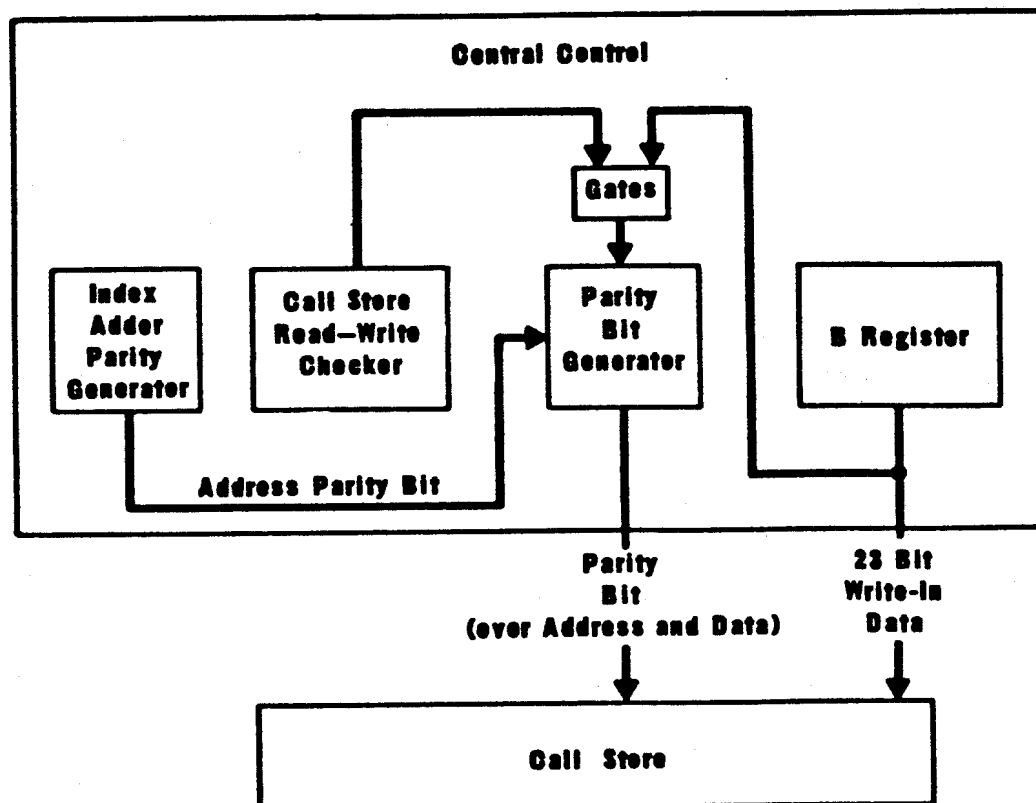
Error Detection and Correction Circuit

- . Uses hamming code to check for single, double or address errors in a PS word or CS words used for program.
- . Error signals are sent to program store and call store instruction checker.



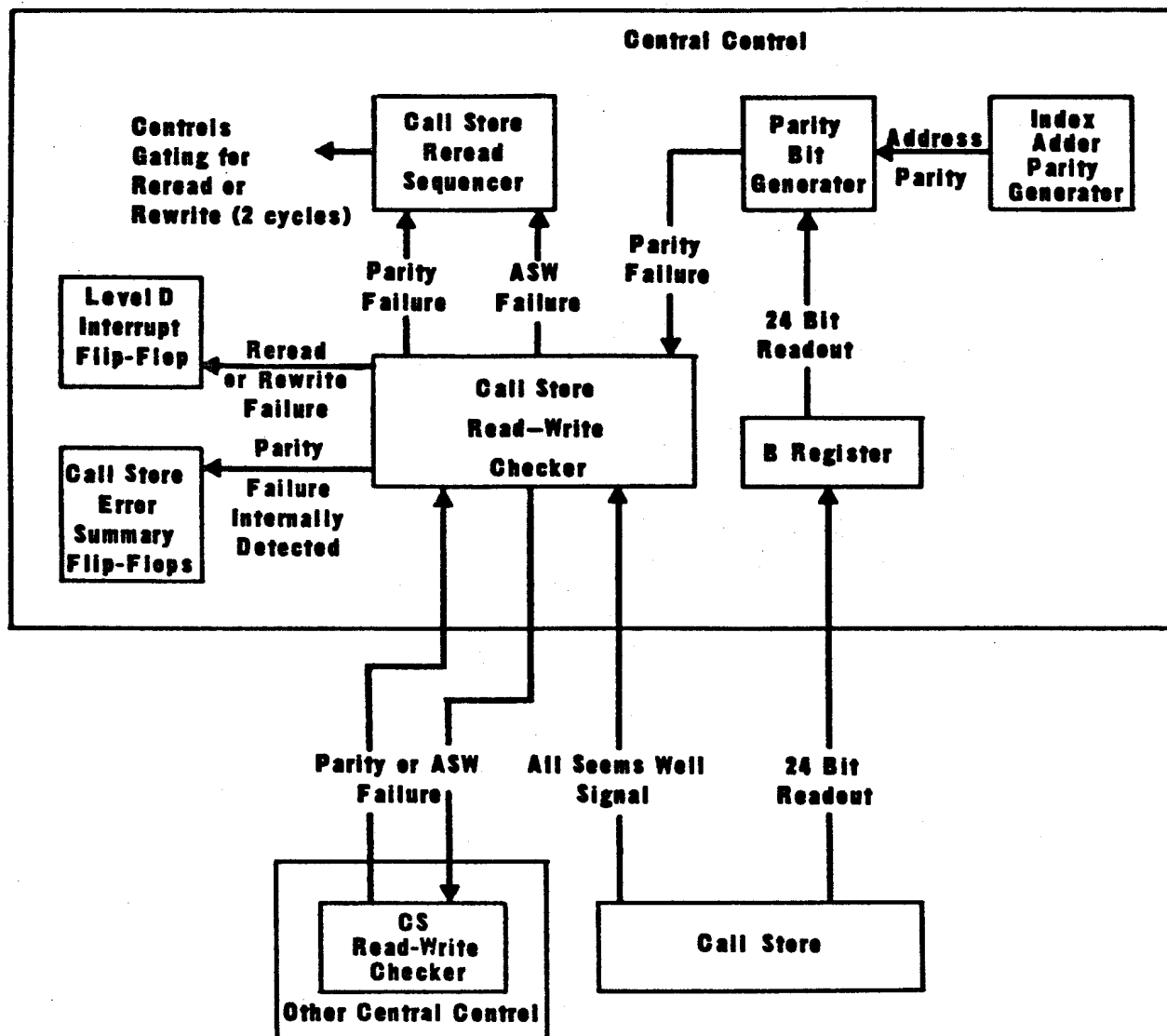
ERROR CHECKING FOR CALL STORE COMMUNICATIONS . . .

COMPUTING THE CALL STORE WRITING PARITY BIT . . .



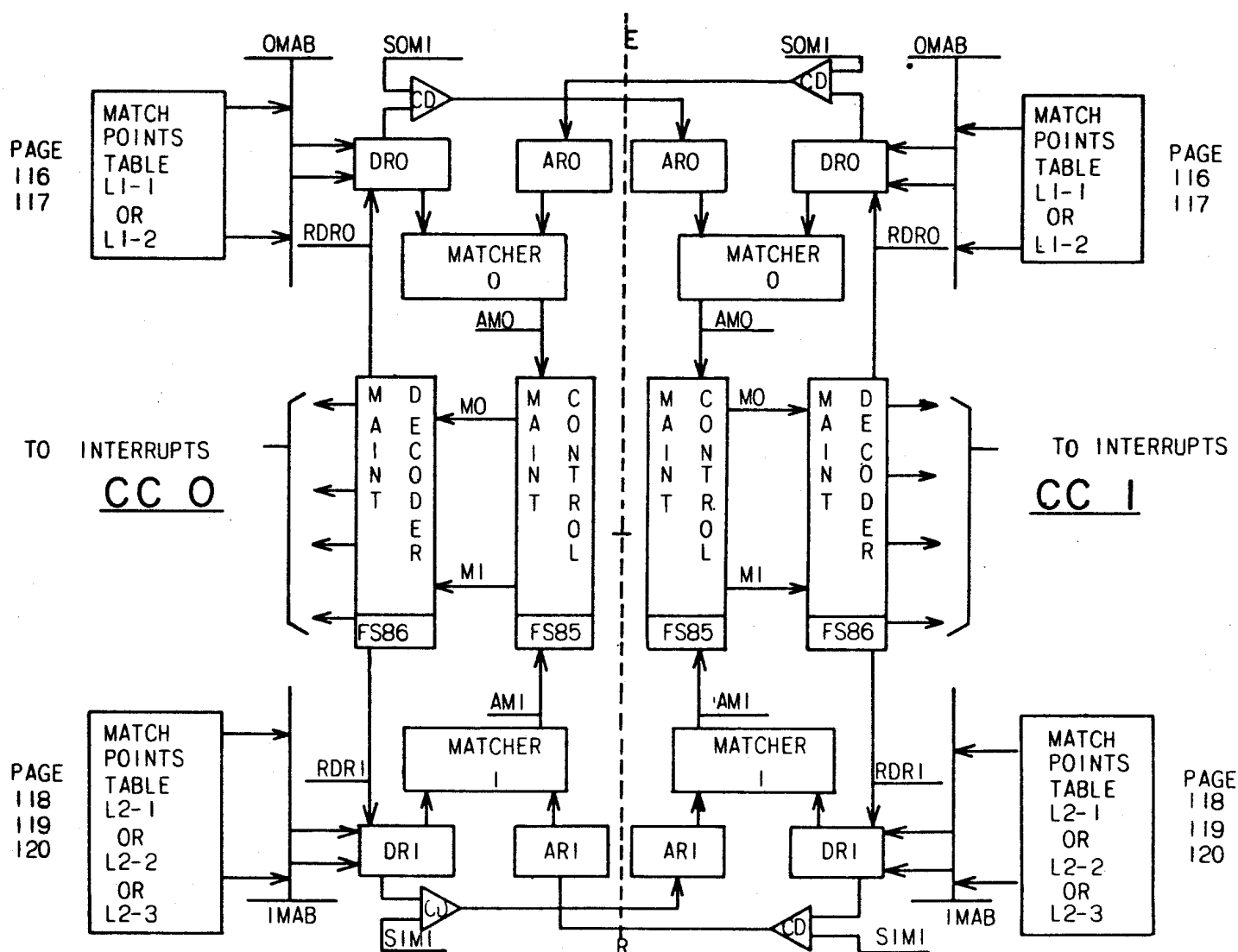
ERROR CHECKING FOR CALL STORE COMMUNICATIONS . . .

DETECTING AND CORRECTING DATA READING ERRORS . . .



MAINTENANCE MATCHING . . .

BLOCK DIAGRAM OF MATCHER CIRCUITS . . .



ROUTINE MATCHING

Condition	Matcher 0	Matcher 1
If WR is set	BR at 10T16	IAOR at 10T16
If RE or FU is set	MB at 10T16	IAOR at 10T16
If EG is set	BOWRR at 10T16	BOWRL at 10T16
If none are set and MC = 0	PAR at 10T16	UB at 0T8 and at 16T22
If none are set and MC = 1	PAR at 10T16	UB at 10T16
If none are set and MC = 2	MB at 10T16	SEQ 0 at 10T16
If none are set and MC = 3	MB at 10T16	SEQ 1 at 10T16

MAINTENANCE MATCHING . . .

General . . .

- . In normal operation duplicated central controls work in parallel.
- . Identical matching circuitry in each unit is used to routinely compare data for a number of points.
- . A mismatch causes a Level C (CC Mismatch) Interrupt to occur.

Operation . . .

- . Two match positions may be matched each cycle.
- . Match Control Register determines points to be matched and time of matching.
- . Mode Control Register determines the matching mode.
- . Maintenance Decoder generates the necessary gating functions.
- . Match Logic determines if a match or mismatch exists.

Partial list of matching modes . . .

- . Routine Match - This is the normal mode when two CC's are running in parallel. Several points are matched on a sequentail basis.
- . Preset Match - Specified points are matched against preset constants. A match is looked for.
- . Directed Match - Only two sets or specified points are matched at specified times each cycle.
- . Sampled Match - Used with EMMS Mismatch Sampling order to obtain one sample per matcher at a specified point in the program.
- . B Test - Special matching of buffer registers.

KEY: MATCHERS CAN TEST FOR MATCH OR MISMATCH

X = 0 TEST FOR MATCH (ABNORMALITY)

X = 1 TEST FOR MISMATCH (ABNORMALITY)

N = OPTIONAL, DEFINED AS FOLLOWS:

I = 0 NO ACTION

I = 1 C LEVEL INTERRUPT ON ABNORMALITY

NM = 0 NO ACTION

NM = 1 STOP MATCHING ON ABNORMALITY

E = 0 NO ACTION

E = 1 EXECUTE STOP STANDBY CENTRAL CONTROL ON ABNORMALITY

F = 0 NO ACTION

F = 1 FAST STOP STANDBY CENTRAL CONTROL ON ABNORMALITY

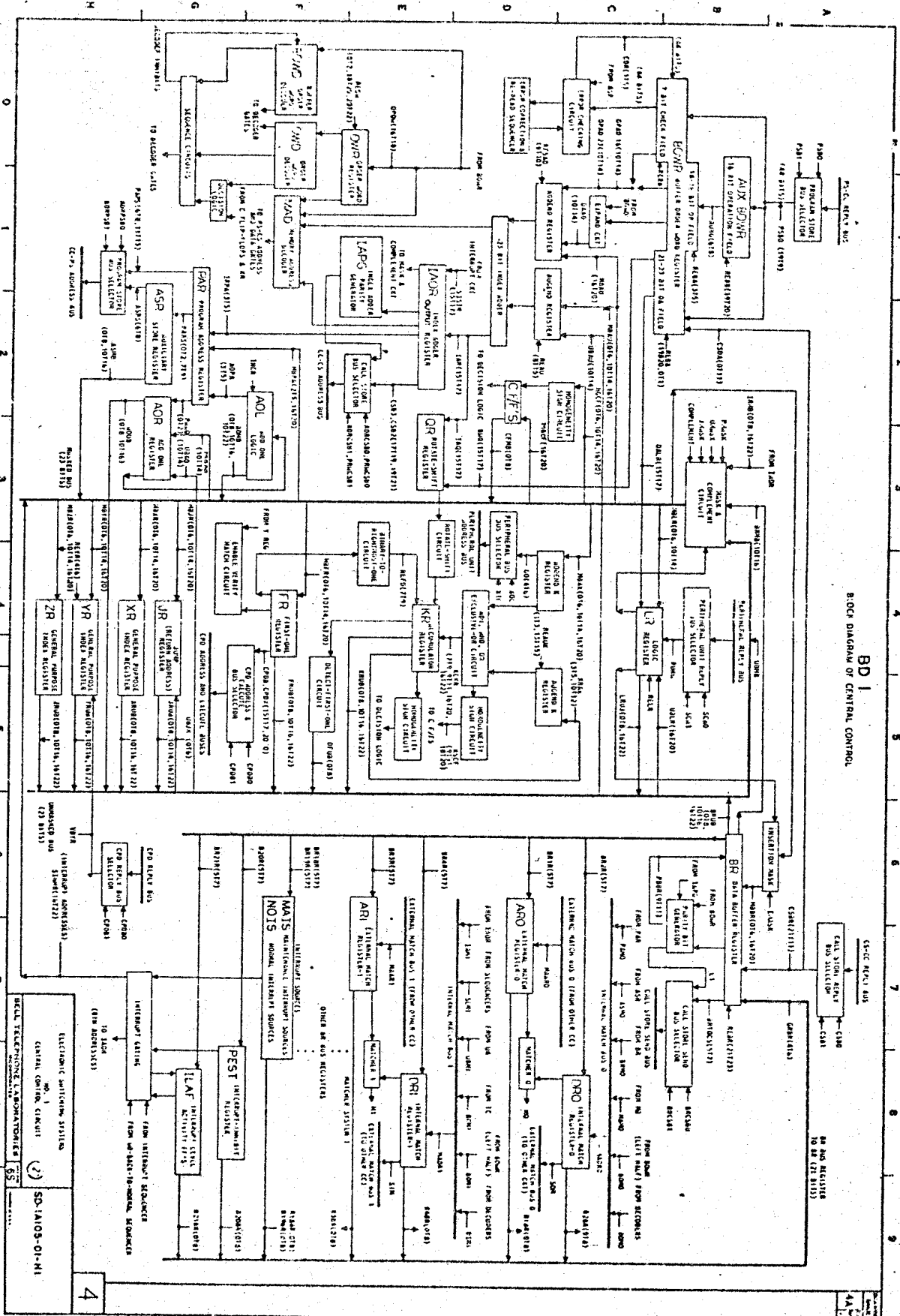
T01 T00	T11 T10	TIME OF MATCH
0 0		NO MATCH
0 1		10T16
1 0		0T0
1 1		16T22

P12 P11 P10	P02 P01 P00	MATCH POINT MATCHER 0	MATCH POINT MATCHER 1
0 0 0		NO MATCH	NO MATCH
0 0 1		PAR	SEQ 0 MC = 3
0 1 0		MASKED BUS	SEQ 1 MC = 2
0 1 1		DSW 19-0	UNMASKED BUS
1 0 0		DR	DSW 43-20
1 0 1		ASR	TADR
1 1 0		DECODER 0	TEST CONNECTOR
1 1 1		MATCH PRESET	DECODER 1
		ARO AND DRO	MATCH PRESET
			ARI AND DRI

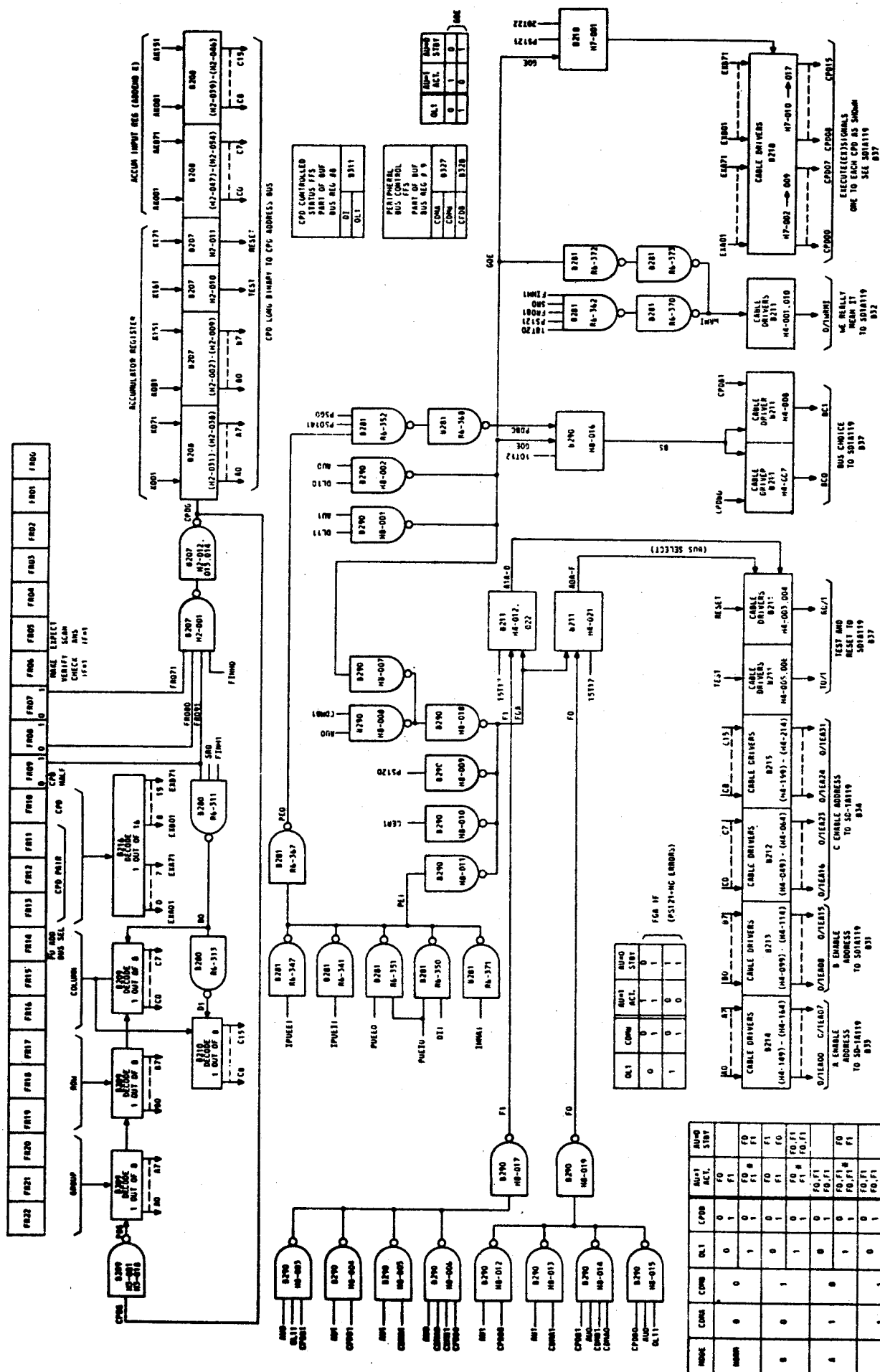
MODE	DSWCR										DSWACL										DSWCR														
	OPTIONS					MODE					MODE					(TOCR) CYCLE					T1					T0					P0				
	11	10	9	8	7	6	5	4	3	2	1	0	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
	F	E	NM	I	IC	TR	PB	CB	TD	NS	Y	X	EC	TOC	PSRR	PCTO	ISTO	ITR1	5	4	3	2	1	0	T11	T10	T01	T00	P12	P11	P10	P02	P01	P00	
RM - ROUTINE MATCH	X	X	X	X						0	0	0	0						DO	NOT	DISTURB														
DM - DIRECTED MATCH	X	X	X	X						1	0	0	0						DO	NOT	DISTURB	X	X	X	X	X	X	X	X	X	X	X	X	X	X
INC. TOC COUNT ALL CYCLES	X	X	X	X						1	0	0	0						0	1	0	1	1	1		X	X	X	X	X	X	X	X	X	X
NMS - NS SAMPLING	X	X	X	X						1	0	0	0						0	1	0	1	1	1		X	X	X	X	X	X	X	X	X	X
NO TOC INC. PSRR AND EC CYCLES	X	X	X	X						1	0	0	0						1	1	0	0	1	1		X	X	X	X	X	X	X	X	X	X
NMS - NS SAMPLING	X	X	X	X						1	0	0	0						1	1	0	0	1	1		X	X	X	X	X	X	X	X	X	X
PM - PRESET MATCH	X	X	X	X						1	0	0	0						DO	NOT	DISTURB	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BPC - CS ONLY	X	X	X	X						0	0	0	1						DO	NOT	DISTURB														
BPP - PS ONLY	X	X	X	X						0	0	1	0						DO	NOT	DISTURB														
BPCP - CS/PS	X	X	X	X						0	0	1	1						DO	NOT	DISTURB														
BPCS - CS SNAP	X	X	X	X						0	0	0	1						DO	NOT	DISTURB	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BPPS - PS SNAP	X	X	X	X						0	0	1	0						DO	NOT	DISTURB	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BPPCPS - CS/PS SNAP	X	X	X	X						0	0	1	1						DO	NOT	DISTURB	X	X	X	X	X	X	X	X	X	X	X	X	X	X
TDR - TRANS. RECORD	X	X	-	0						0	1	0	0						DO	NOT	DISTURB														

- = DON'T CARE

BD 1 BLOCK DIAGRAM OF CENTRAL CONTROL

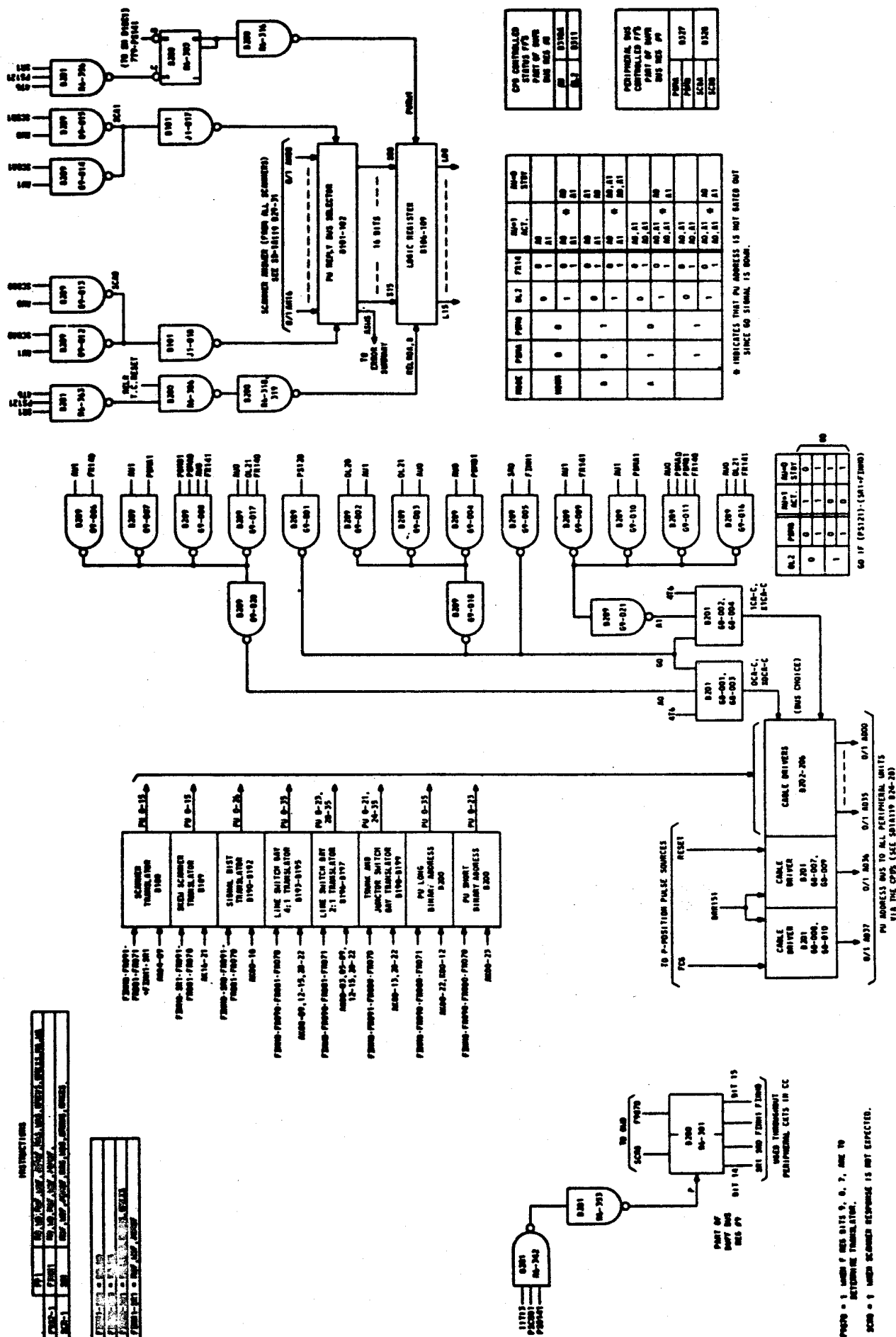


COMPOSITE DIAGRAM OF PERIPHERAL SYSTEM



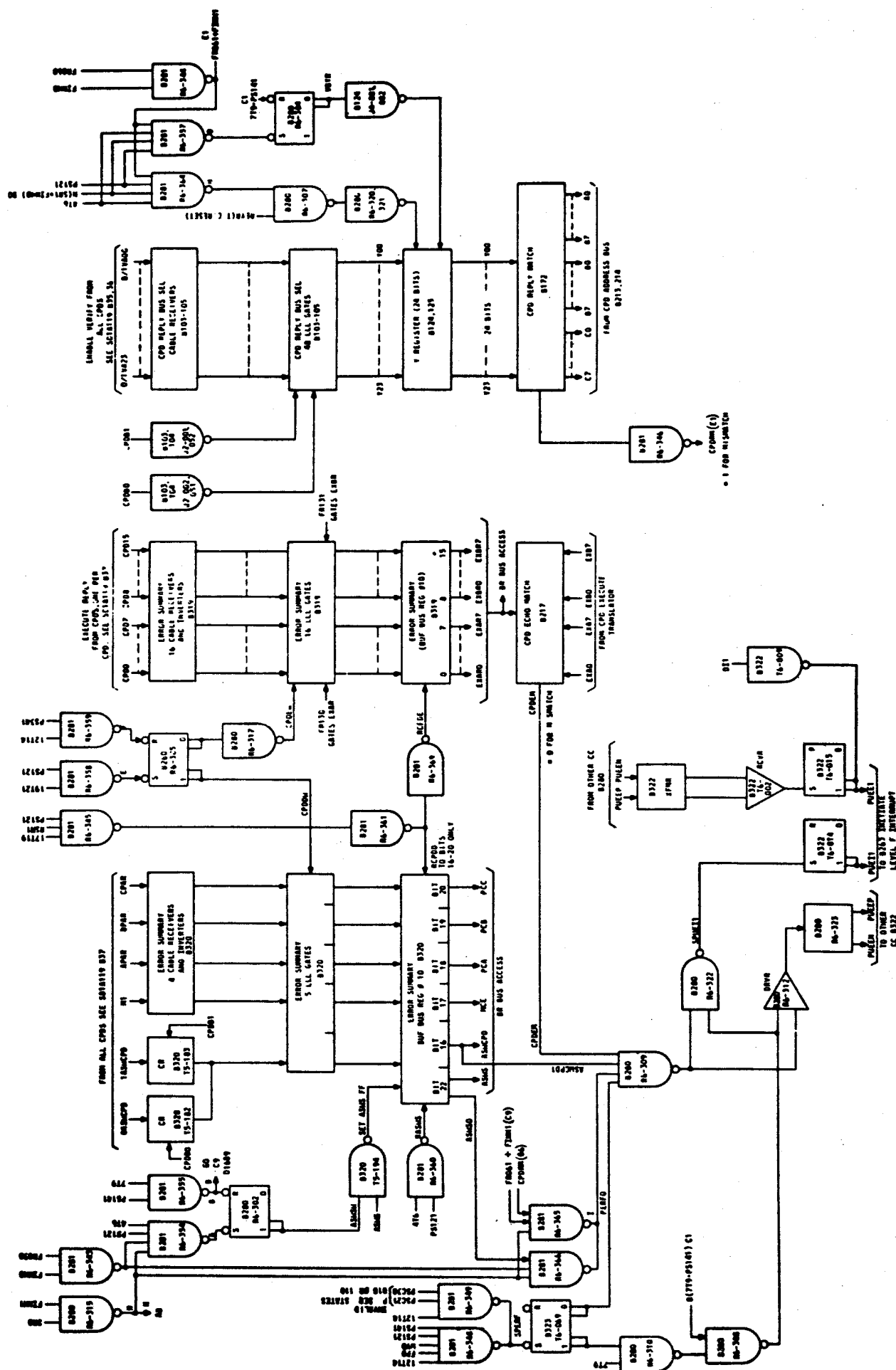
Q INDICATES THAT CPD ENABLE ADDRESS IS NOT GATED OUT
SINCE FBA SIGNAL IS DOWN

COMPOSITE DIAGRAM OF PERIPHERAL SYSTEM

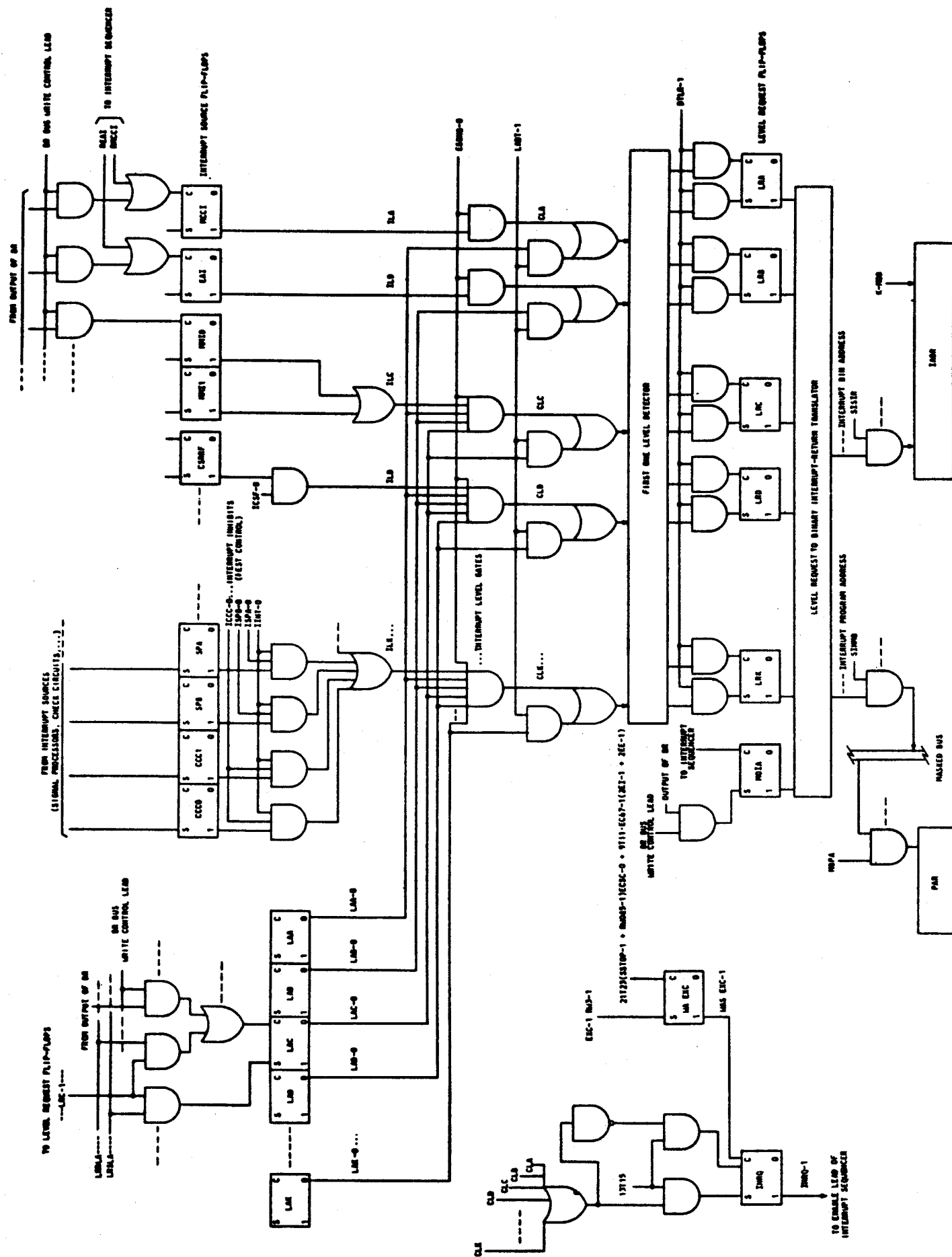


PG20 = 1 LATER P RES DITS 9, 0, 7, ARE TO
RETURN THE TRANSLATOR.

COMPOSITE DIAGRAM OF PERIPHERAL SYSTEM

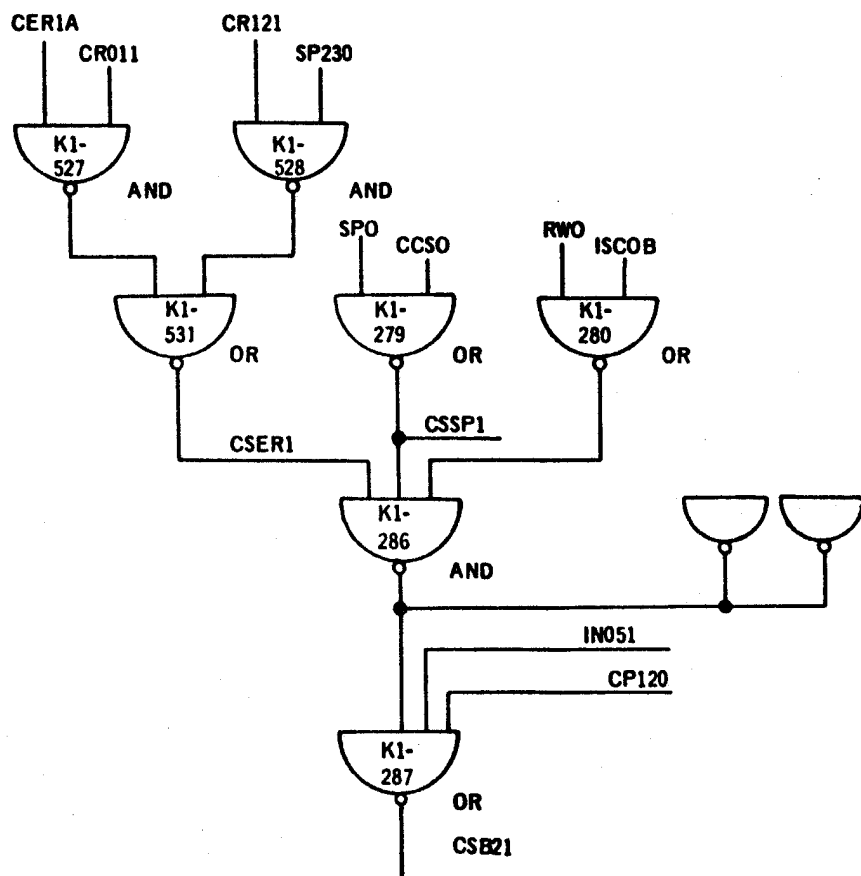


COMPOSITE DIAGRAM OF THE INTERRUPT CONTROL SYSTEM

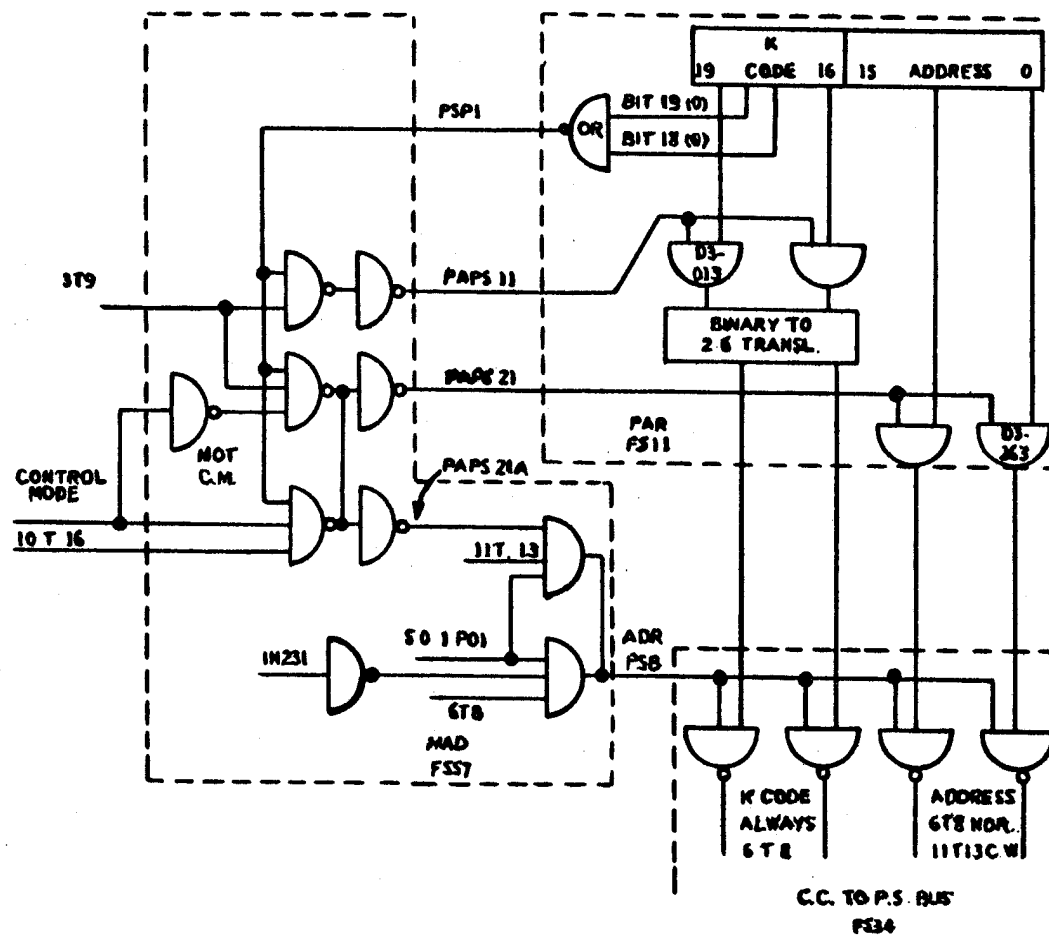


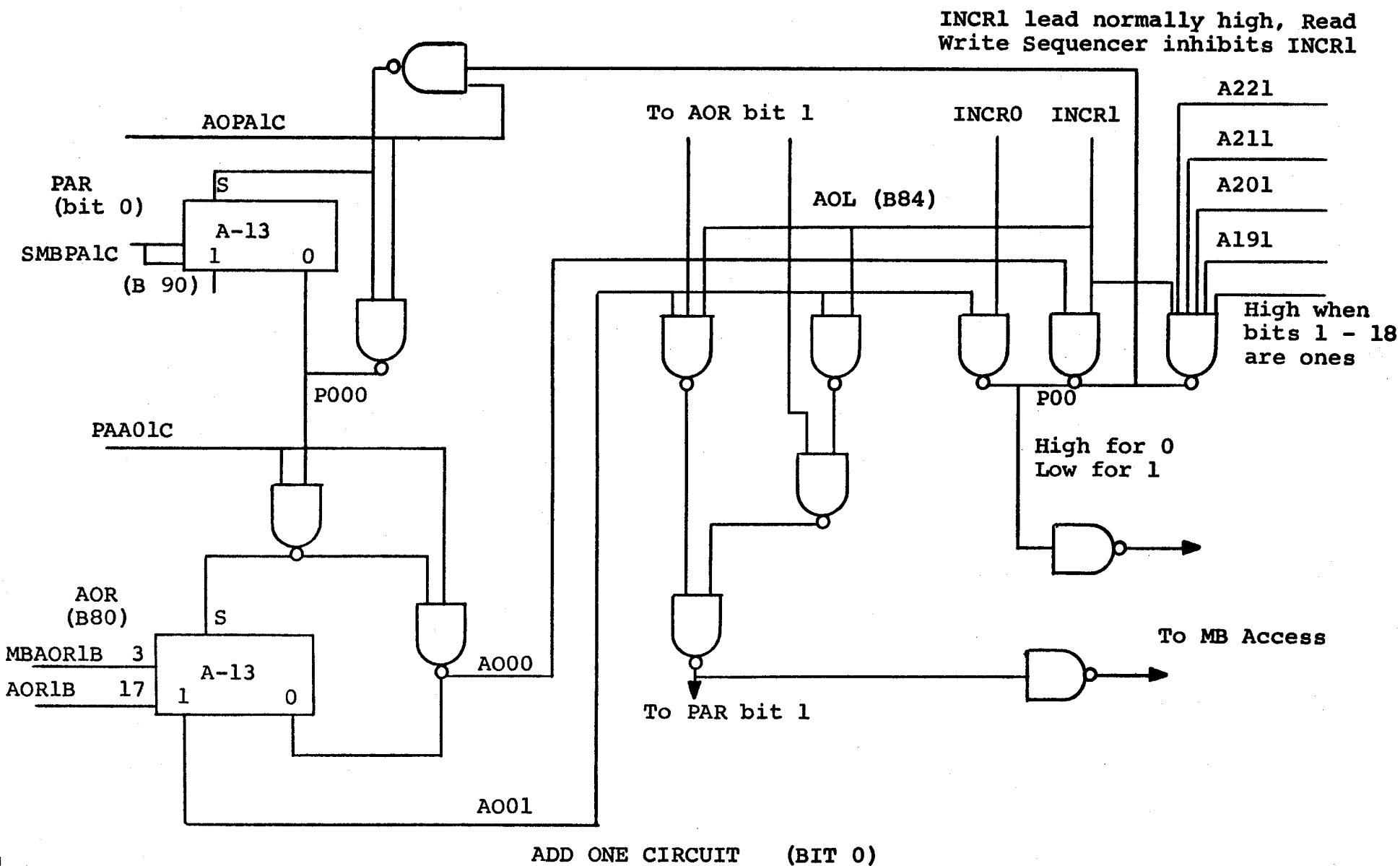
LESSON 34 (MAD) LECTURE AIDS . . .

REFREAD OR REWRITE ADDRESSING

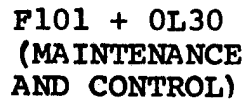


SIMPLIFIED PAPS GATING (V.G. 34-13)





Issue 2: December 1, 1970

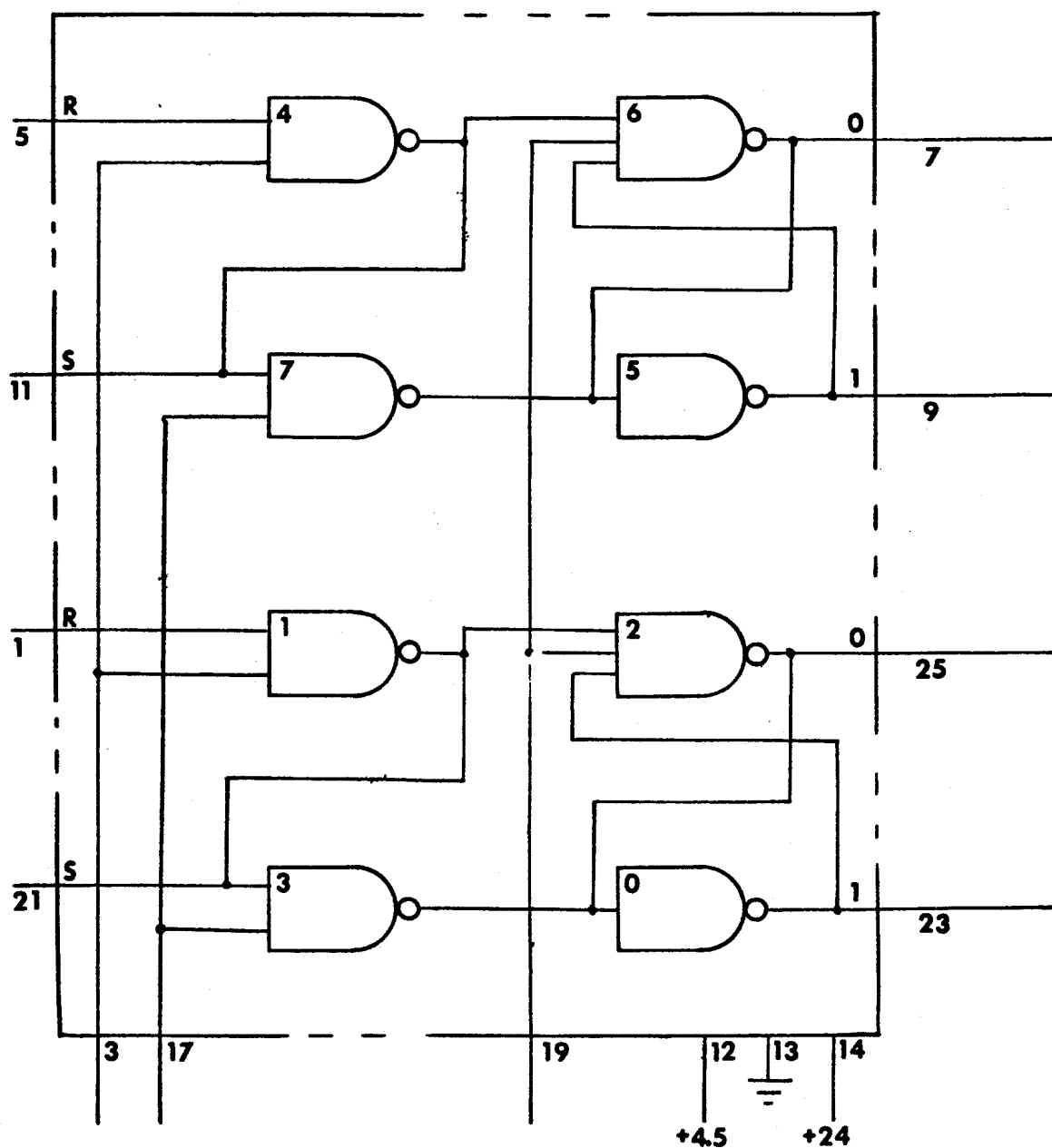


AUOA OUTPUT OF AU FF BB8
AULA BIT 0, IF = 0 CCO ACTIVE,
AULA LEAD HIGH IN CCO, LOW CCl

PBAO-1 - PBA FF BB8 BIT 3, IF SET, TELLS ACTIVE CC WHAT BUS TO USE. PBAO LEAD HIGH WHEN FF RESET. PBA1 IS ITS COMPLEMENT.

PS BUS SELECTION

PBO	PBA	PBT	ACTIVE	STANDBY
0	0	0	0	1
0	1	0	1	0
0	0	1	0	-
0	1	1	1	-
1	0	0	0 + 1	-

SIMPLIFICATION

ISSUE

ISSUE

22 D

ENGR
DERO
DRAWN
FHL

TITLE

2 BIT REGISTER A 13

BELL TELEPHONE LABORATORIES
INCORPORATED

SD-1A102

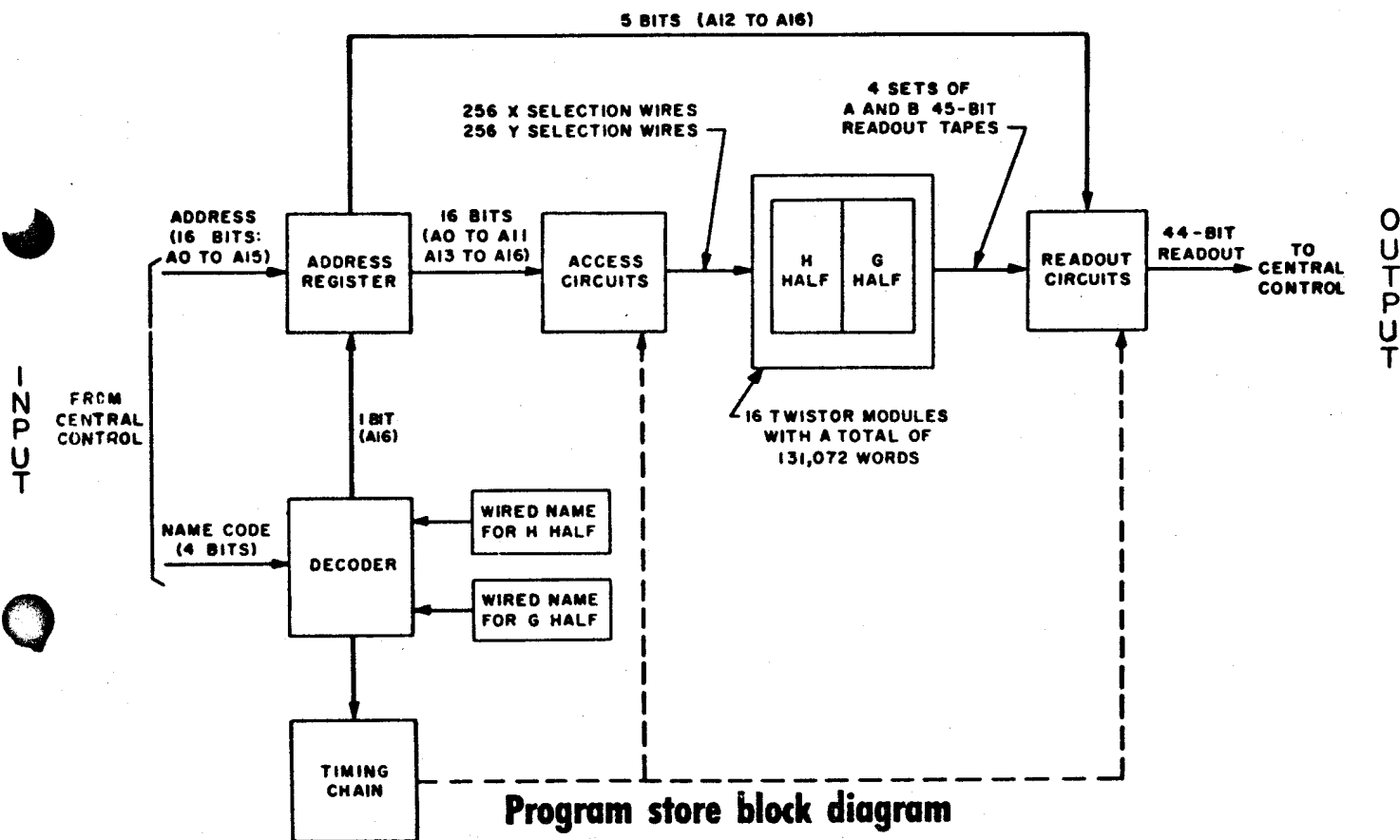
NO. OF SHEETS PER SET 1

SHEET
1

PROGRAM STORE . . .

General . . .

- . Random access read only memory
- . Cannot be written at electronic speeds
- . 5.5 microsecond cycle time
- . 44 Bit words
- . 131,072 words per store.
- . Divided into G and H halves
- . Split duplication provided for reliability
- . Memory element is the permanent magnet twister



Uses . . .

- . Source of CC programs (Call processing and maintenance)
- . Source of input-output programs
- . Translation data

PROGRAM STORE INPUTS . . .

- . Central Control - Normal Inputs
Mode, Name Code, and Address } Also See Bus Section
- . Central Control - Emergency Alarm Bus
Allows CC to determine in an emergency
which PS and which bus can be used.
- . Master Control Center - Override Bus
 - . Intended for use when Emergency Alarm Bus
does not function
 - . MCC can set routing flip-flops with
manual controls
- . Central Pulse Distributor
 - . Set or reset RO, TBLO, TBL1 flip-flops
 - . Inhibit Timing Chain
 - . Reset certain other flip-flops
- . Signal Distributor
 - . Control of relays used to select Monitor Bus
test points

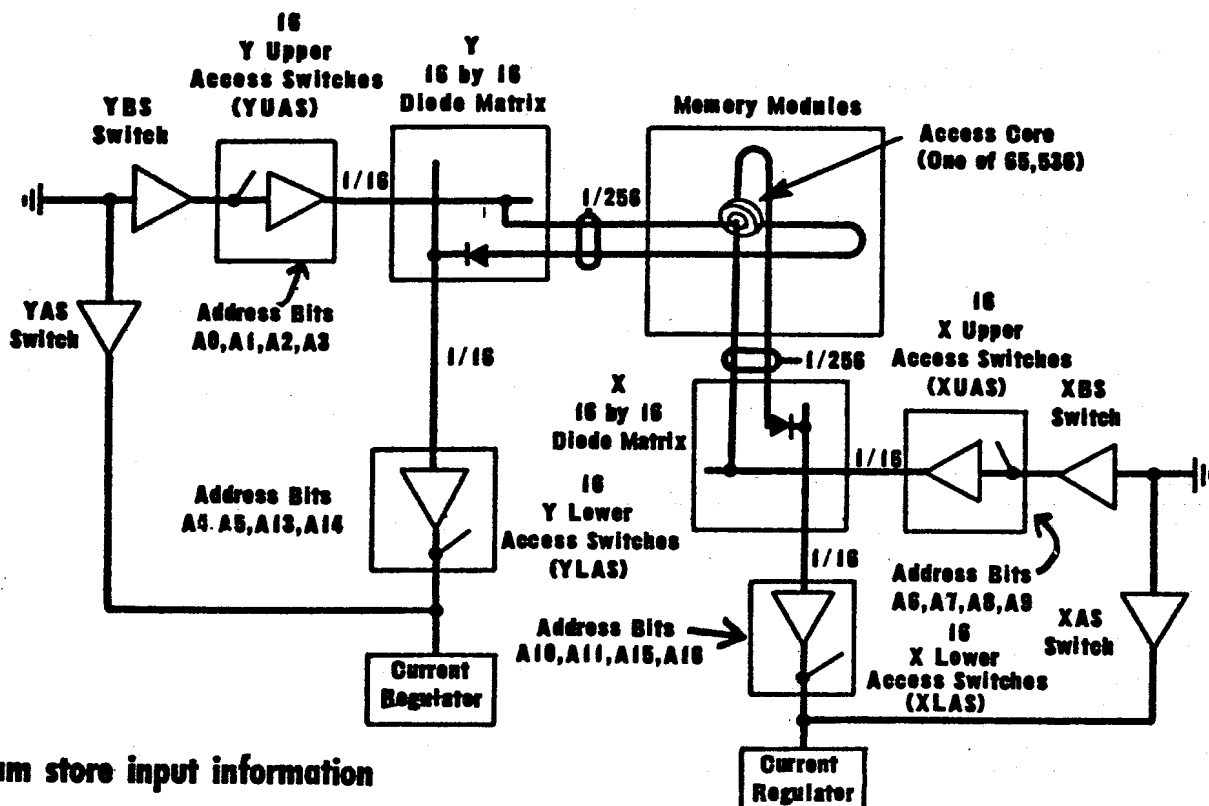
PROGRAM STORE OUTPUTS . . .

- . CENTRAL CONTROL - See Bus Section
- . 44 Bit Readout
- . All Seems Well Pulse
- . Sync Pulse
- . Master Scanner
- . A 48 pair monitor bus is used to monitor test points within a PS, only one PS at a time.
- . These test points are selected by signal distributor controlled relays.
- . 18 Test points are permanently connected to scan points.

INFORMATION BLOCK
LAYOUT

Information Module	PS0		PS Modules PS1		PS2	
	H	G	H	G	H	G
0	0			10		
1	1			11		
2	2			12		
3	3			13		
4	4			14		
5	5			15		
6	6			16		
7	7			17		
10		10			0	
11		11			1	
12		12			2	
13		13			3	
14		14			4	
15		15			5	
16		16			6	
17		17			7	
20			0			10
21			1			11
22			2			12
23			3			13
24			4			14
25			5			15
26			6			16
27			7			17

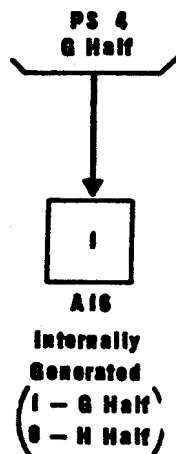
From Magnetic Listing



Program store input information

Mode	Name Code	Module	Readout Tape	Solenoid Plane (two cards)	Word
0 0 0 0	1 0 1 0	0 1 1	1	1 0 0 1 1 1	0 1 0 1 0 1
HM GM CM OW	E18 E16 E17 E16	A15 A14 A13	A12	A11 A10 A9 A8 A7 A6 (X ACCESS) Solenoid Plane 39	A5 A4 A3 A2 A1 A0 (Y ACCESS) Word 21

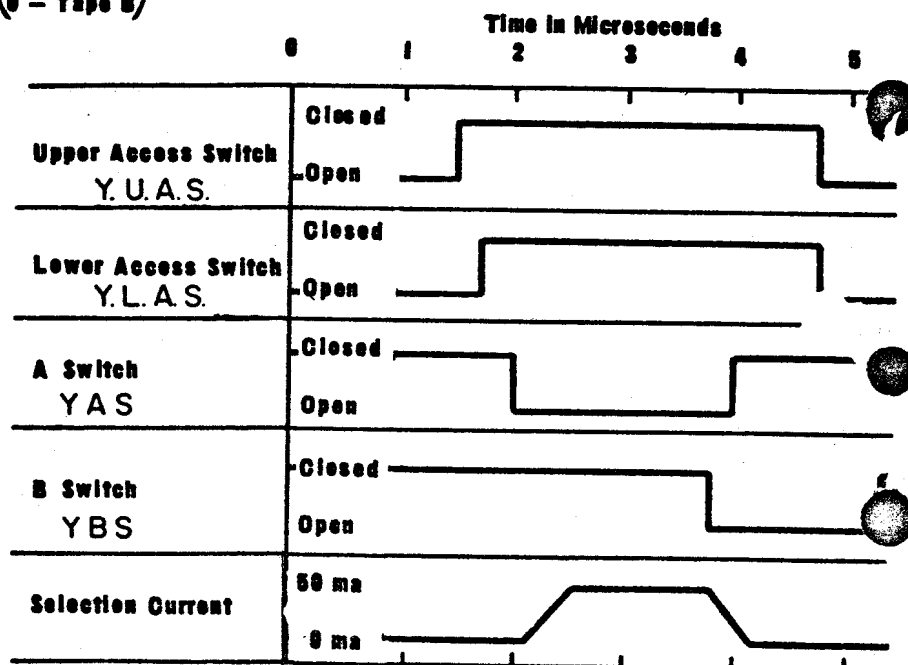
Normal Mode

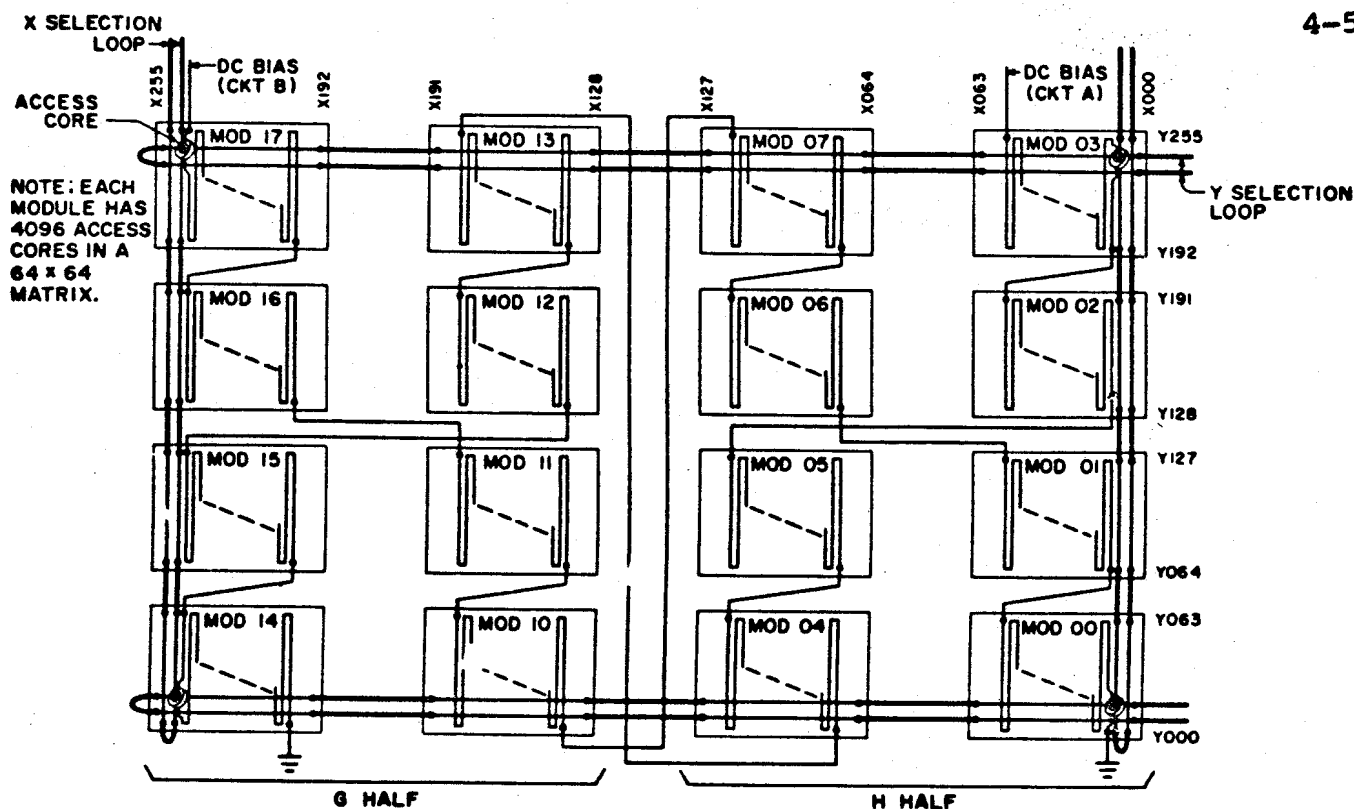


Module 13

Tape A

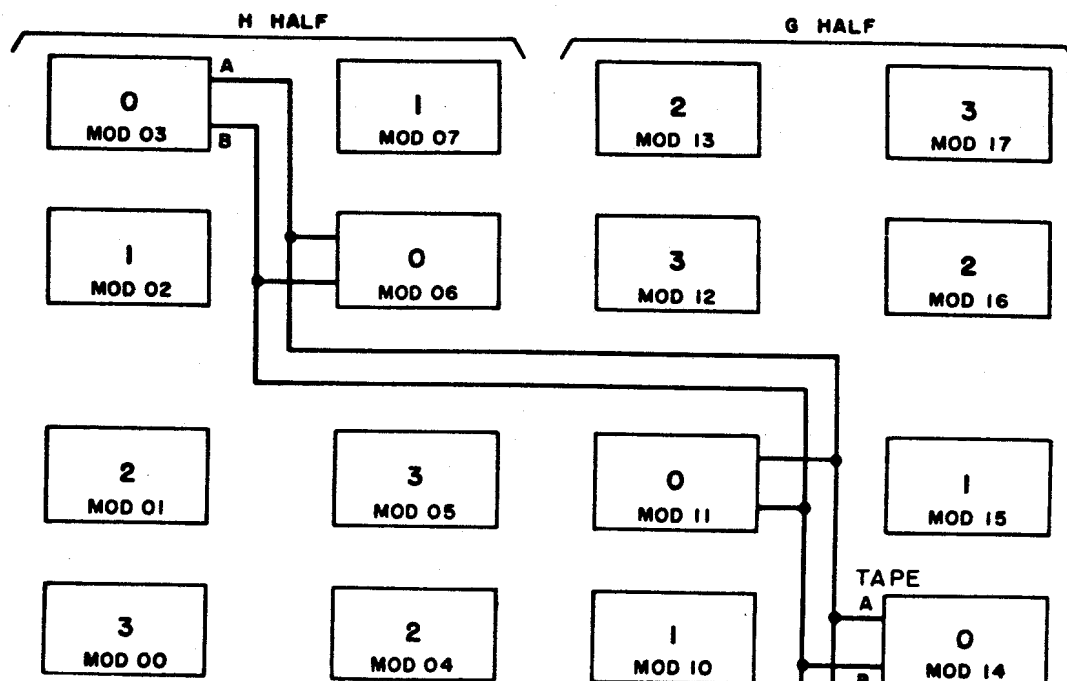
(1 - Tape A)
(0 - Tape B)





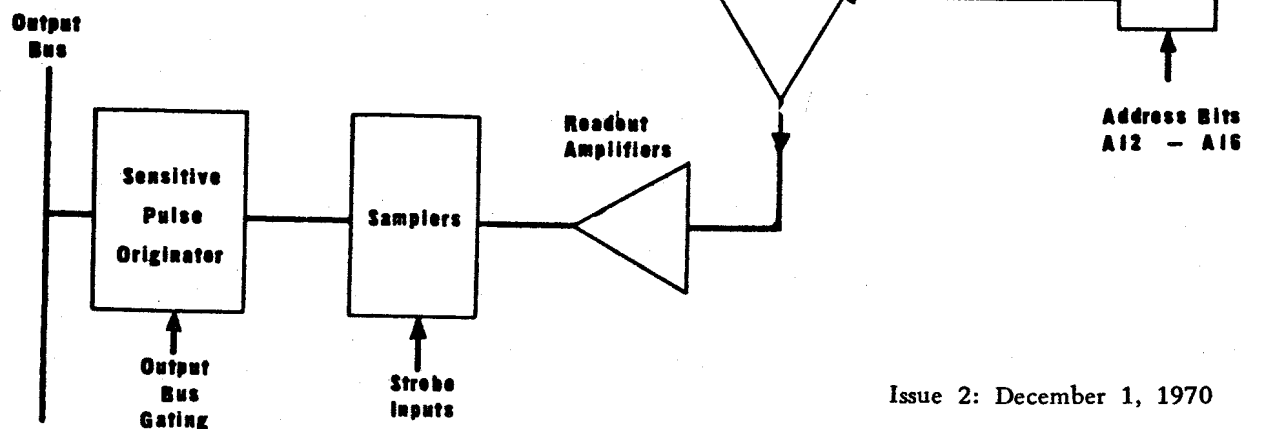
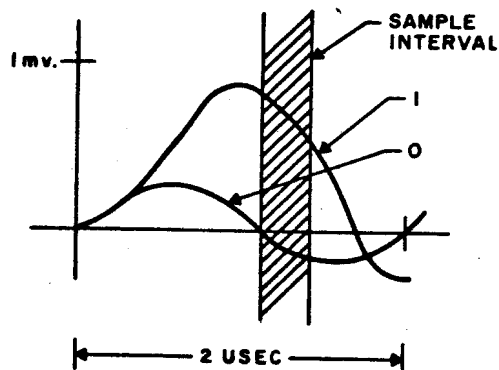
Wiring of Selection and Bias Wires in
Program Memory Store (Rear View)

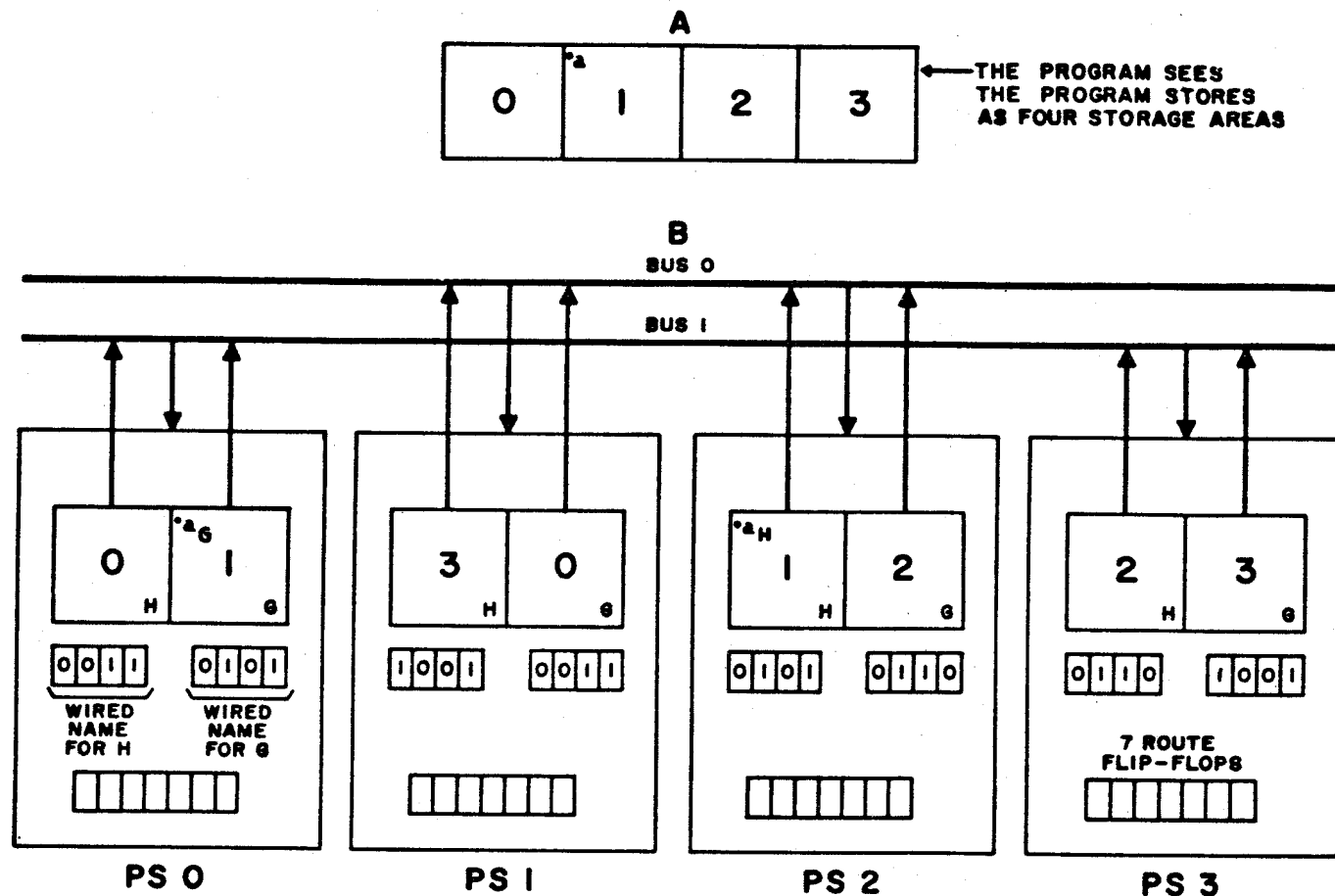
Translator Inputs from PAR/ASR				Program Store K Code				
X19	X18	X17	X16		C19	C18	C17	C16
0	1	0	0		0	0	1	1
0	1	0	1		0	1	0	1
0	1	1	0		0	1	1	0
0	1	1	1		1	0	0	1
1	0	0	0		1	0	1	0
1	0	0	1		1	1	0	0
1	0	1	0		1	0	0	0
1	0	1	1		0	0	0	1
1	1	0	0		0	0	1	0
1	1	0	1		0	1	0	0
1	1	1	0		1	0	0	0
1	1	1	1		0	0	0	1



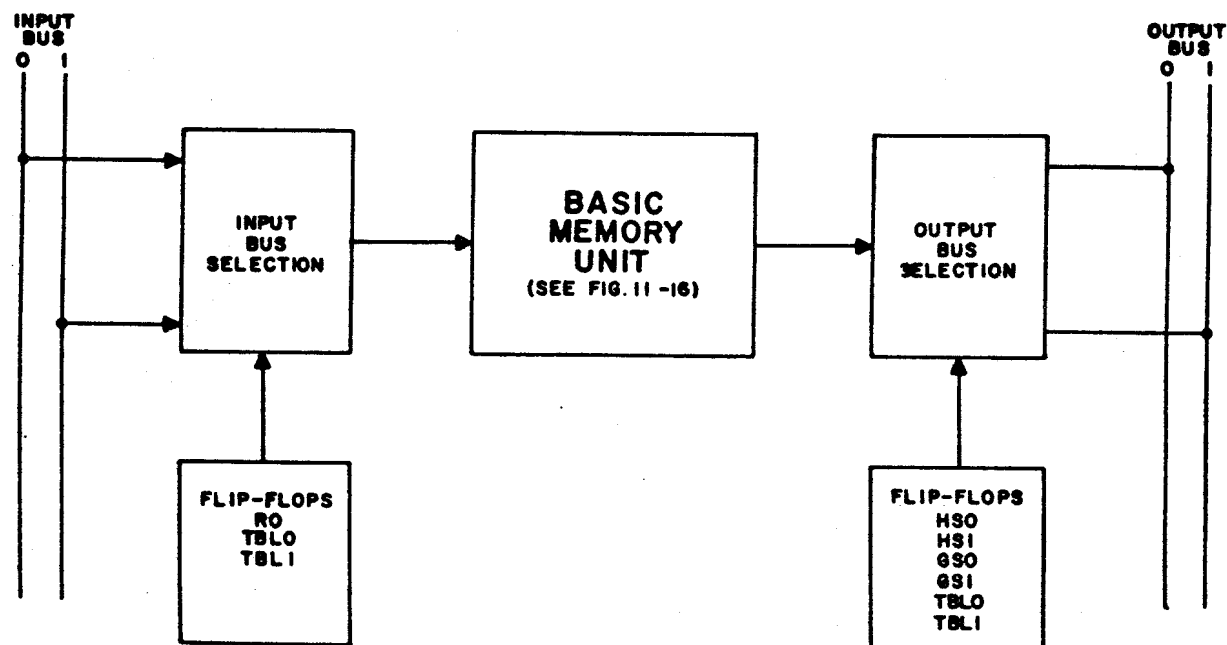
NOTE: THE 44-BIT A READOUT AND THE 44-BIT B READOUT ARE EACH CONNECTED IN PARALLEL WITH SIMILAR READOUTS FROM SIMILARLY NUMBERED MODULES. FOUR MODULES ARE CONNECTED TO THE SAME OUTPUT PAIRS IN EACH WIRING PATTERN.

TYPICAL SIGNAL AT SELECTOR INPUT





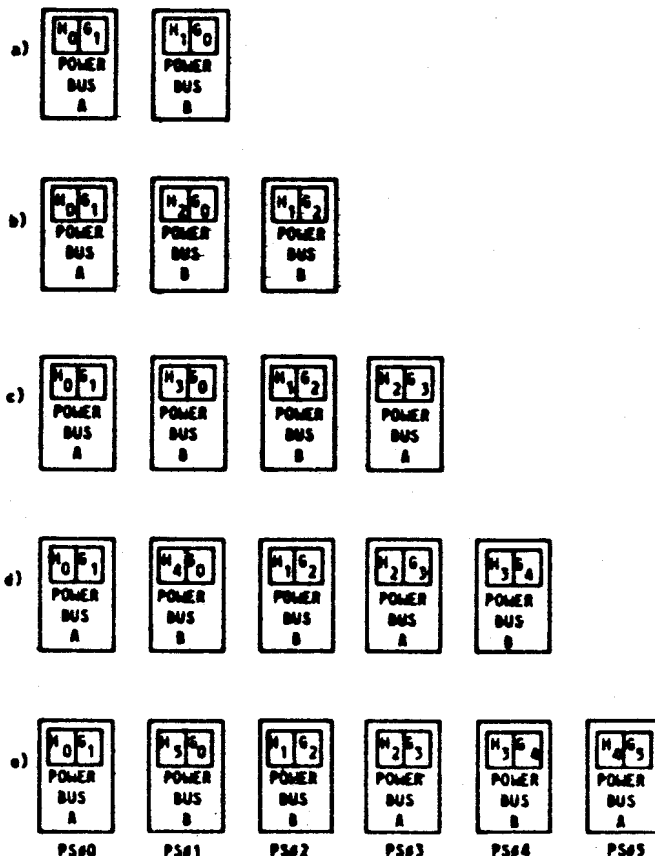
BOTH THE H-HALF AND G-HALF OF EACH STORE HAVE A WIRED NAME.



NORMAL INPUT-OUTPUT CONTROL . . .

- . Each Program Store is divided into a "G" and "H" half.
- . Information blocks are duplicated in different halves of different stores.
- . Each half of a store has a wired name code.
- . A word is normally selected by sending a 4 bit name code (K code) and a 16 bit address which specifies a word within a block.
- . In normal operation each half of a PS may:
 - . Receive from either bus (both receive on same)
 - . Two halves may send on either, both, or neither of the buses
- . Seven route flip-flops determine the input-output configuration
- . Route flip-flops controlled by CPD

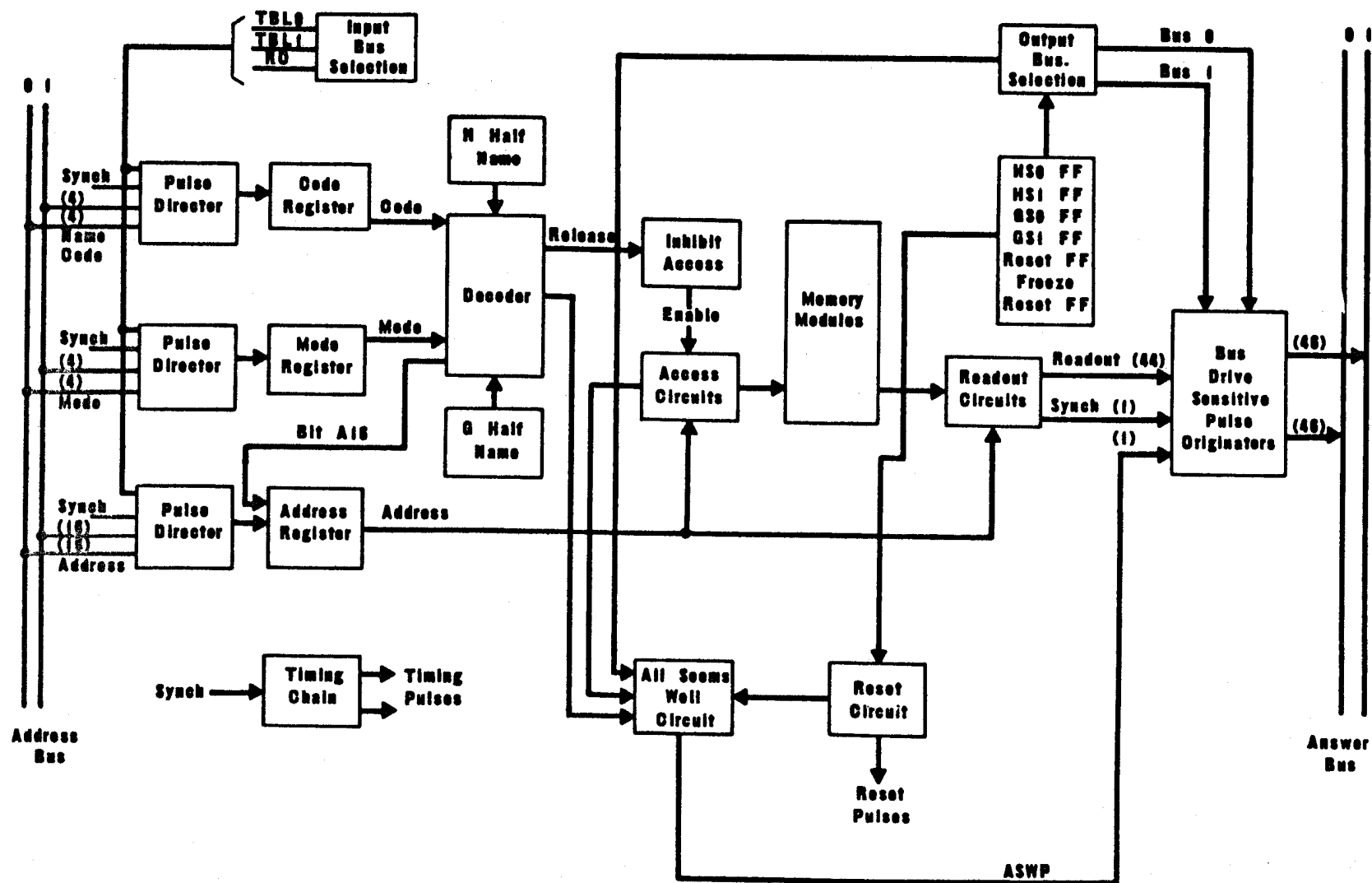
DUPLICATION OF INFORMATION CONTAINED IN PROGRAM STORES.



K CODE BITS IN PROGRAM STORE.

K BITS				INFORMATION BLOCK SPECIFIED
K3	K2	K1	K0	
0	0	1	1	H0, G0
0	1	0	1	H1, G1
0	1	1	0	H2, G2
1	0	0	1	H3, G3
1	0	1	0	H4, G4
1	1	0	0	H5, G5

Program store normal mode reading operation ...



PROGRAM STORE MODES OF OPERATION . . .

	<u>H</u>	<u>G</u>	<u>C</u>	<u>CW</u>
Read in Normal Mode	0	0	0	-
Read in H Maintenance Mode	0	1	1	-
Read in G Maintenance Mode	1	0	1	-
Read in Control Mode	1	1	0	0
Write in Control Mode	1	1	0	1

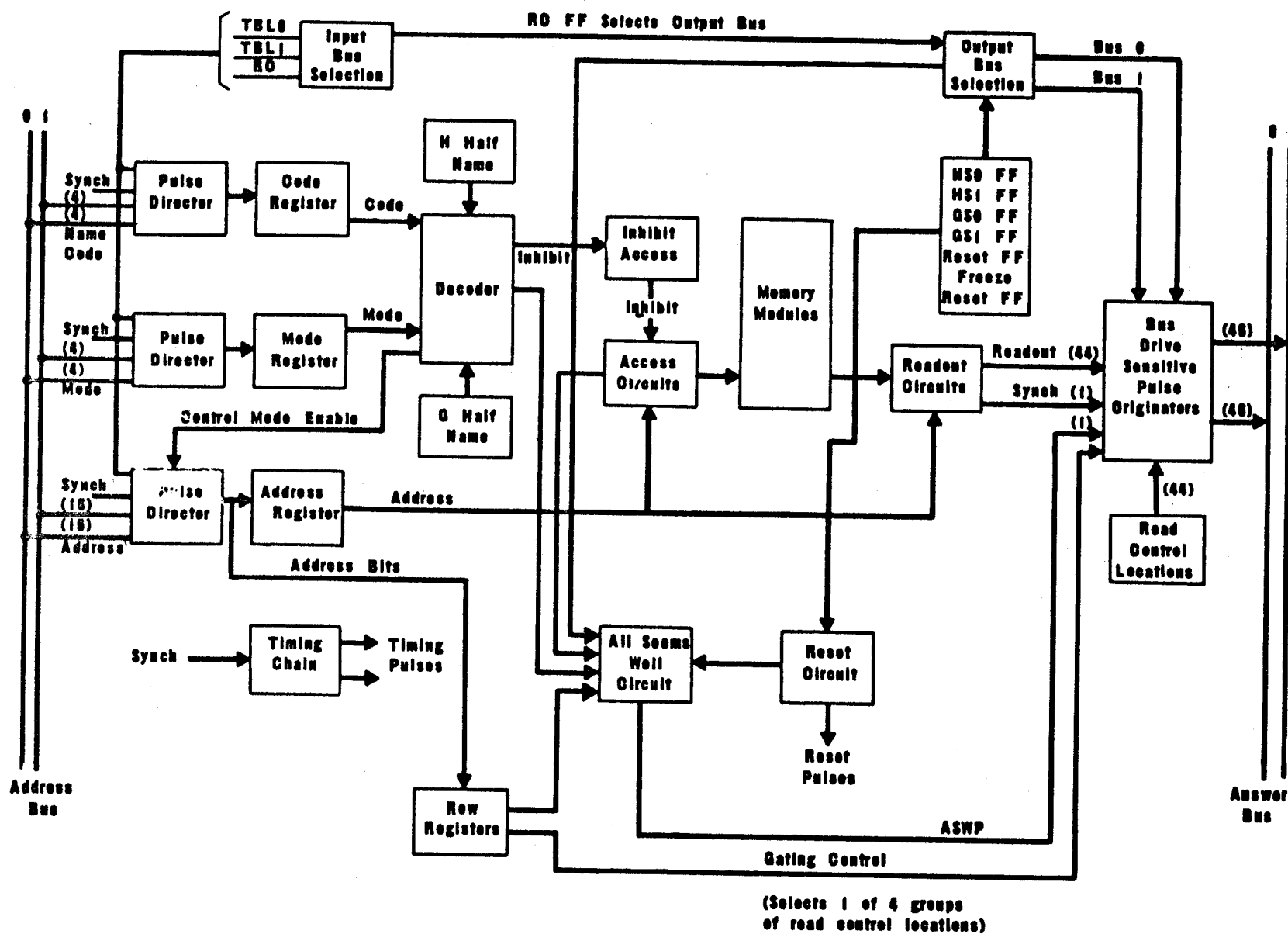
Normal Mode . . .

- . Used when Central Control is obtaining program and translation information from the Program Store.
- . Complete flexibility in choice of buses.
- . Two Program Stores will respond to transmitted name code.

Maintenance Modes . . .

- . Two types - G Maintenance and H Maintenance
- . Used when Central Control is performing diagnostic checks.
- . Only one half of one store will respond to transmitted name code.

Program store control mode reading operation ...

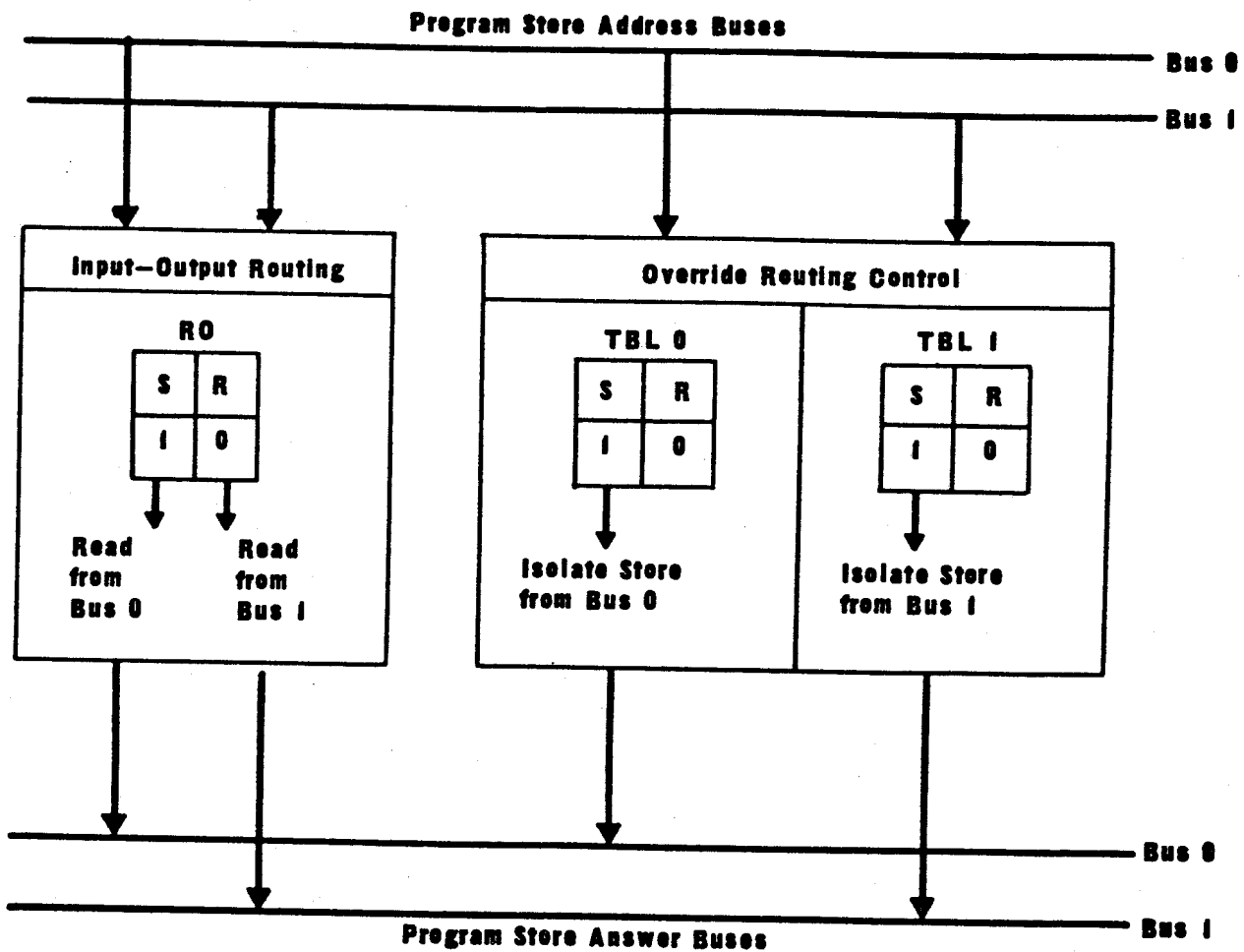


CONTROL MODE . . .

- . No reading of memory modules occurs.
- . Read Control Mode
 - . Used to check the status of internal test points.
 - . Program Store with H half name code match responds.
- . Write Control Mode
 - . Used to permit Central Control to set up desired conditions in the store.
 - . Permits Central Control to make later diagnostic checks or change output bus selection.
 - . Program Store with H half name code match responds.

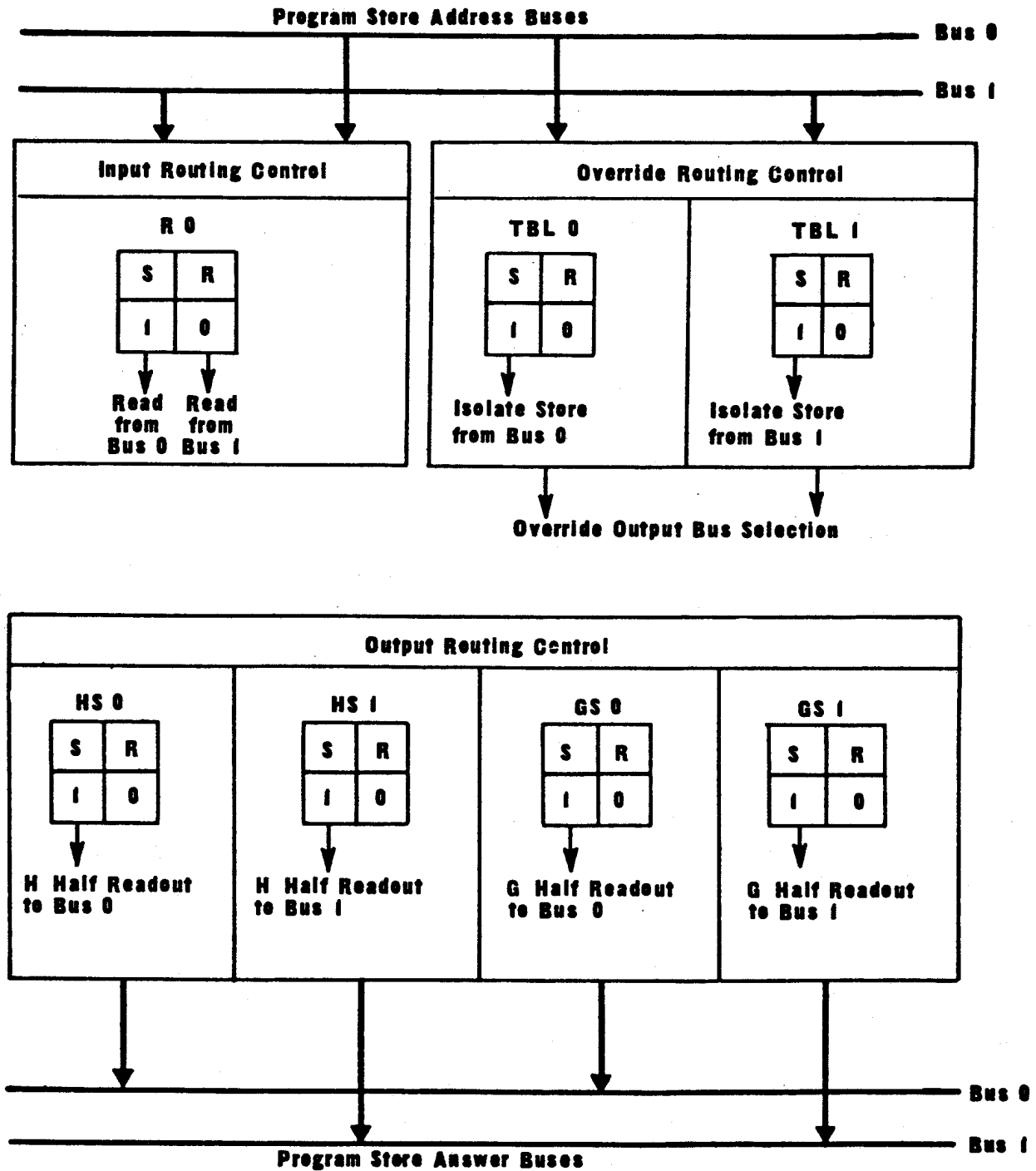
EFFECTS OF ROUTING CONTROL FLIP-FLOPS . . .

MAINTENANCE AND CONTROL MODES . . .



EFFECTS OF ROUTING CONTROL FLIP-FLOPS . . .

NORMAL MODE . . .

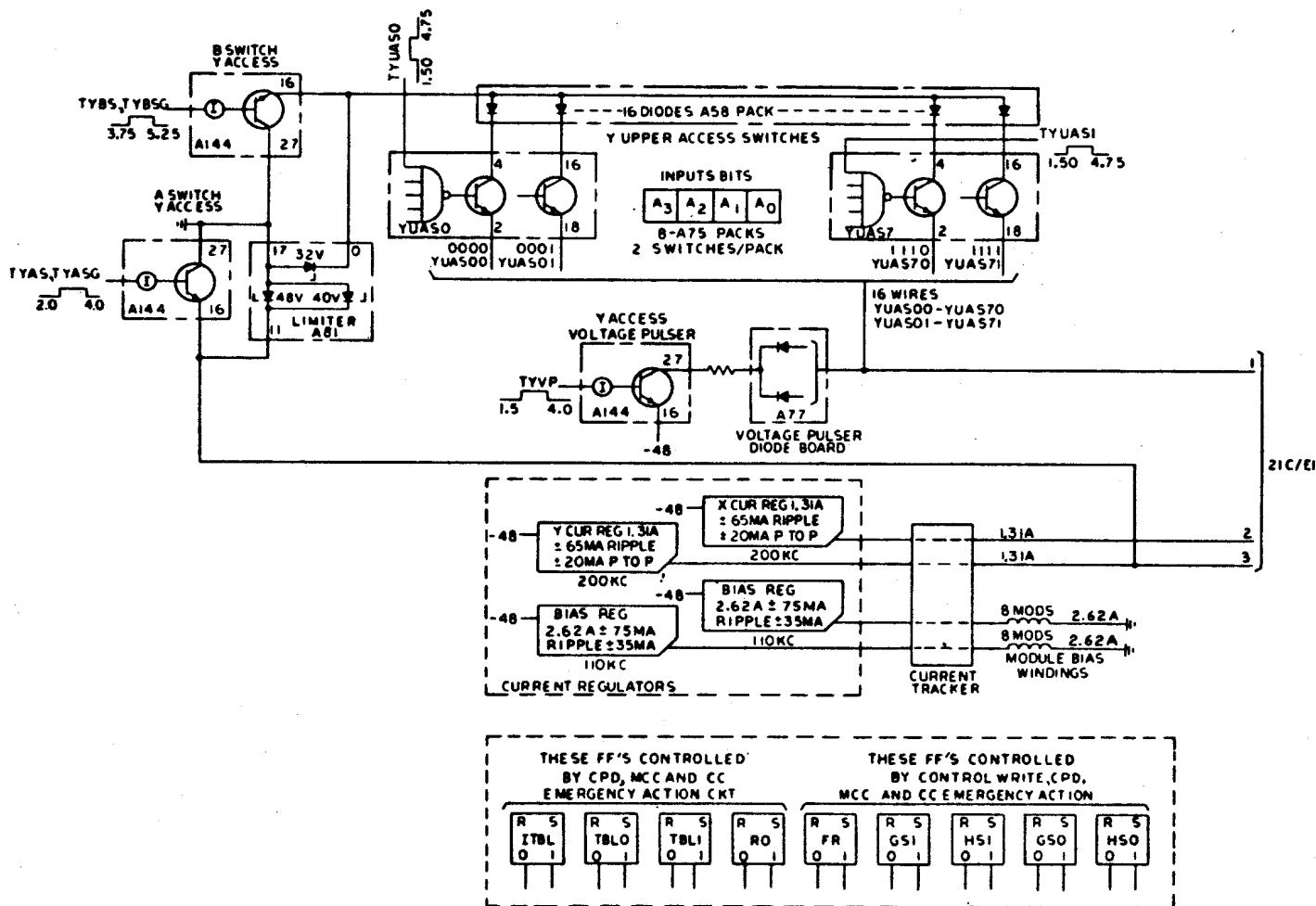
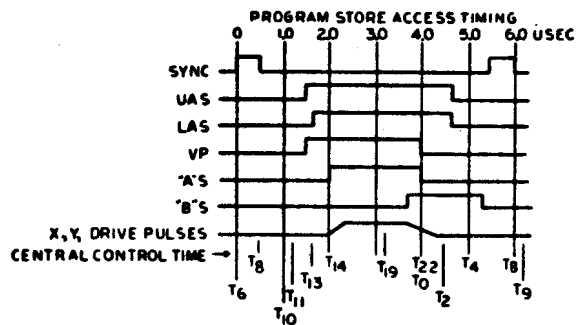


TRAINEE MANUAL - Plant Training Course No. 90

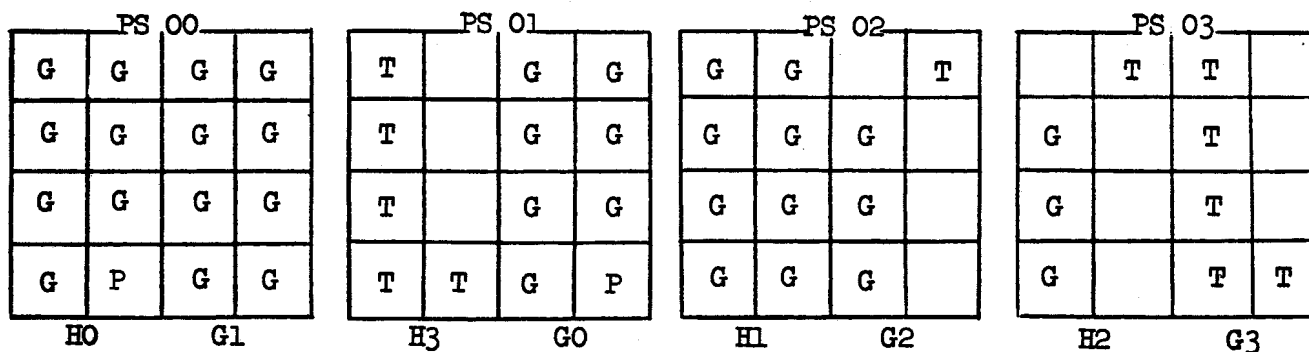
Table of Contents

General	Section 1
Bus System	Section 2
Central Control	Section 3
Program Store	Section 4
Call Store	Section 5
Central Pulse Distributor	Section 6
Scanner	Section 7
Signal Distributor	Section 8
Networks	Section 9
Miscellaneous	Section 10
Program Fund	Section 11
Records - Documents	Section 12

PART OF ROUTING CONTROL



TYPICAL ARRANGEMENT OF 4 PROGRAM STORES



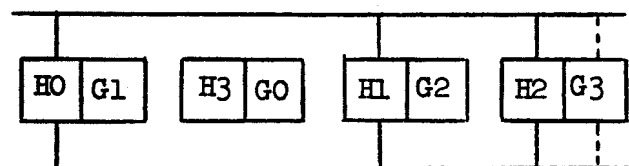
G = GENERIC

T = TRANSLATIONS

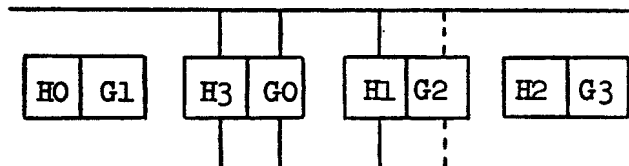
P = PARAMETERS

PROGRAM STORE STATE
CONTROL...

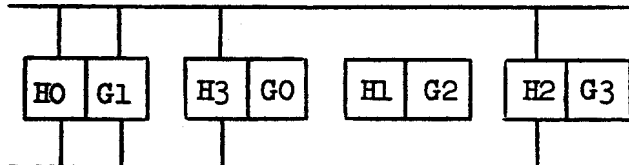
STATE 1



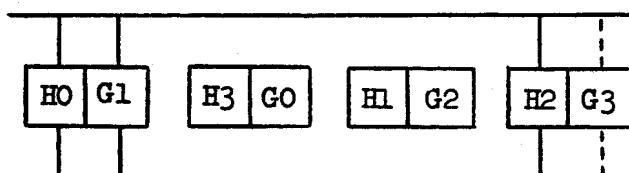
STATE 2



STATE 3



STATE 4



TAPE GROUPS

GO	G1	G2	G3
G1	GO	G3	G2
G2	G3	GO	G1
G3	G2	G1	GO

H - half

G - half

PROGRAM STORE ADDRESSES...

0.1 aa bb cc

"aa"

MOD.*

00-01

00

02-03

01

04-05

02

06-07

03

10-11

04

12-13

05

14-15

06

16-17

07

20-21

10

22-23

11

24-25

12

26-27

13

30-31

14

32-33

15

34-35

16

36-37

17

40-41

20

42-43

21

44-45

22

46-47

23

50-51

24

52-53

25

54-55

26

56-57

27

60-61

30

62-63

31

64-65

32

66-67

33

70-71

34

72-73

35

74-75

36

76-77

37

ODD No.-Pass 1

EVEN No. Pass 0

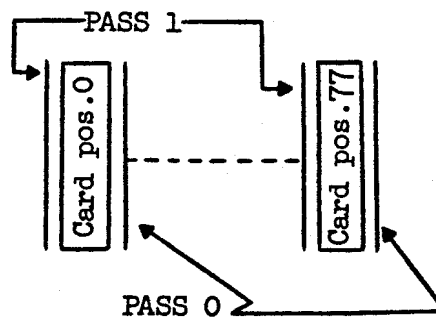
"bb" - Card number.

"cc" - Word number.

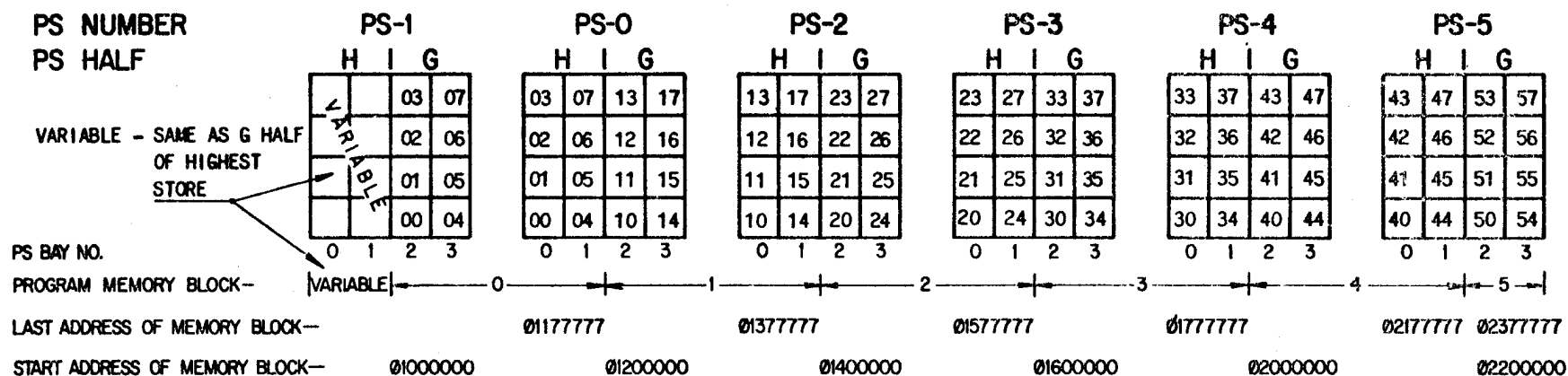
Bit 12...

0 for tape "B"

1 for tape "A"

(ALL NUMBERS ARE
OCTAL)*Mod. within memory
block.

Memory block.

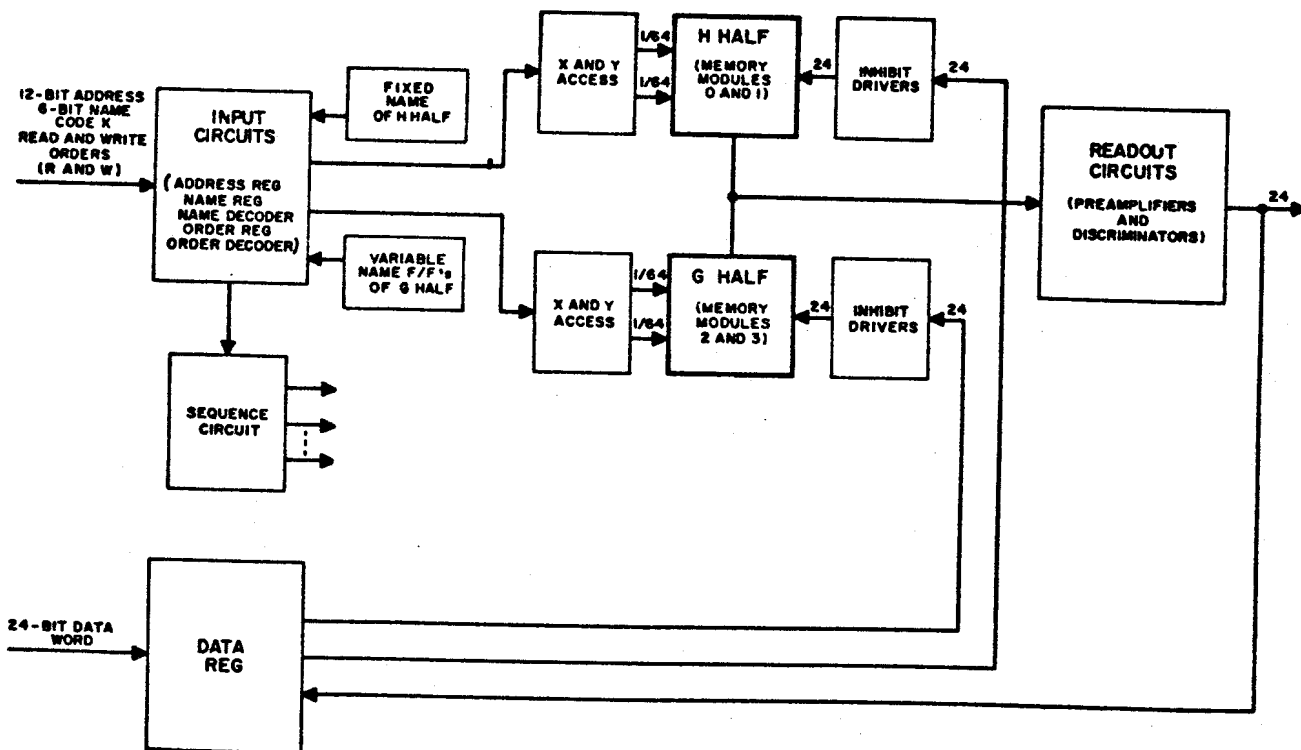
PS NUMBER
PS HALF

OFFICE TYPE		GENERIC MODS	PARAMETER MOD(S)	START OF HEAD TABLE	PROGRAM MOD. NO.	STARTING ADDRESS	ENDING ADDRESS	PROGRAM MOD. NO.	STARTING ADDRESS	ENDING ADDRESS
PG-1A002	CC-1	0-21	4	Ø1560000	00	Ø1000000	Ø1017777	30	Ø1600000	Ø1617777
PG-1A003	SP-1	0-27	PASS 0 OF 3 & ALL OF 4	Ø1760000	01	Ø1020000	Ø1037777	31	Ø1620000	Ø1637777
PG-1A004	CC-CTX-1	0-25	4	Ø1560000	02	Ø1040000	Ø1057777	32	Ø1640000	Ø1657777
PG-1A005	SP-CTX-1	0-31	PASS 0 OF 3 & ALL OF 4	Ø1760000	03	Ø1060000	Ø1077777	33	Ø1660000	Ø1677777
PG-1A006	CC-2	0-22	4	Ø1560000	04	Ø1100000	Ø1117777	34	Ø1700000	Ø1717777
PG-1A007	CC-3	0-22	4	Ø1560000	05	Ø1120000	Ø1137777	35	Ø1720000	Ø1737777
PG-1A009	CC-CTX-2	0-27	4	Ø1760000	06	Ø1140000	Ø1157777	36	Ø1740000	Ø1757777
PG-1A010	SP-CTX-3	0-33	PASS 0 OF 3 & ALL OF 4	Ø1760000	07	Ø1160000	Ø1177777	37	Ø1760000	Ø1777777
					10	Ø1200000	Ø1217777	40	Ø2000000	Ø2017777
					11	Ø1220000	Ø1237777	41	Ø2020000	Ø2037777
					12	Ø1240000	Ø1257777	42	Ø2040000	Ø2057777
					13	Ø1260000	Ø1277777	43	Ø2060000	Ø2077777
					14	Ø1300000	Ø1317777	44	Ø2100000	Ø2117777
PG-2A005	AV-3	0-12 & 21-27	4	Ø1360000	15	Ø1320000	Ø1337777	45	Ø2120000	Ø2137777
PG-2A008	AV-4	0-12 & 21-27	4	Ø1360000	16	Ø1340000	Ø1357777	46	Ø2140000	Ø2157777
PG-2A009	AV-176-4	0-11 & 21-27	4	Ø1360000	17	Ø1360000	Ø1377777	47	Ø2160000	Ø2177777
					20	Ø1400000	Ø1417777	50	Ø2200000	Ø2217777
					21	Ø1420000	Ø1437777	51	Ø2220000	Ø2237777
					22	Ø1440000	Ø1457777	52	Ø2240000	Ø2257777
					23	Ø1460000	Ø1477777	53	Ø2260000	Ø2277777
					24	Ø1500000	Ø1517777	54	Ø2300000	Ø2317777
					25	Ø1520000	Ø1537777	55	Ø2320000	Ø2337777
					26	Ø1540000	Ø1557777	56	Ø2340000	Ø2357777
					27	Ø1560000	Ø1577777	57	Ø2360000	Ø2377777

CALL STORE . . .

GENERAL . . .

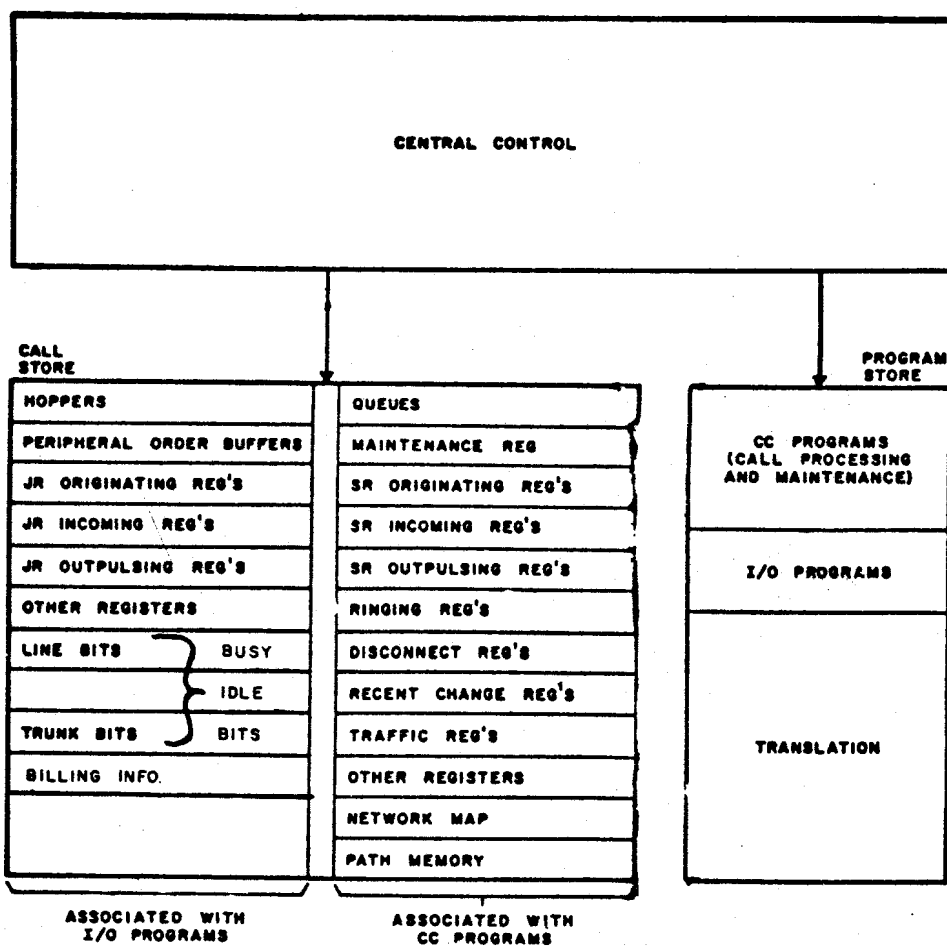
- . Read-write random access memory
- . Stores call related data
- . 5.5 microsecond cycle time
- . Capacity is 8192 (24 bit words) per store
- . Ferrite sheet used for memory element
- . Readout is destructive. Regenerate operation must follow each read operation
- . Split duplication provided for reliability



Basic Call Store

CALL RELATED INFORMATION IS STORED IN THE CALL STORE . . .

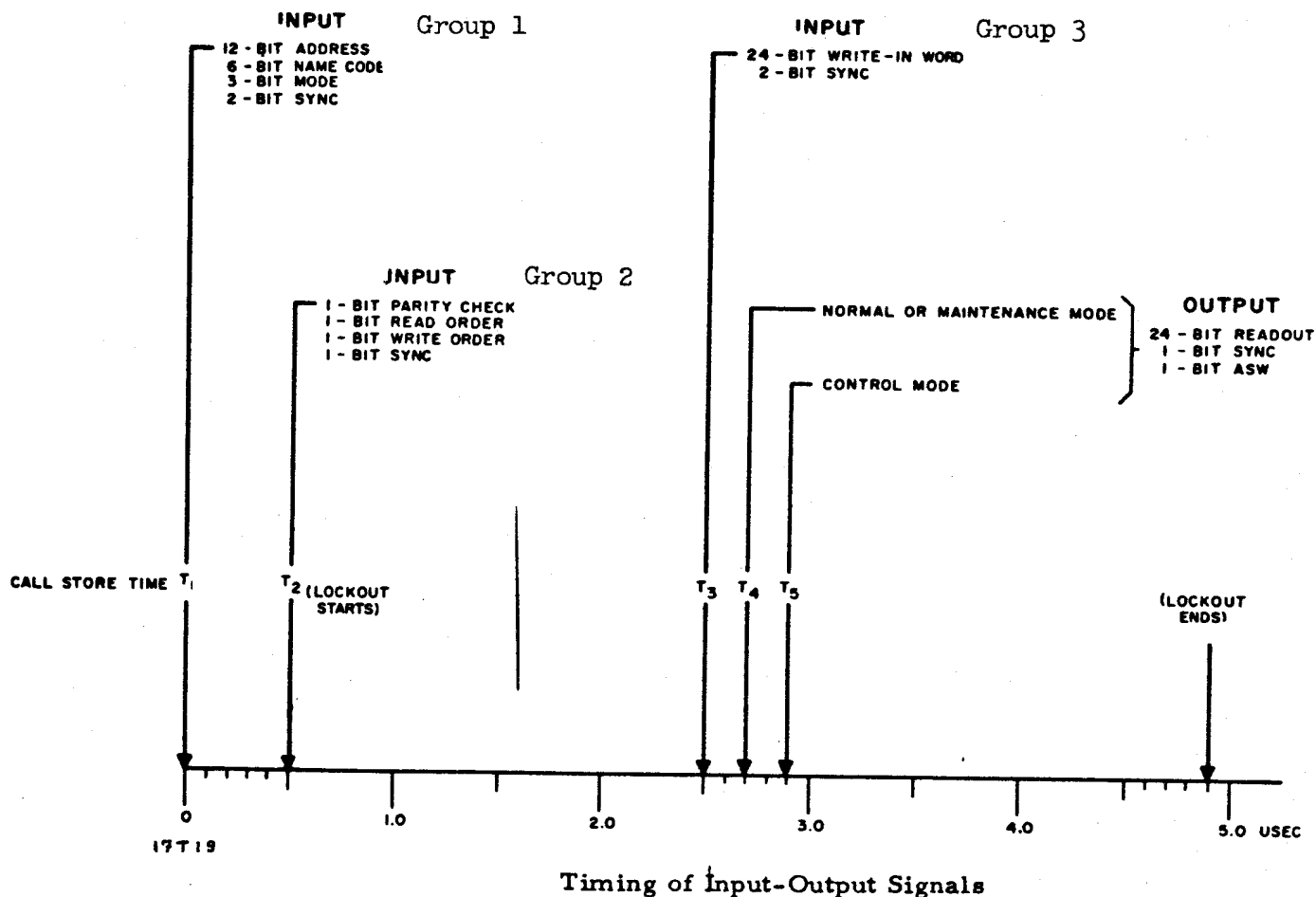
- . Busy-idle status of lines, trunks, junctors, service circuits, and network links.
- . Network Path Memory
- . Digits Received
- . Digits to be Outpulsed
- . Billing Information
- . Recent Change Information



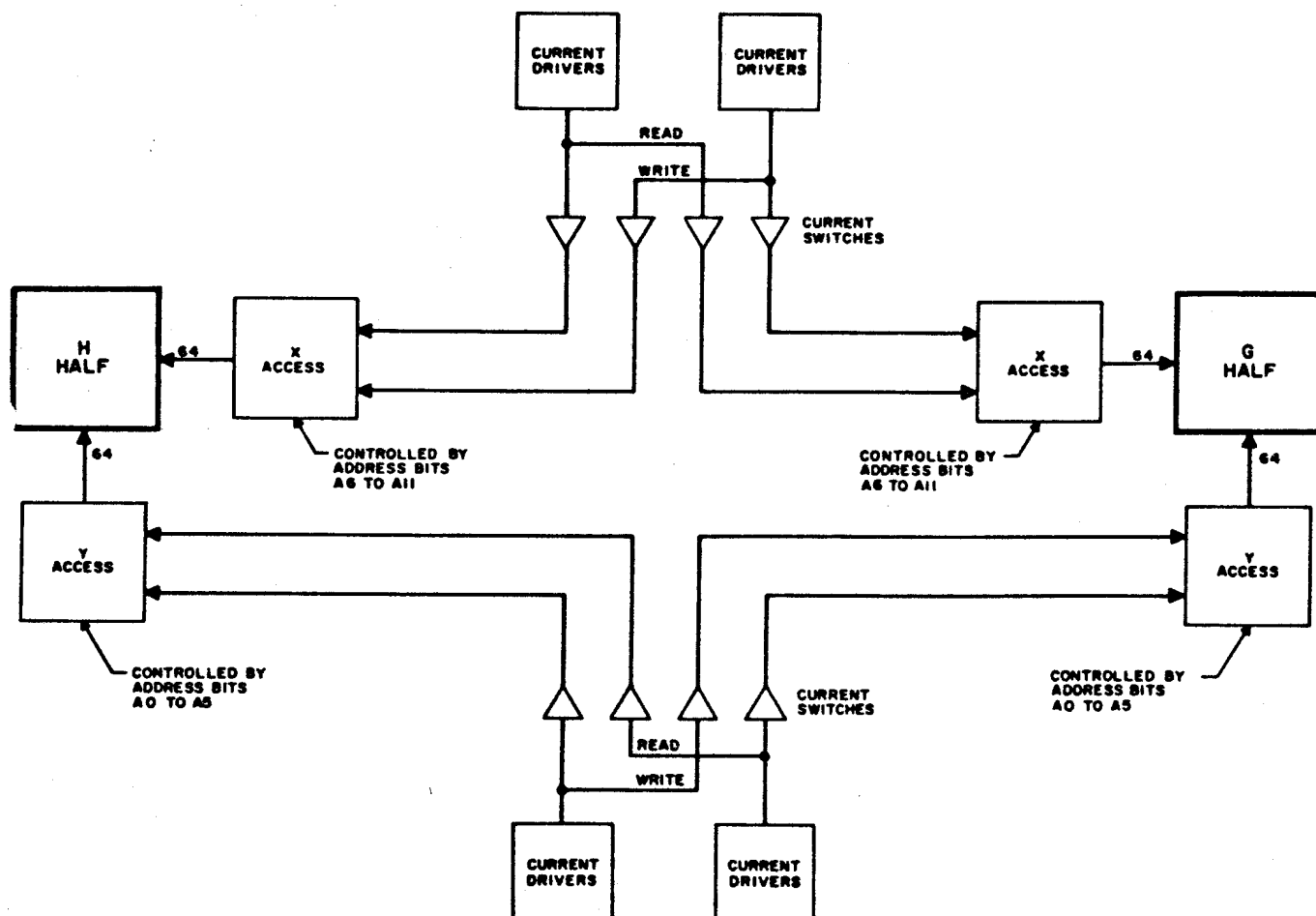
SOME SPECIAL STORAGE AREAS OF
CS AND PS MEMORY IN AN OFFICE

INPUT INFORMATION . . .

Group 1	{	6 Bit Name Code	- Specifies the Store Half
		12 Bit Address	- Specifies one of 4096 Words in a Store Half
		3 Bit Mode	- Specifies the Mode of Operation
		2 Synch Bits	- 1 Synch Bit for Mode and Name Code, 1 Synch Bit for Address
Group 2	{	1 Bit Parity Check	- Odd Parity Check over Name Code and Address
		1 Bit Read	- Specifies Read Operation
		1 Bit Write	- Specifies Write Operation
		1 Synch Bit	- Synch Bit for Read, Write, Parity Check
Group 1		Arrives at Time T_1	
Group 2		Arrives at Time T_2	



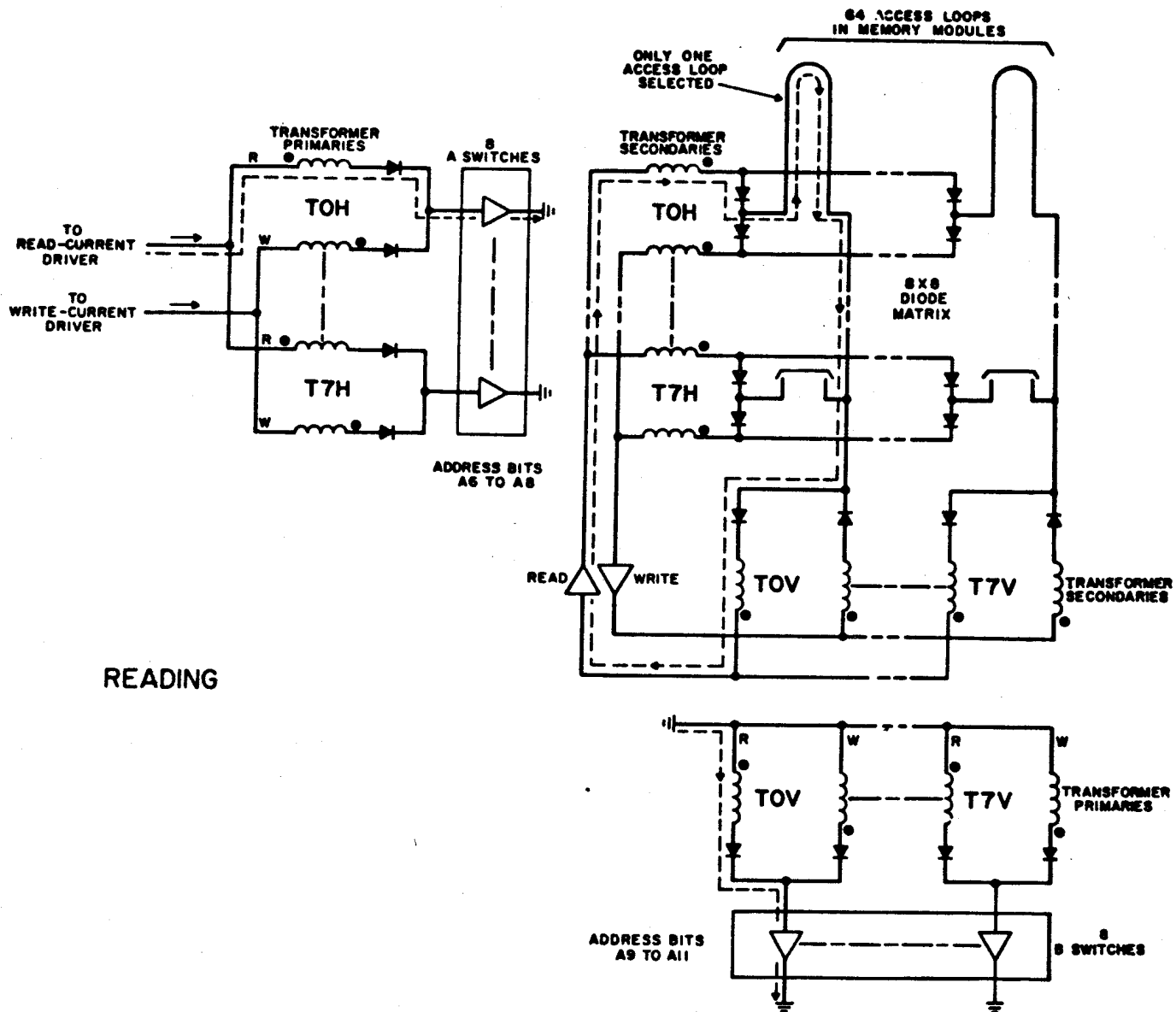
Timing of Input-Output Signals



Basic Arrangements for Memory Access

ACCESS CIRCUITS . . .

- . Reading or writing operations require both an X and Y access selection.
- . The X and Y selection circuits are each divided into three current loops . . .
 - . Input Marker Loop
 - . Matrix Loop
 - . Output Marker Loop
- . For reading or writing, current must flow in all three current loops.



READING OPERATION . . .

. Phase One . . .

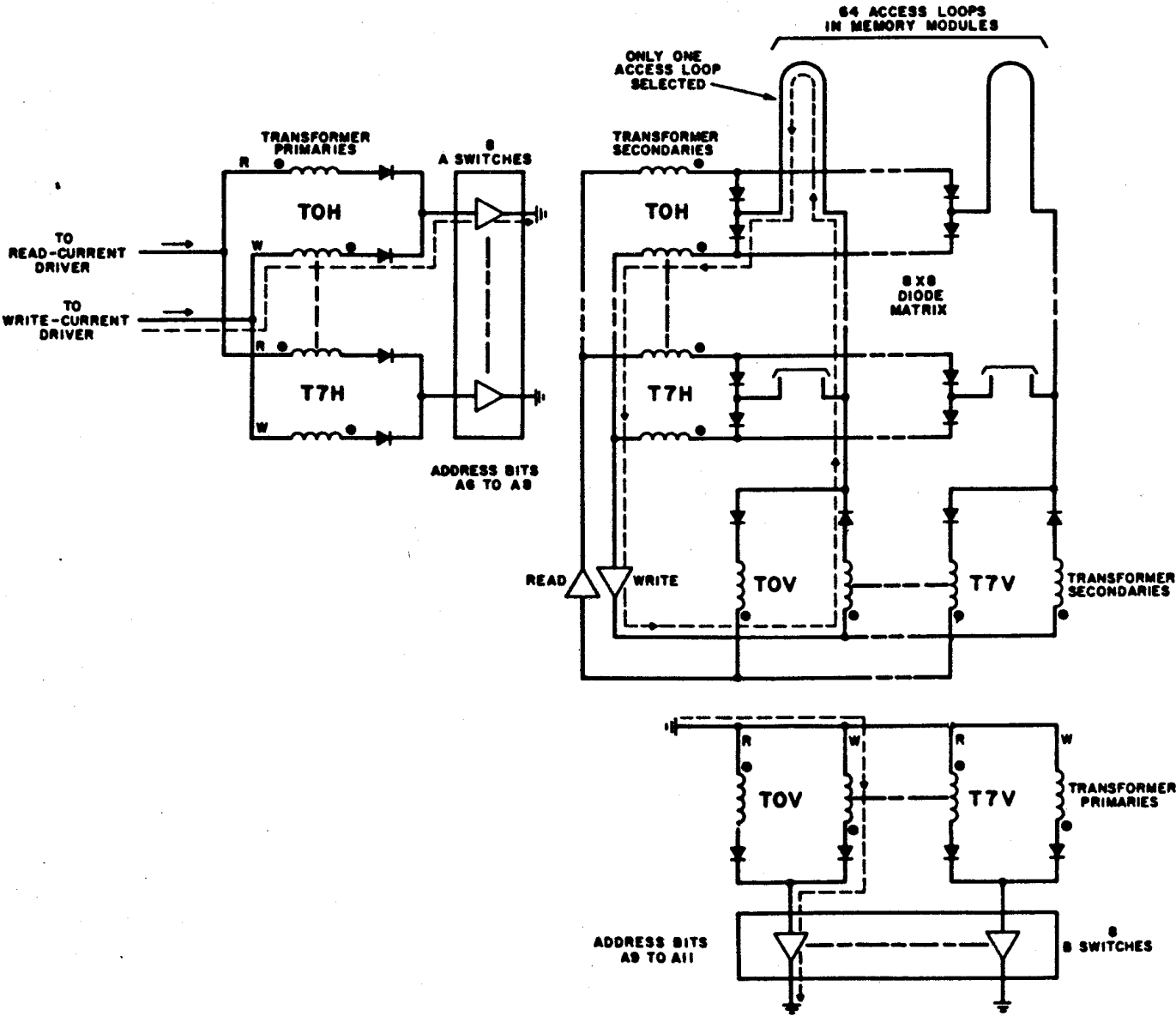
- . One of eight "A" switches is closed in the input marker . . .
 - . Selection of switch is determined by address bits
- . Current from read-current driver flows through primary of one transformer
- . One of eight "B" switches is closed in the output marker . . .
 - . Selection of switch is determined by address bits
 - . Closure of output marker loop reflects a low impedance into the matrix loop
- . Read switch in matrix is closed by clock pulse
- . Current is induced in the secondary of one of eight transformers in matrix
 - . Current flows through one of eight access loops of selected transformer
 - . Selection of particular access loop determined by low impedance path of output marker
- . Current flows in one of 64 access loops.

. Phase Two . . .

- . Information stored at selected address sent to readout circuitry . . .
 - . Destructive readout
- . Information is stored in the data register
- . Information is written back into this address by pulsing the access loop in the opposite direction . . .
 - . This tends to write all "1's" back
 - . Any bit of the data register which holds a "0" activates an inhibit pulse for that bit

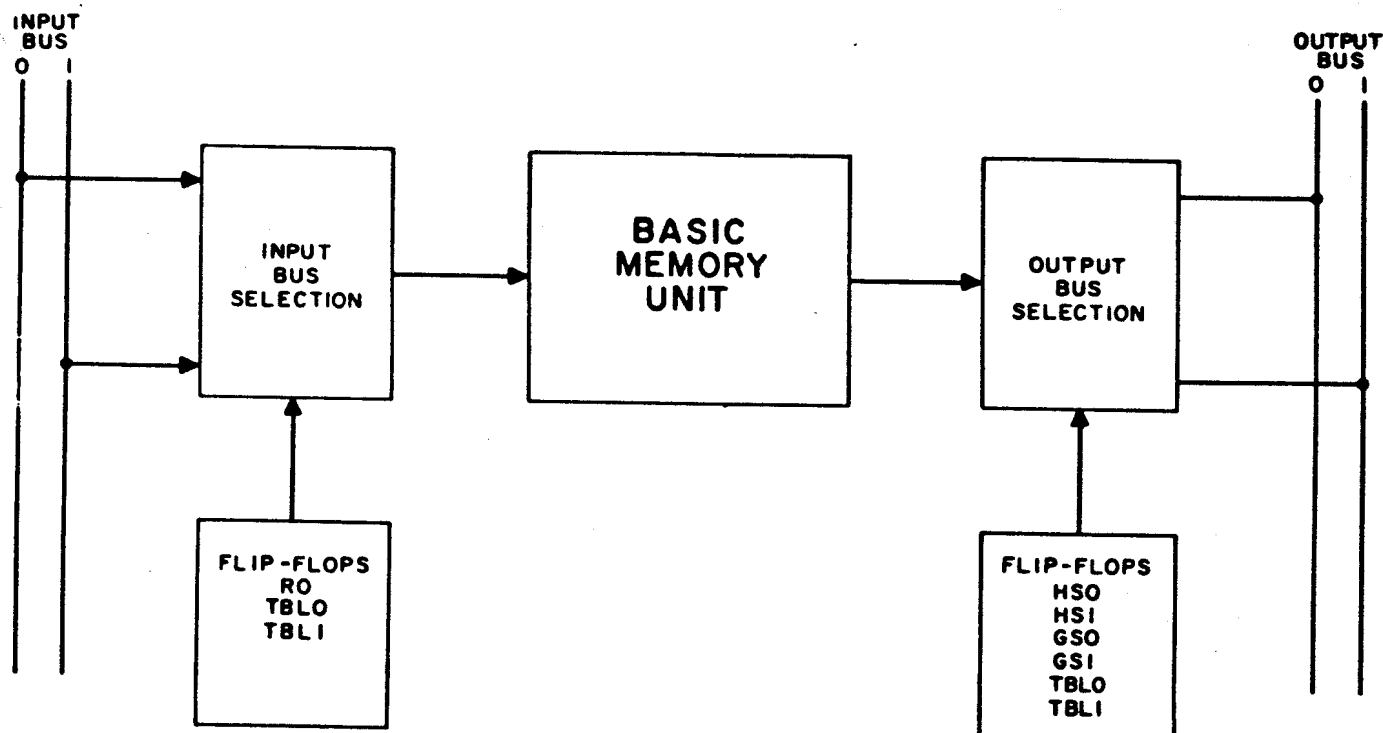
WRITING OPERATION . . .

- . Similar to reading operation . . .
- . Input marker loop closed
- . Output marker loop closed
- . Matrix loop closed
- . Write current flows in opposite direction to read current
- . Information to be written into call store is obtained from the data register

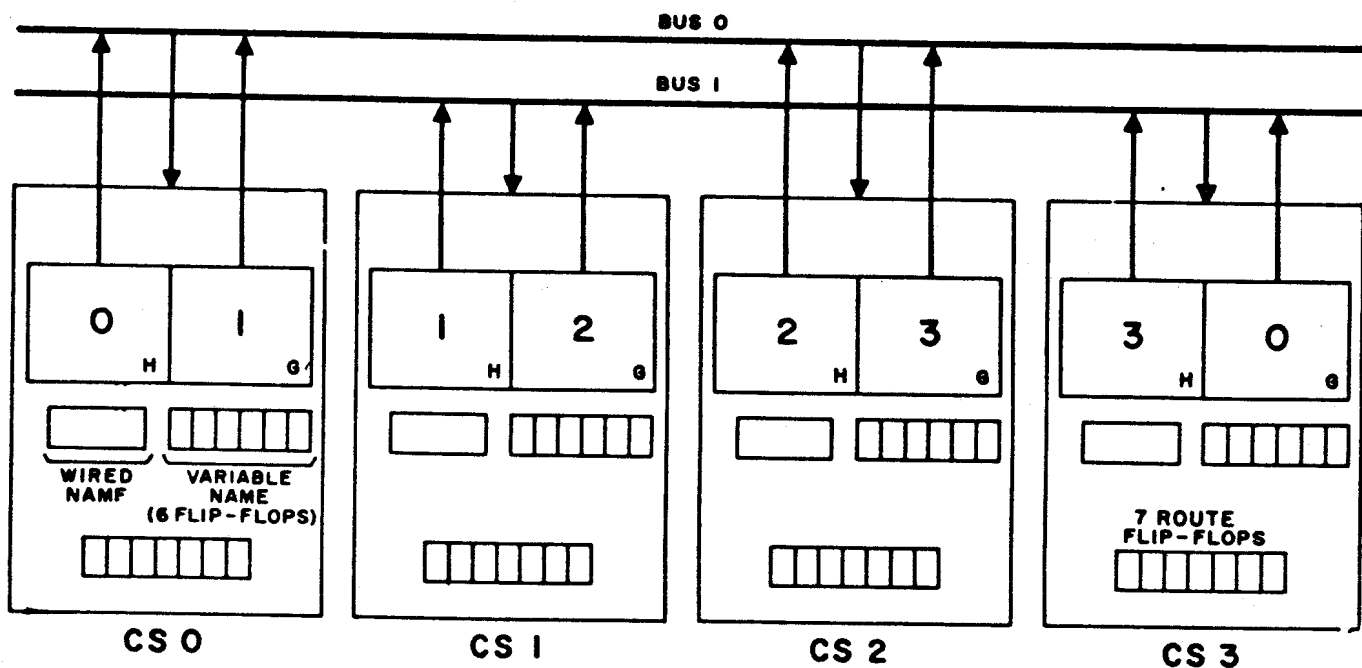


Readout Selection . . .

- . 4 Sets of readout wires come out of the memory modules
- . Combined together and connected to a common set of discriminators
- . Readout selection determined by address bits



INPUT - OUTPUT CONTROL



NOTE: THE H-HALF NAME OF EACH STORE IS WIRED AND FIXED.
THE G-HALF NAME IS SET ON 6 FLIP-FLOPS AND IS VARIABLE.

Call Store Name and Route Flip-Flops

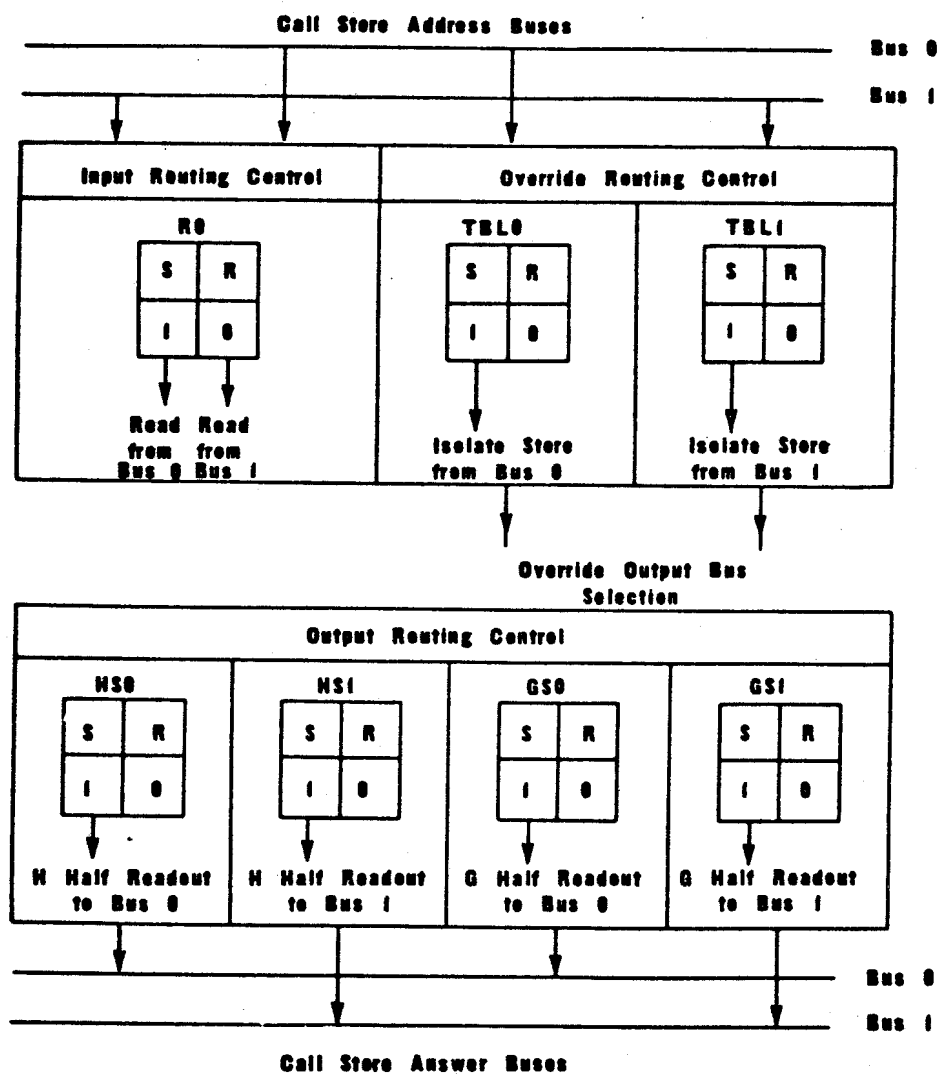
INPUT-OUTPUT CONTROL . . .

- . Each call store is divided into a "G" and "H" half.
- . Information blocks are duplicated in different halves of different stores
- . Each store-half has a 6-bit "Name" (K code) . . .
 - . H half is wired
 - . G half is assigned a "name" by setting the appropriate combination on six flip-flops . . .
 - . Status may be changed by program
- . In normal operation each half of a CS may . . .
 - . Receive from either bus (both receive on same)
 - . A half may send on either, both or neither of the buses.
- . Seven route flip-flops determine input-output configuration
- . Route flip-flops controlled by CPD

CONTROL FLIP-FLOPS

F/F	SET	RESET
R0	RECEIVE ALL REQUESTS FROM BUS 0. SEND MAINTENANCE AND CONTROL READOUTS ON BUS 0	RECEIVE ALL REQUESTS FROM BUS 1. SEND MAINTENANCE AND CONTROL READOUTS ON BUS 1
H80	SEND NORMAL READOUTS FROM H ON BUS 0	—
H81	SEND NORMAL READOUTS FROM H ON BUS 1	—
G80	SEND NORMAL READOUTS FROM G ON BUS 0	—
G81	SEND NORMAL READOUTS FROM G ON BUS 1	—
TBLO	INHIBIT INPUTS AND OUTPUTS ON BUS 0 IN ALL MODES	—
TB1I	INHIBIT INPUTS AND OUTPUTS ON BUS 1 IN ALL MODES	—

Normal mode . . .



CALL STORE MODES OF OPERATION . . .

	<u>H</u>	<u>G</u>	<u>C</u>
Normal Mode	0	0	0
H Maintenance Mode	0	1	1
G Maintenance Mode	1	0	1
Control Mode	1	1	0

. Normal Mode . . .

. Two stores respond . . .

. One from "G" half

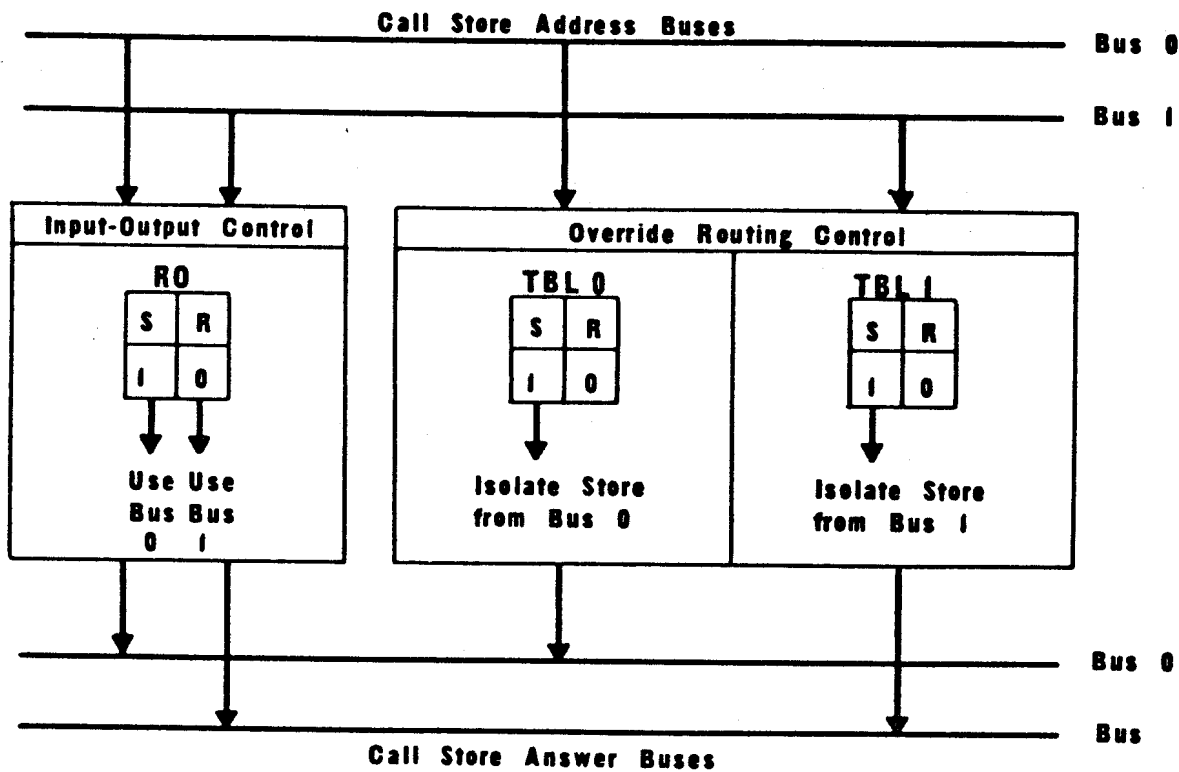
. One from "H" half

. Two readouts (if any) are sent to CC over
separate buses

. If one store out of service . . .

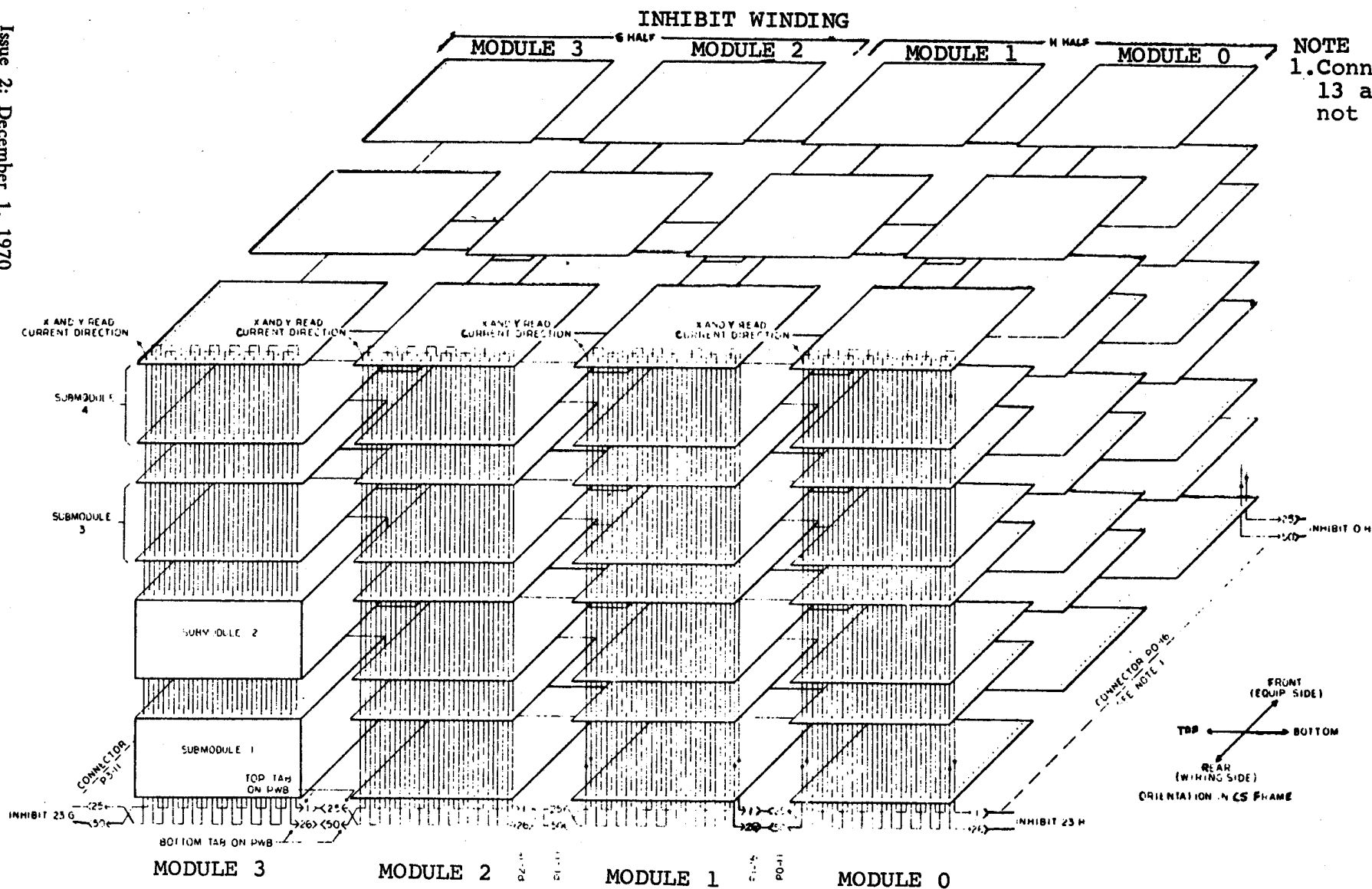
. Readout from other CS is sent to CC over both
buses

Maintenance modes and control modes . . .



Maintenance Mode . . .

- . Used when a particular half of a particular store is to respond to either a read or write operation
- . H maintenance mode . . .
 - . H maintenance mode is specified.
 - . Store in which H half name code matches name code from CC will respond.
 - . Word will be written into or read from H half at location specified by 12-bit address.
- . G maintenance mode . . .
 - . G maintenance mode is specified
 - . Store in which H half name code matches name code from CC will respond.
 - . Word will be written into or read from G half at location specified by 12-bit address.
- . Input and output bus is selected by RO flip-flop . . .
 - . HSO, HSl, GSO, and GS1 has no effect
 - . TBLO and TBL1 may override RO
- . Control Mode . . .
 - . Read and write orders do not involve ferrite sheets
 - . Read orders check state of flip-flops
 - . Write orders set flip-flops
 - . RO flip-flop controls input-output configuration



NOTE
1. Connector pin 13 and 37 are not used.

Y ACCESS WINDING

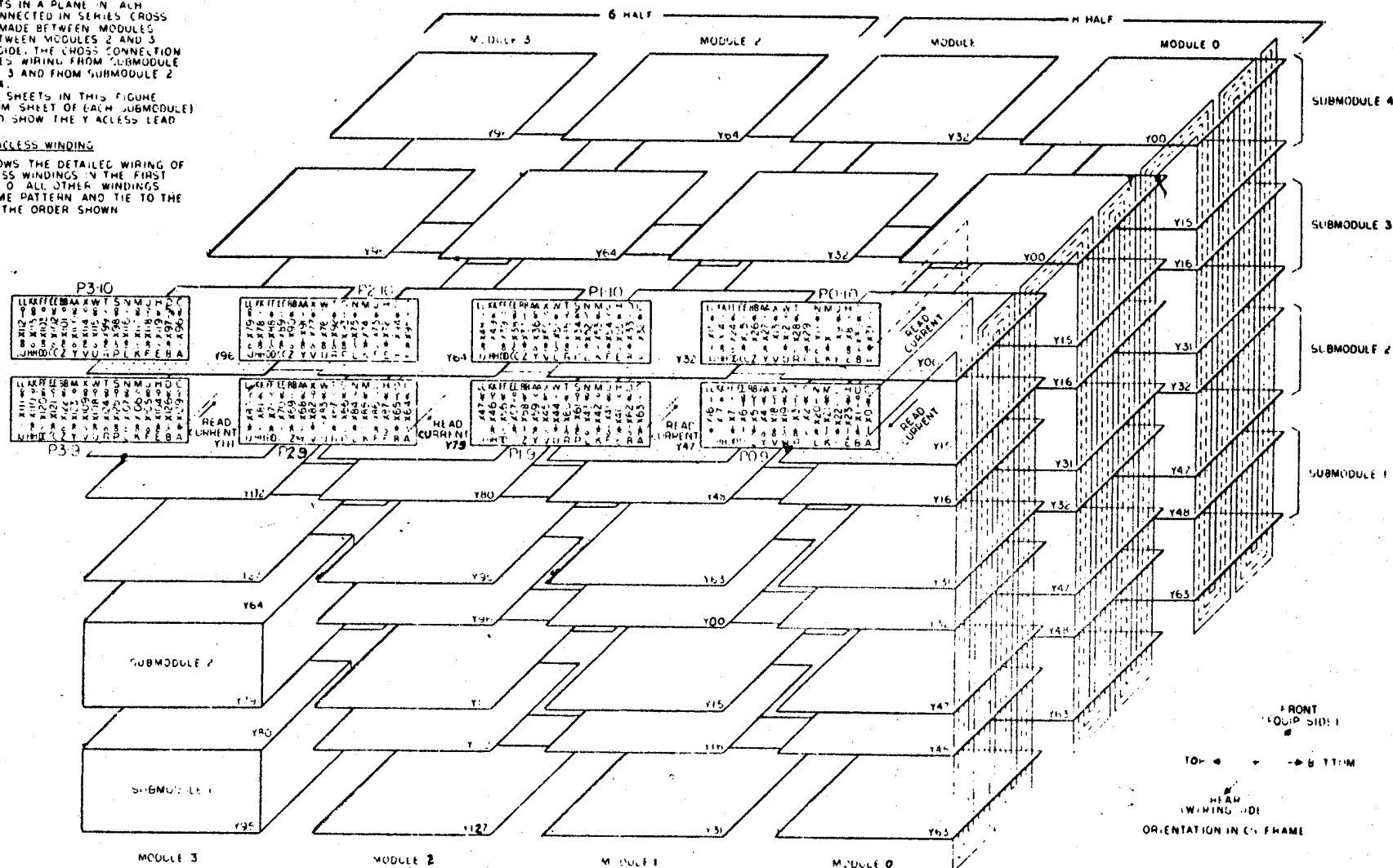
THE Y ACCESS WINDING IS THE PLATED LEAD ON THE FERRITE SHEET. THE PLATED LEAD OF THREE SHEETS IN A PLANE IN EACH MODULE ARE CONNECTED IN SERIES. CROSS CONNECTION IS MADE BETWEEN MODULES 0 AND 1 AND BETWEEN MODULES 2 AND 3. ON THE FRONT SIDE, THE CROSS CONNECTION ALSO TRANSFERS WIRING FROM SUBMODULE 1 TO SUBMODULE 3 AND FROM SUBMODULE 2 TO SUBMODULE 4.

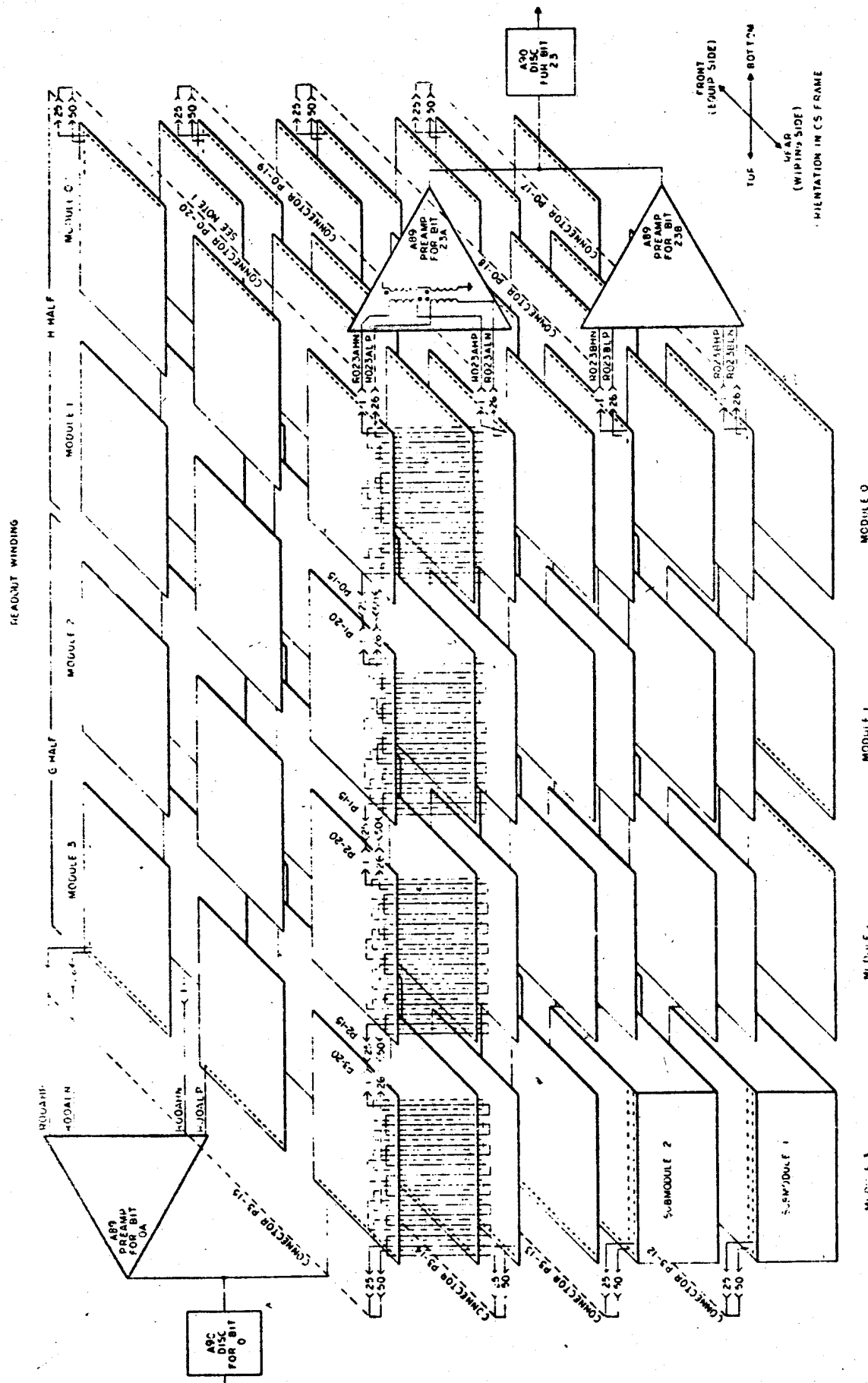
THE FERRITE SHEETS IN THIS FIGURE (TOP AND BOTTOM SHEET OF EACH SUBMODULE) ARE LABELED TO SHOW THE Y ACCESS LEAD THEY CONTAIN.

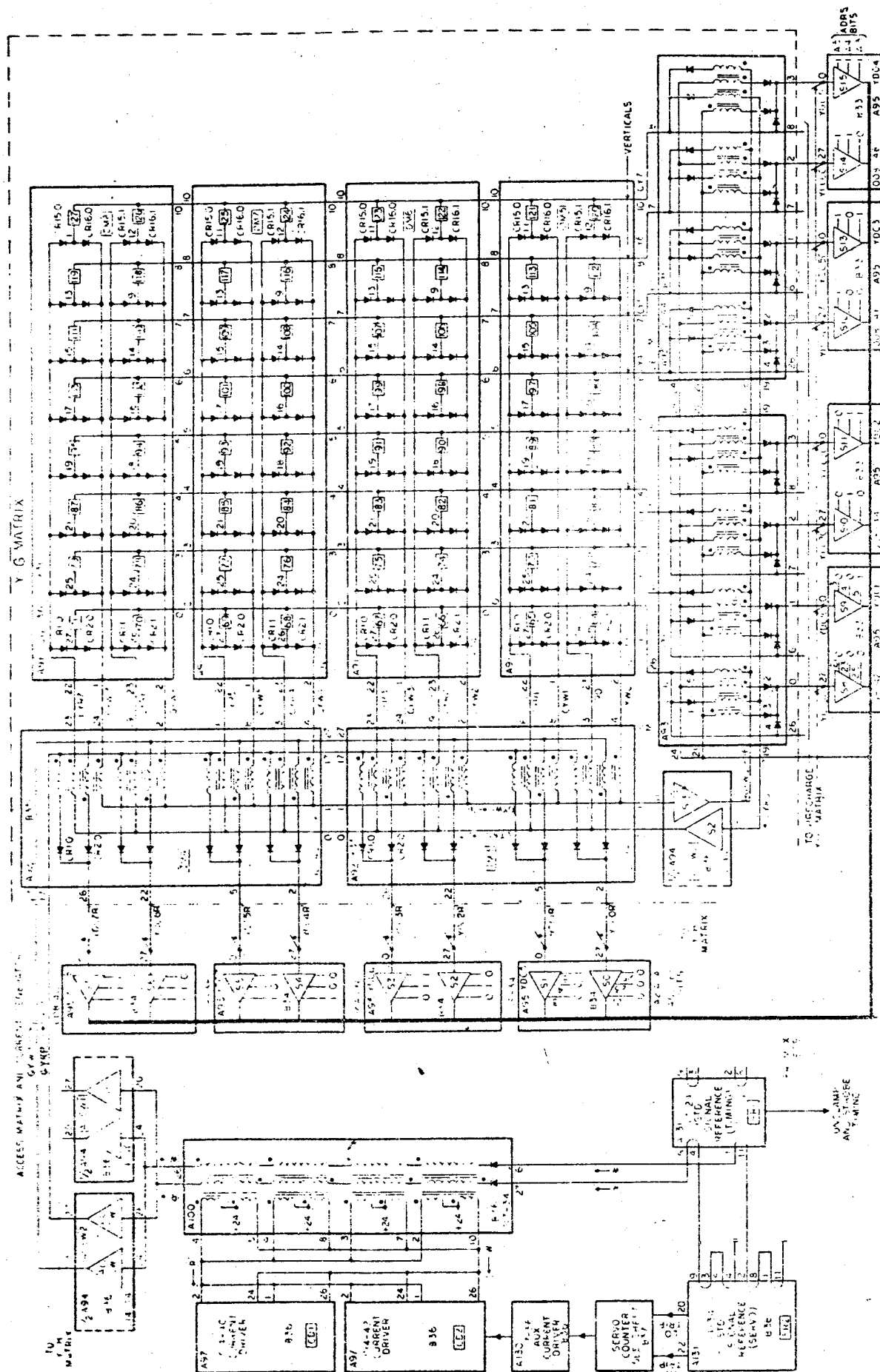
X ACCESS WINDING

THE FIGURE SHOWS THE DETAILED WIRING OF THE TWO X ACCESS WINDINGS IN THE FIRST ROW OF MODULE 0. ALL OTHER WINDINGS FOLLOW THE SAME PATTERN AND TIE TO THE CONNECTORS IN THE ORDER SHOWN.

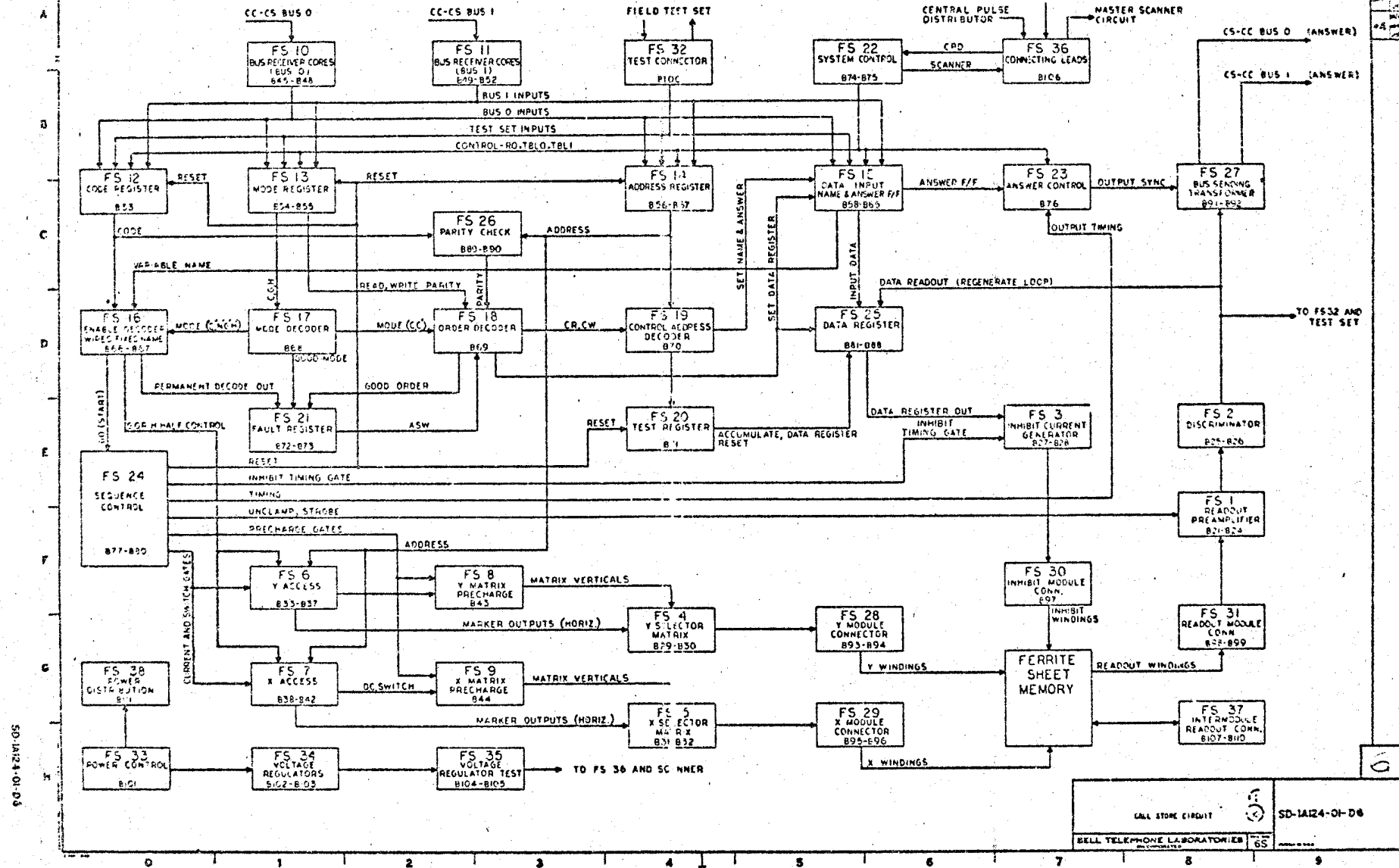
Y AND X ACCESS WINDING







INDEX BLOCK DIAGRAM



INFORMATION NOTE 302 (CONT)

A

B

C

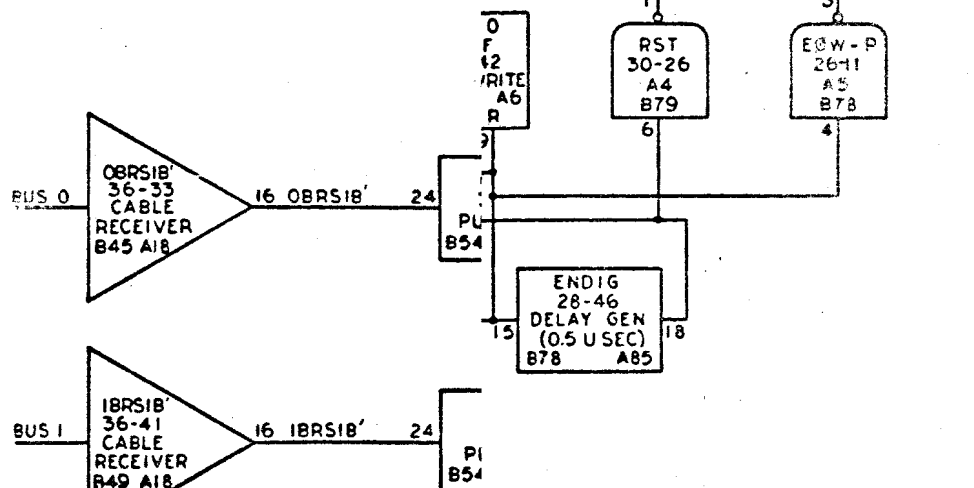
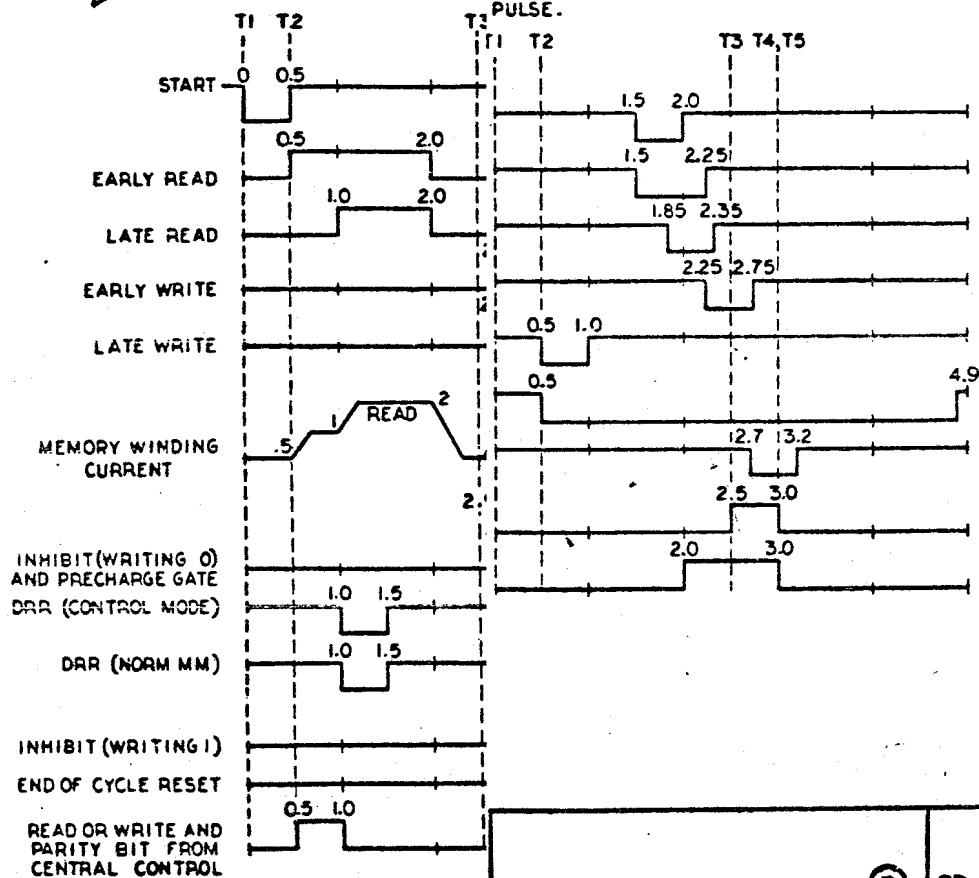
D

E

F

G

H

RITE
RIVE
OGICRESET-CODE,
MODE, ORDER
& ADDRESS
REGISTERSLATE DATA
REGISTER RESET
(POST WRITE DISTURB)STBI- IS AN INTERNALLY GENERATED
TEMPERATURE DEPENDENT TIMING
PULSE.

CALL STORE CIRCUIT

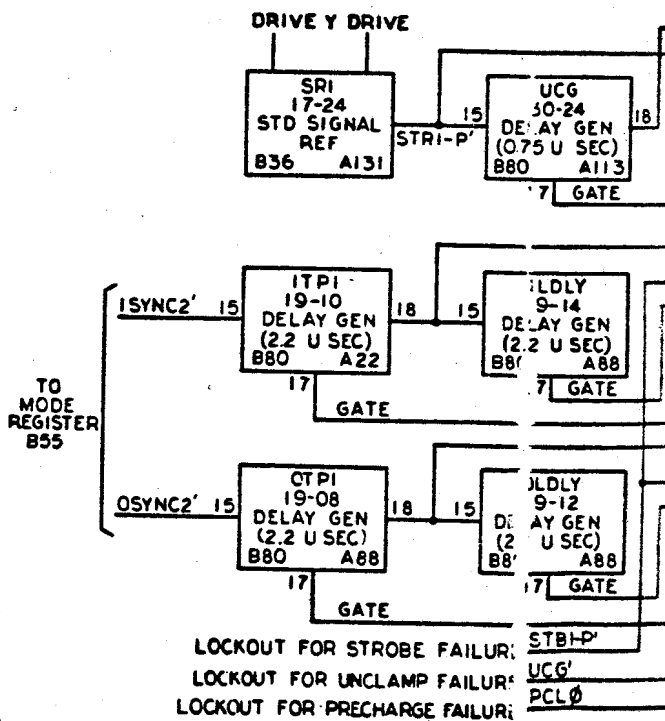
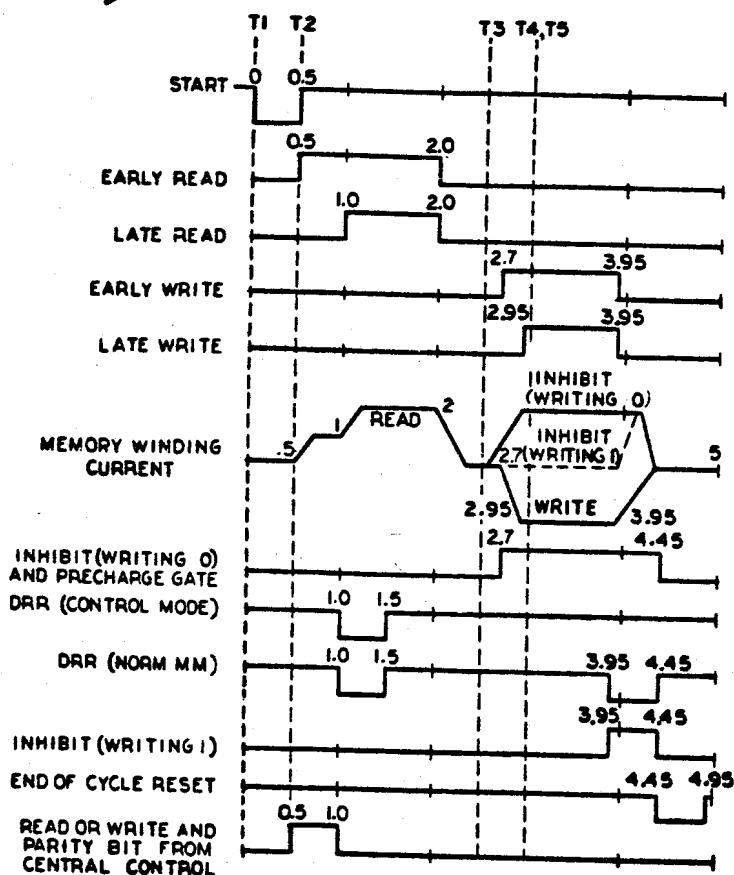
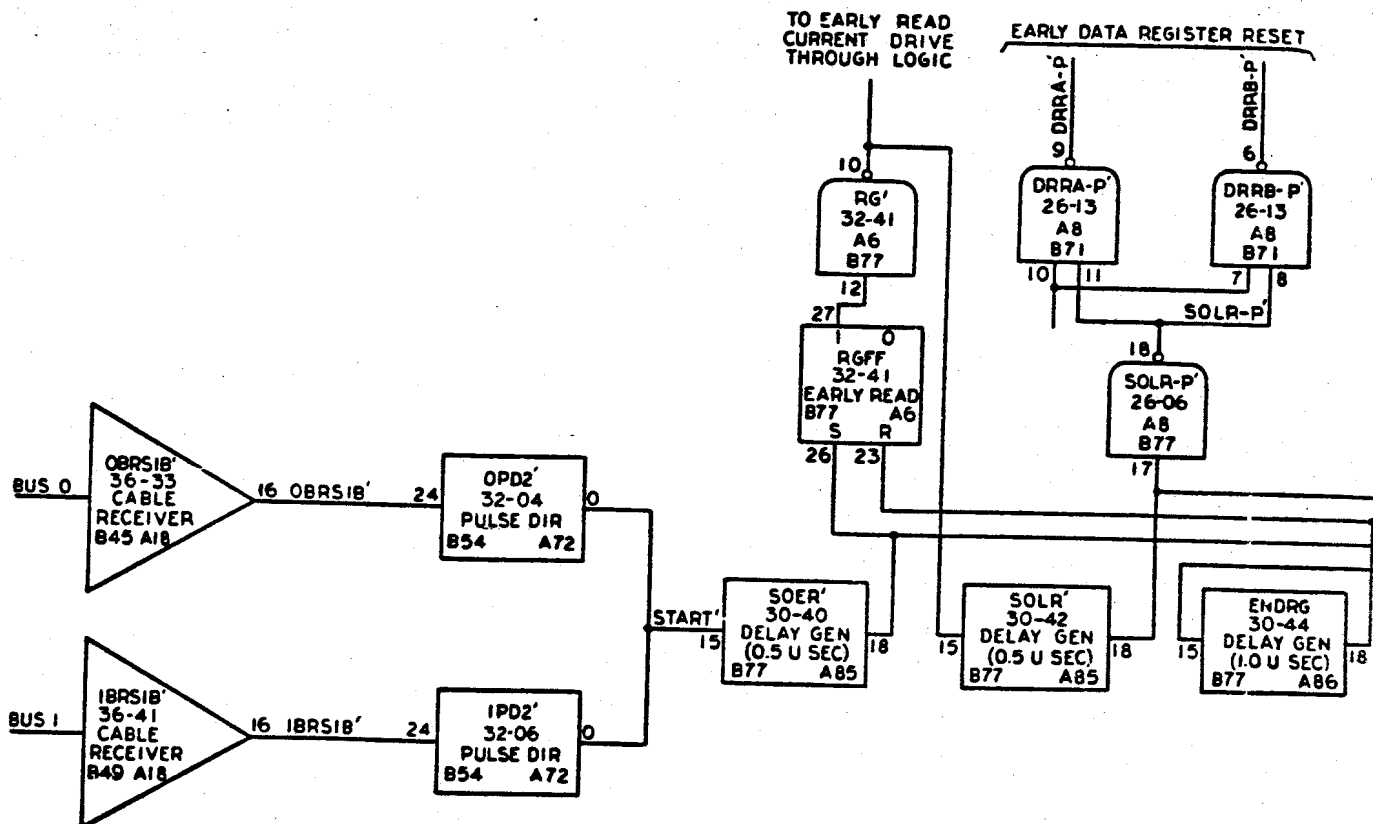
2

SD-1A124-01-D10

BELL TELEPHONE LABORATORIES
INCORPORATED

65

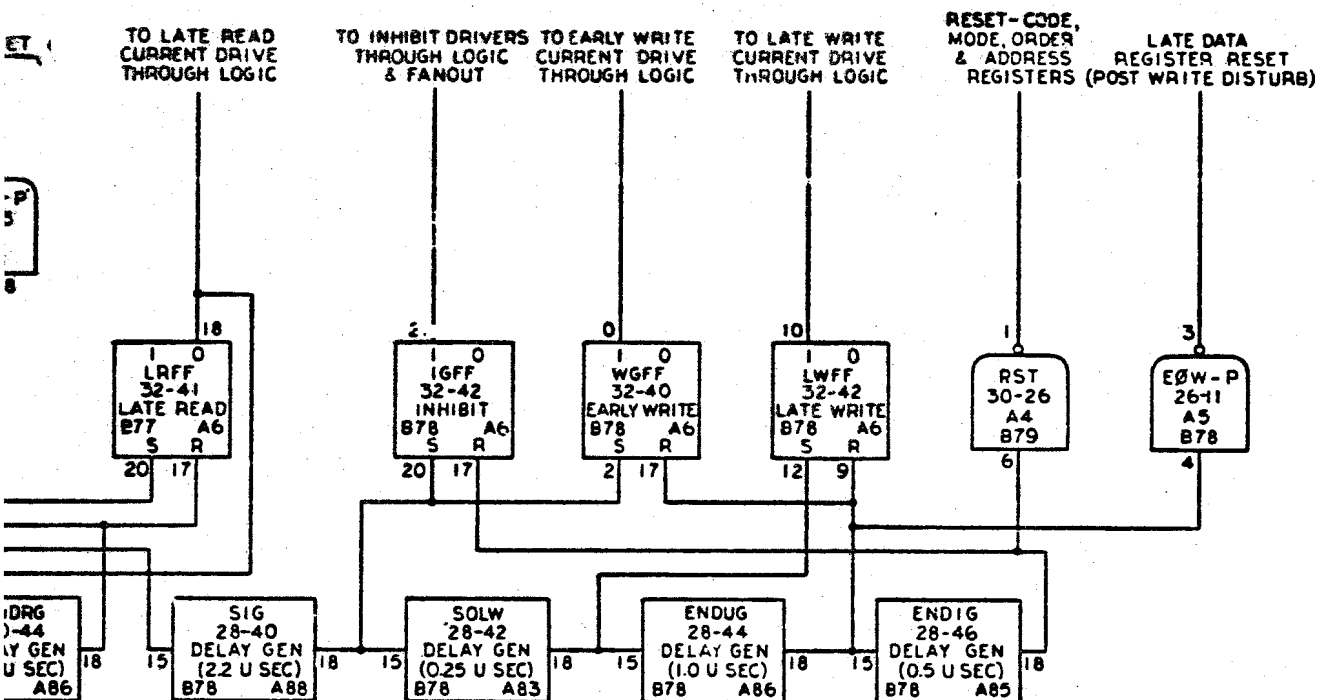
SD-1A124-01-D10



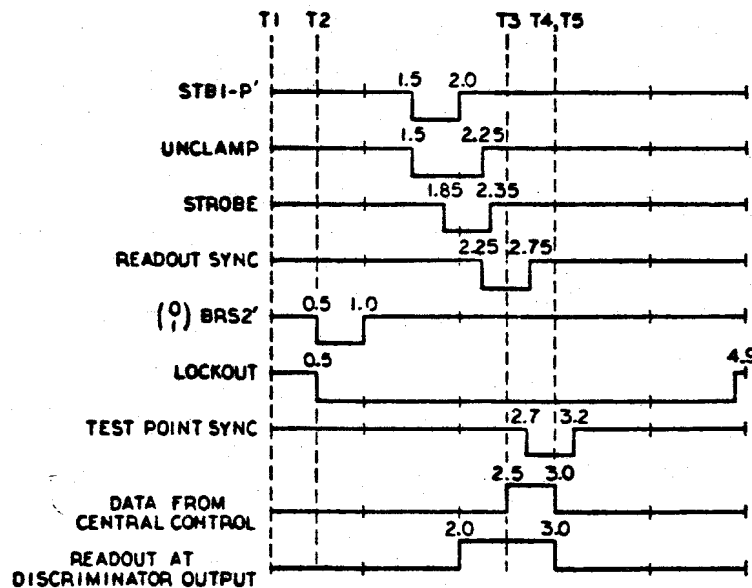
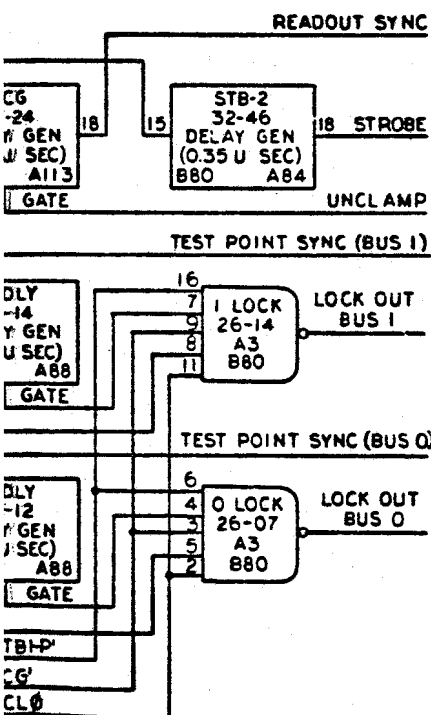
SD-1A124-C J10

E

SEQUENCE CONTROL TIMING CHAIN



NOTE: STBI- is an INTERNALLY GENERATED TEMPERATURE DEPENDENT TIMING PULSE.



DRAWING
ISSUE
2A
3A
6B

6

CALL STORE CIRCUIT

2

SD-1A124-01-D10

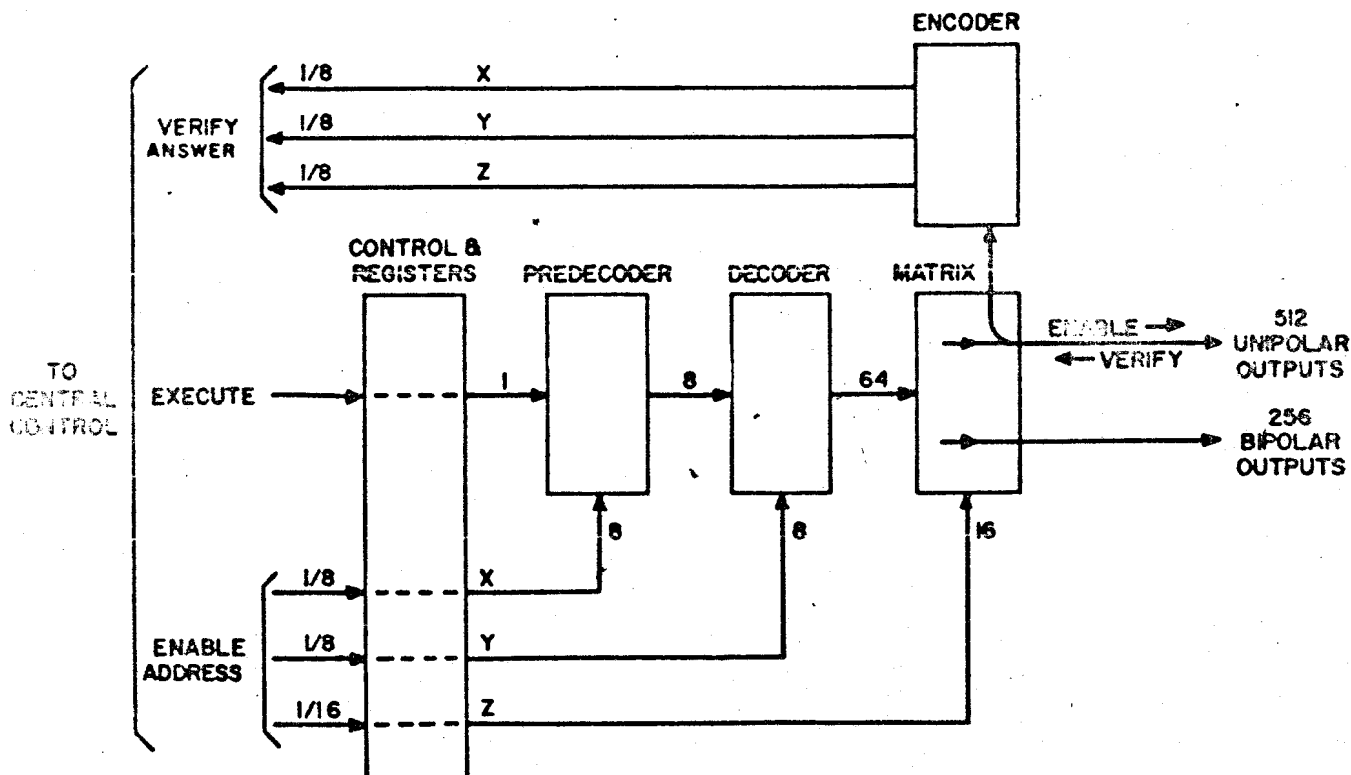
BELL TELEPHONE LABORATORIES
INCORPORATED

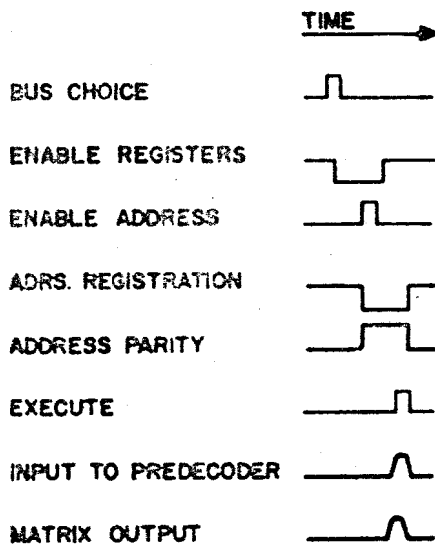
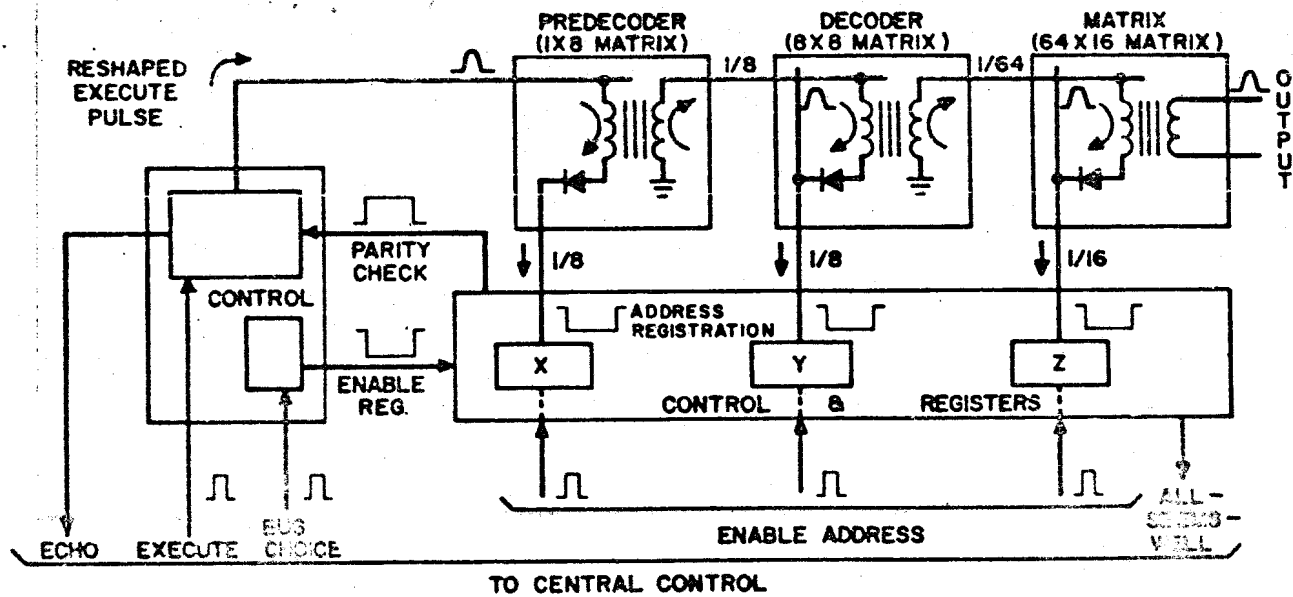
65

CENTRAL PULSE DISTRIBUTOR . . .

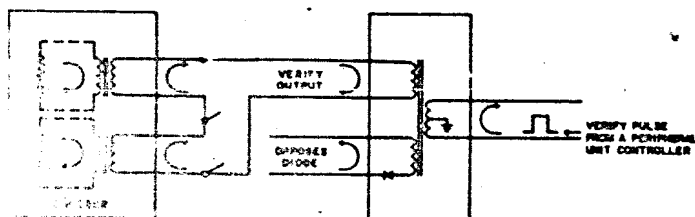
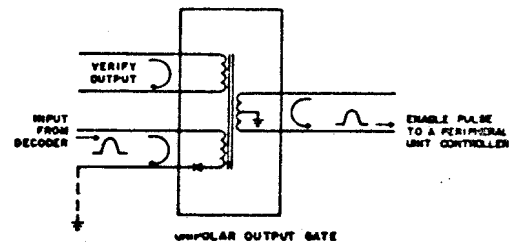
Provides CC with fast access to many points throughout the Central Office

- . Program Store Status Flip-Flops
- . Call Store Status Flip-Flops
- . Maintenance and Test Points
- . Lamps and Relays in the MCC
- . Select and Enable Peripheral Units
 - . Scanners
 - . Signal Distributors
 - . Network Frames
 - . Teletypewriters
 - . AMA Recorders
- . Cycle Time 11 Microseconds (Electronic Speed)

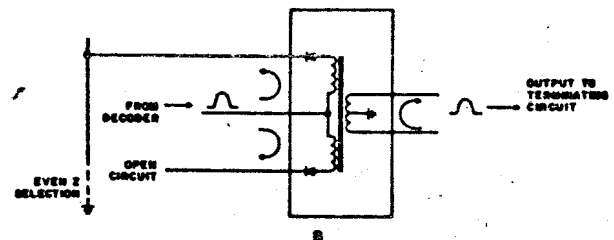
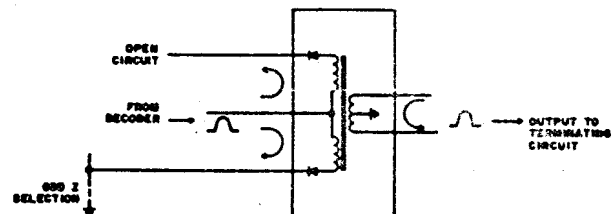




COMMUNICATIONS FROM CENTRAL CONTROL



Enable and Verify Signals

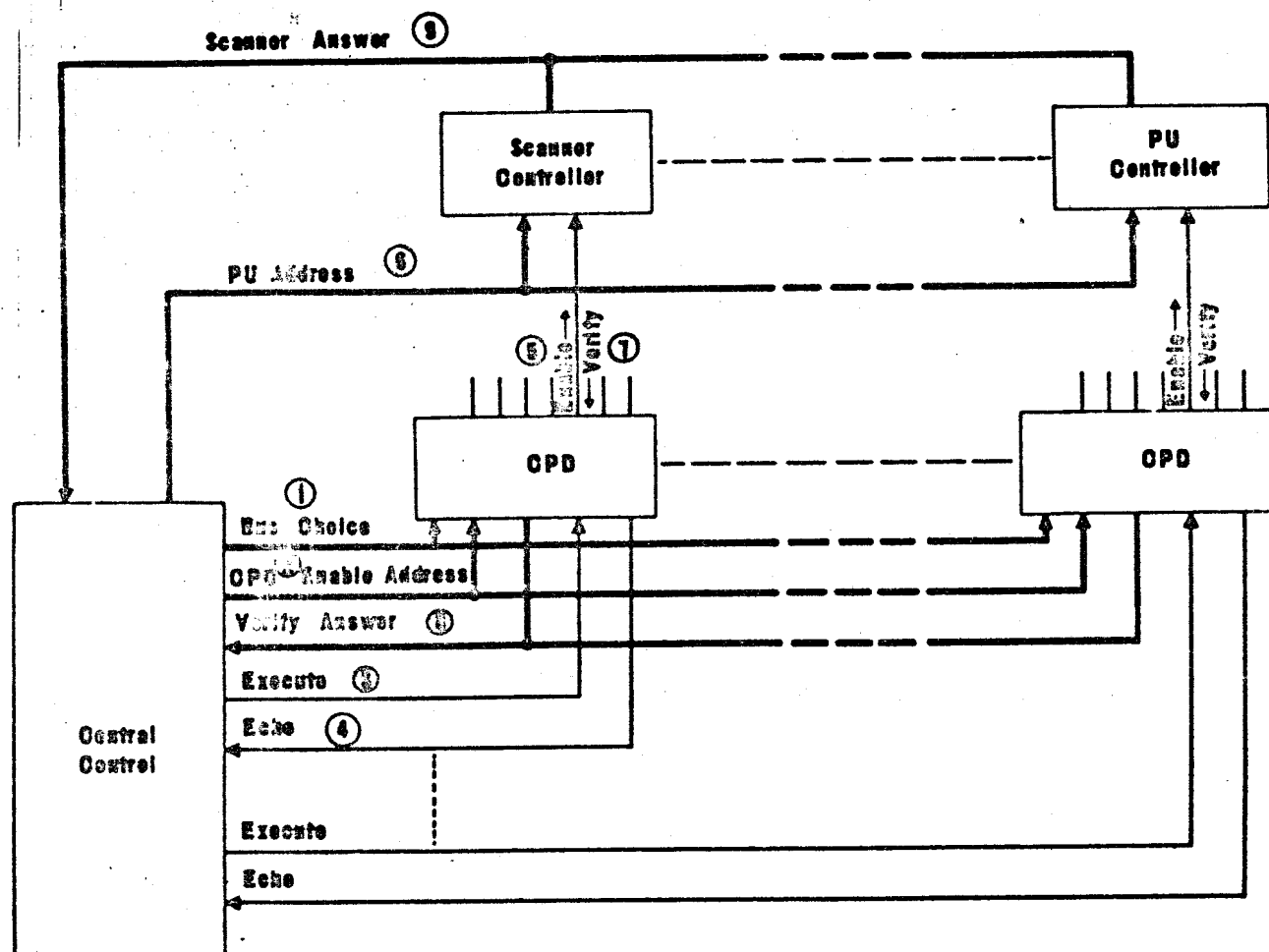


Bipolar Output Gate

COMMUNICATIONS FROM CENTRAL CONTROL . . .

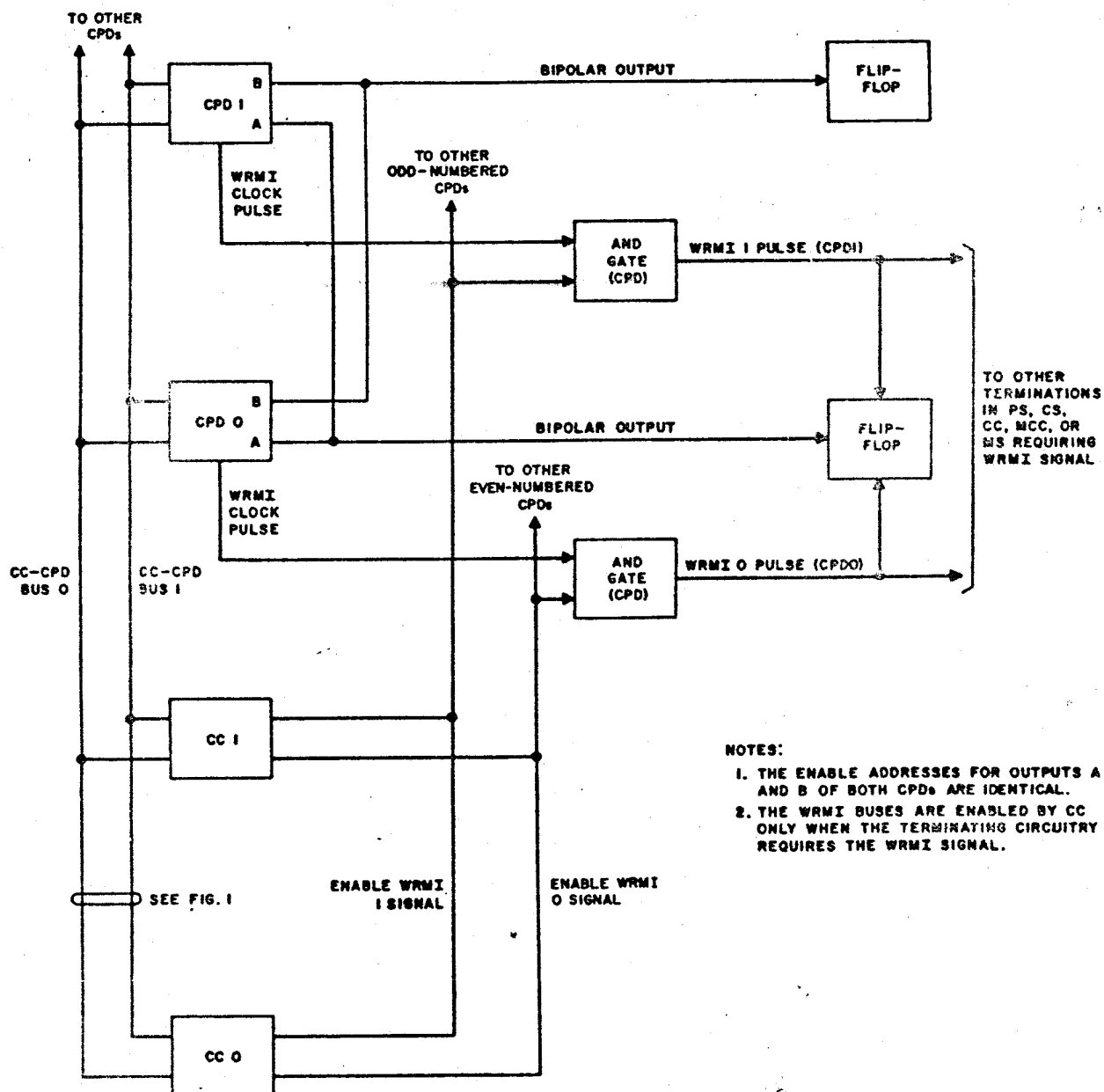
CPD requires these three communications in rapid succession from CC . . .

- . Bus Choice
- . Enable Address
- . Execute Signal
- . Pulses One of 768 Outputs . . .
 - . 512 Unipolar
 - . 256 Bipolar
 - . Outputs Connected to Units over Private Paths
- . CPD Outputs . . .
 - . Unipolar Output . . .
 - . Transmitted to Peripheral Unit Controllers as an Enable Pulse
 - . Enable Verify Pulse is Returned to the CPD
 - . Bipolar Outputs . . .
 - . Polarity of the output pulse depends on whether Z register selection is even or odd.
 - . Used to control flip-flops and other logic circuits.
 - . Verify Answer . . .
 - . 2 USEC after PU receives enable pulse a verify pulse is sent back to CPD over same pair.
 - . Direction of current is opposite enable current.
 - . Pulse is produced in verify output side of transformer.
 - . Verify pulse is encoded and sent from CPD to CC as a verify answer in a 1 out of 8, 1 out of 8 1 out of 8 code.

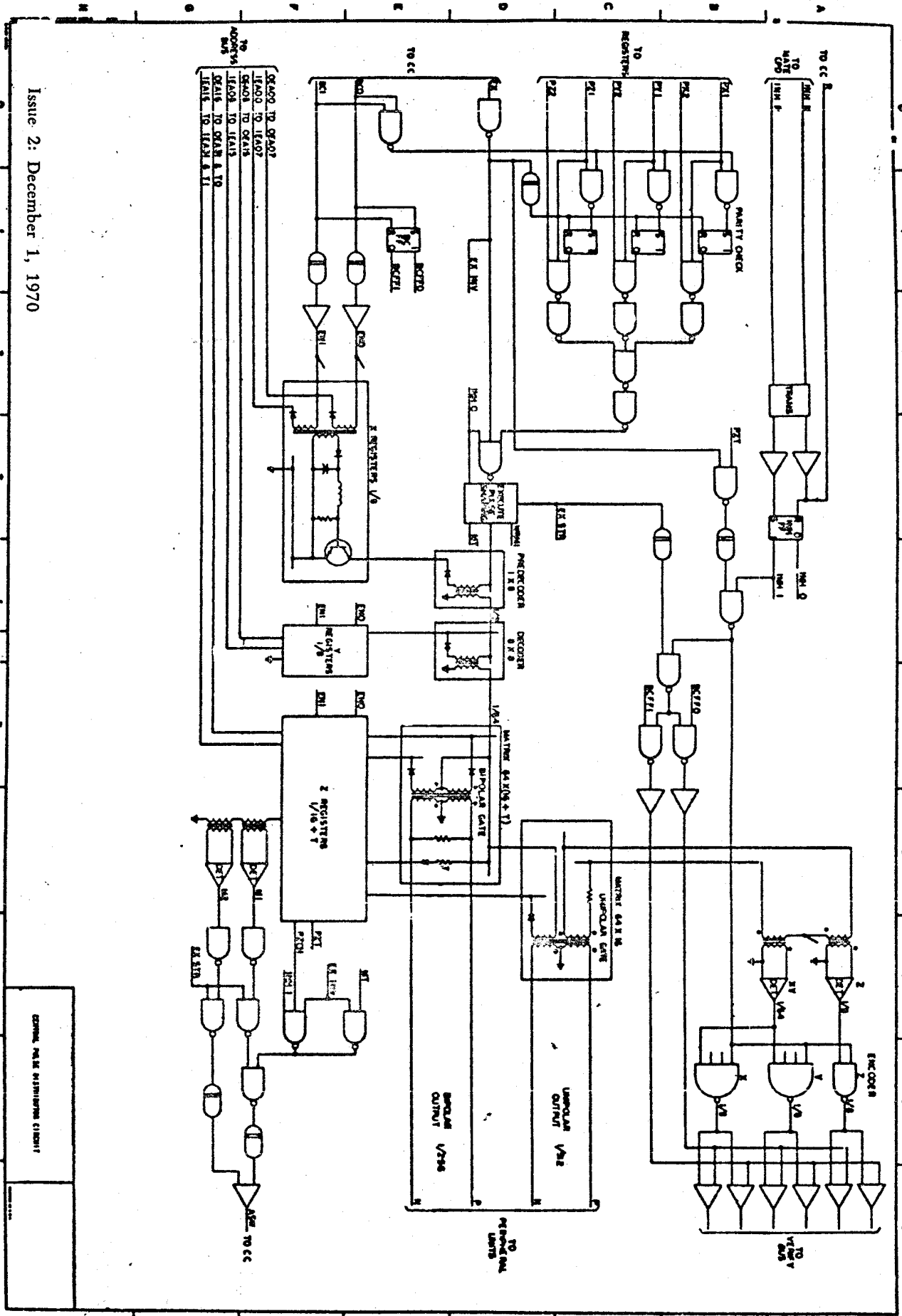


SEQUENCE OF CONTROLLING SYSTEM FLIP-FLOPS OR LOGIC CIRCUITRY
(BIPOLAR OUTPUTS) . . .

- . Bus Choide Signal to all CPD's
- . Enable Address to all CPD's
- . Execute Pulse to One CPD
- . Execute Echo Pulse to CC to Verify that Correct CPD has Responded
- . Operate logic circuitry as follows:
 - . CPD Generates Bipolar Output with Proper Polarity
 - . CPD Generates WRMI Clock Pulse
 - . CC Generates Enable WRMI Signal
 - . "AND" WRMI Clock Pulse with Enable WRMI from CC to Obtain WRMI - CPD Signal
- WRMI - CPD to all Units Requiring this Signal
- . Combine WRMI - CPD and Bipolar Output in the Selected Unit to Operate Logic Circuitry

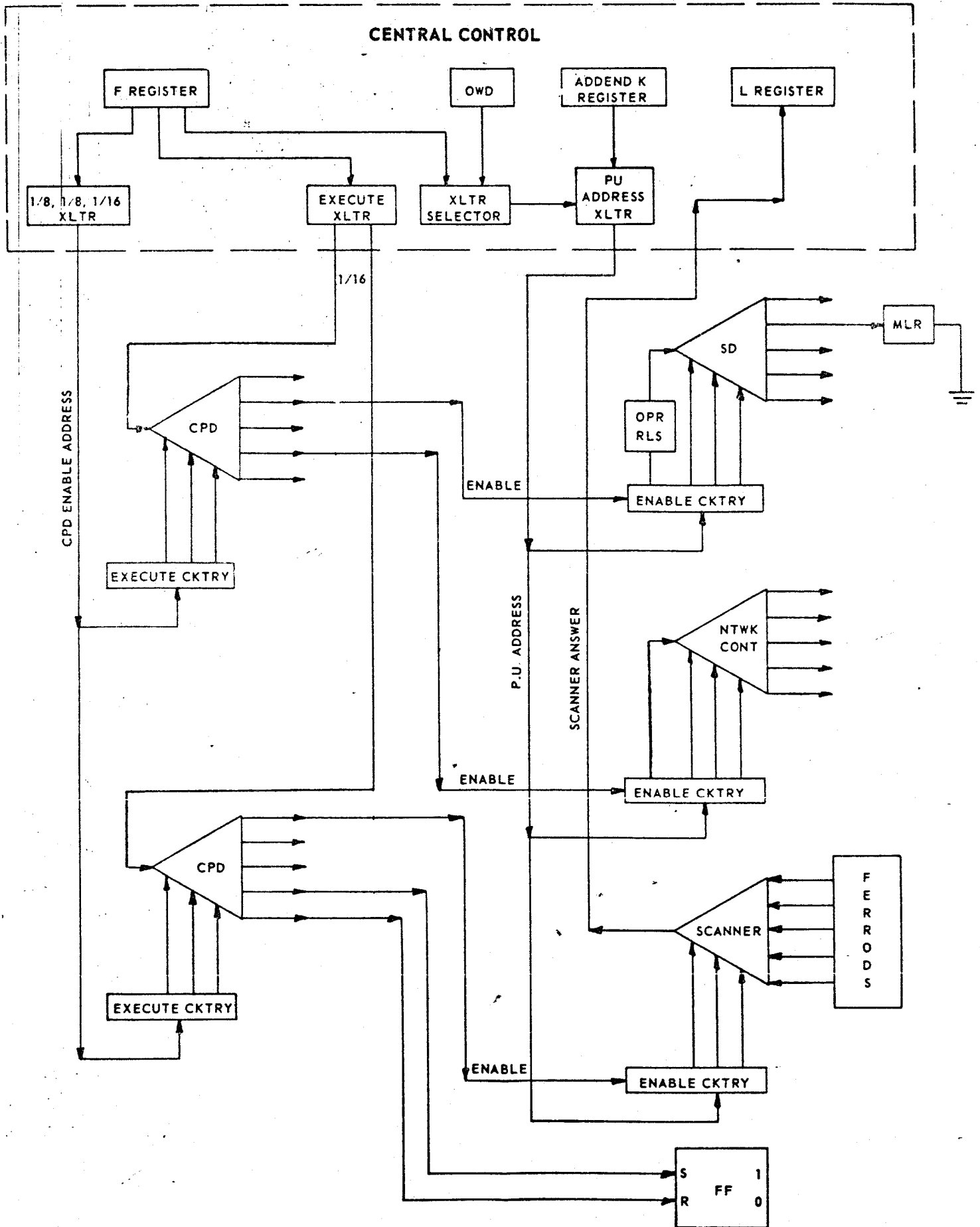


Issue 2: December 1, 1970



CONTROL UNIT DISTRIBUTION CIRCUIT

PERIPHERAL SYSTEM



Theory of Enables

1. ENABLE HEAD-HEAD TABLE

E6HLSF

LSFEH
LJSEH
TSFEH
TJSEH
UTSDH+12
UTSDH
UTSDH

LINE SWITCH FRAME
 LINE JUNCTUR SWITCH FRAME
 TRUNK SWITCH FRAME
 TRUNK JUNCTUR SWITCH FRAME
 UT SIGNAL DISTRIBUTORS
 MT SIGNAL DISTRIBUTORS

2. ENABLE HEAD TABLES

LSFEH	LSES01
	LSES02
	LSES03
	LSES04

LJSEH	LJES01
	LJES02
	LJES03
	LJES04

TSFEH	TSES01
	TSES02
	TSES03
	TSES04

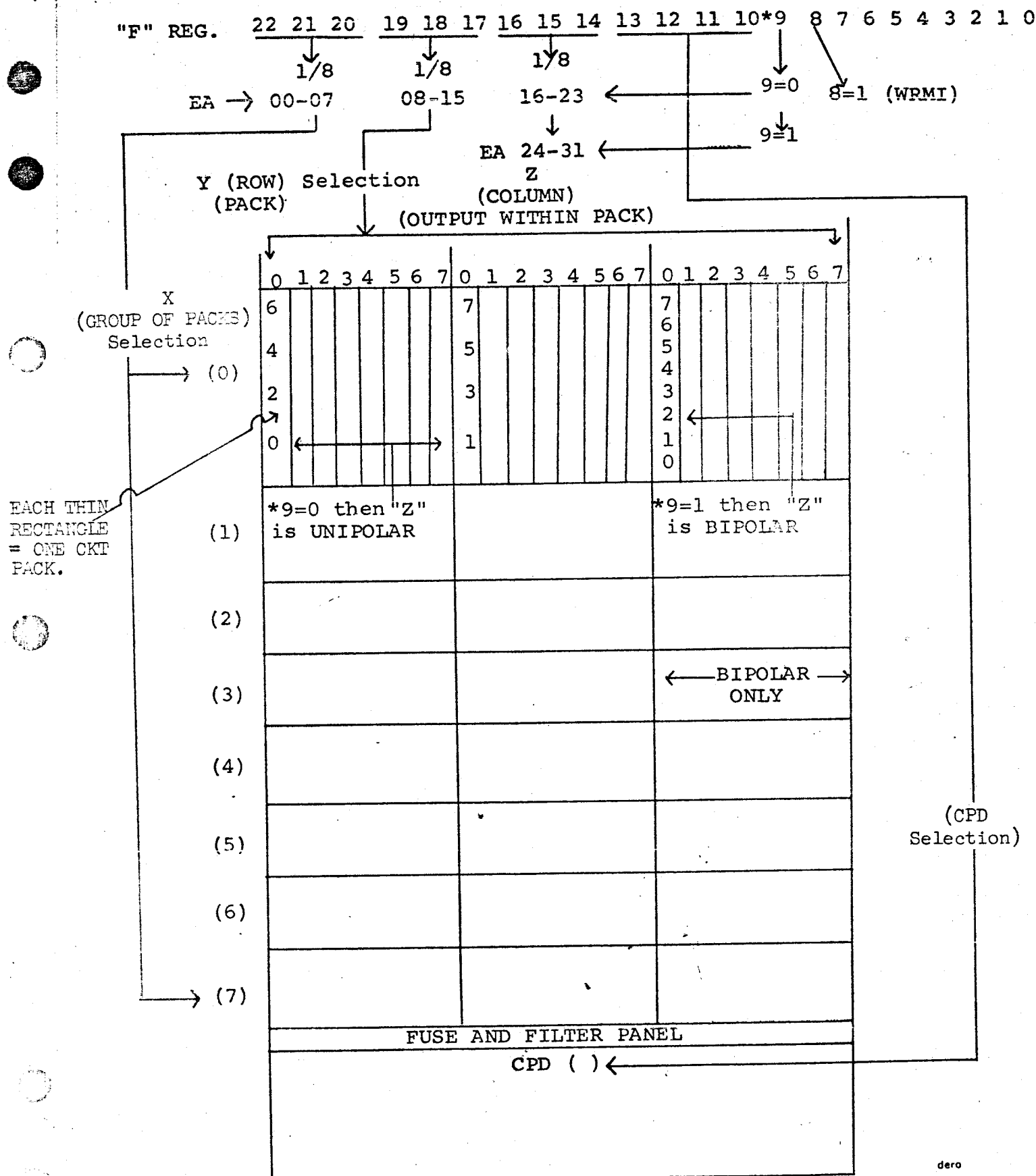
TJSEH	TJES01
	TJES02
	TJES03
	TJES04

UTSDH+12	USDS01
	USDS02
	USDS03
	USDS04

UTSDH	SSDS01
	SSDS02
	SSDS03
	SSDS04

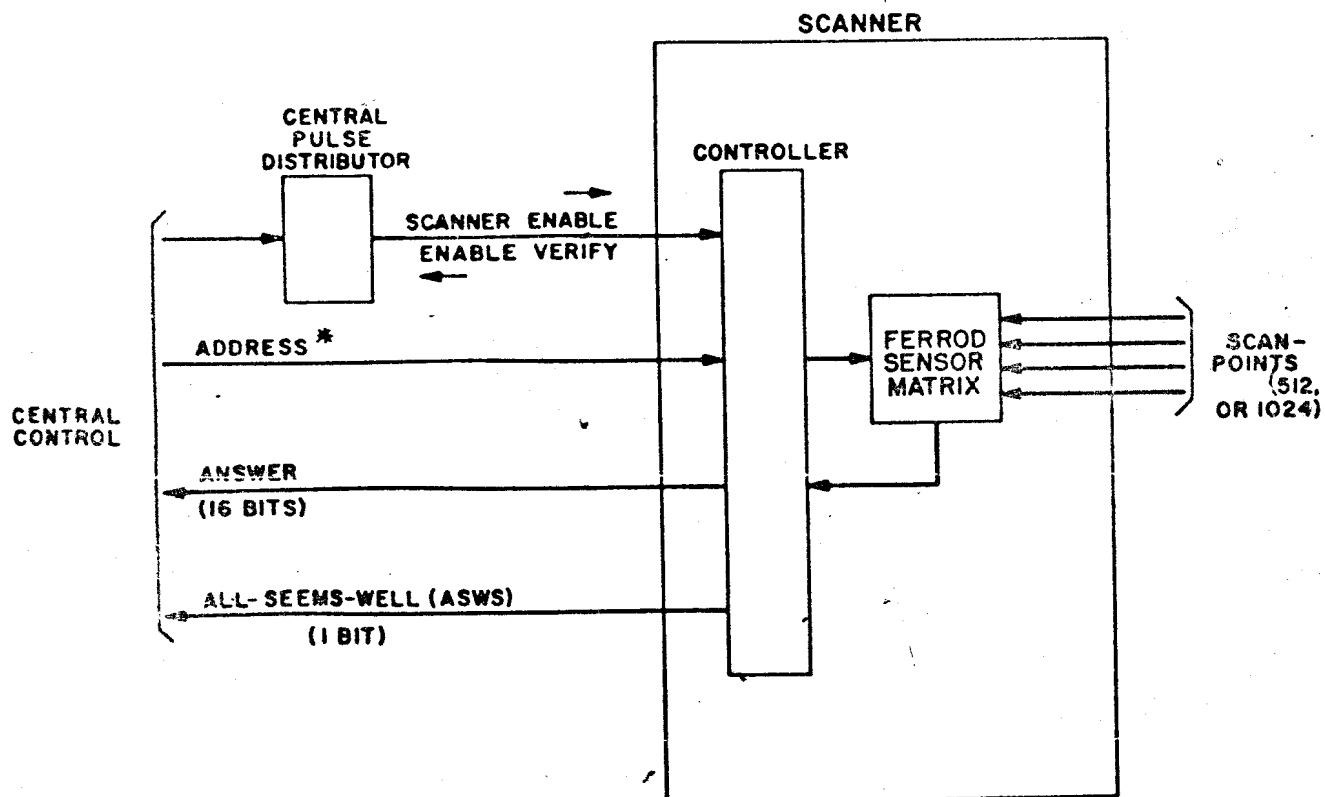
3. ENABLE SUBTABLES

LSES0	SEARCH	
	SEARCH	
	SEARCH	
	SEARCH	
	SEARCH	
	SEARCH	
	SEARCH	
	SEARCH	
	SEARCH	
	SEARCH	



SCANNERS . . .

- . Scanners sample lines, trunks and other circuits at discrete intervals of time as directed by the system.
- . Each "scan point" is connected to a ferrod.
- . Ferrods are interrogated in unique groups of sixteen at a time.
- . Scanner results return to the L register in CC.
- . Scanner operate time is 1.8 to 2.5 microseconds.
- . Scanners may be addressed at a maximum rate of once every 11 microseconds.

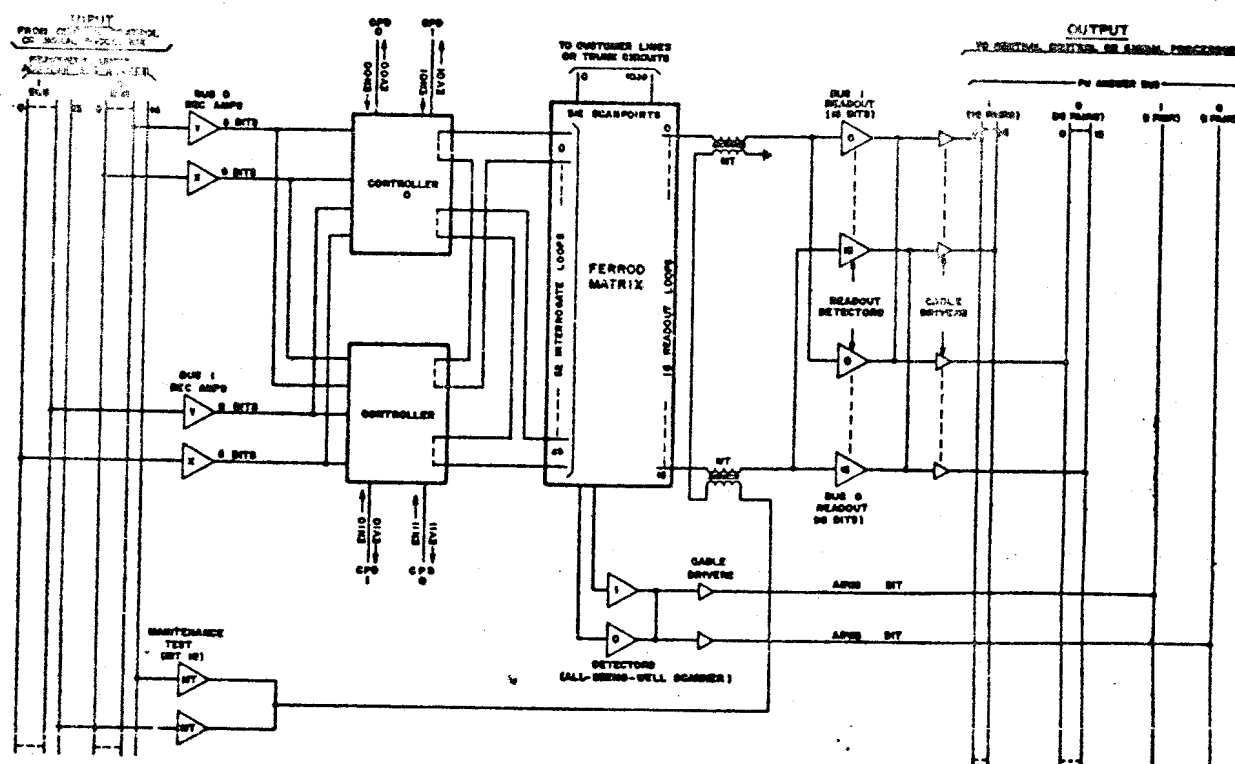


* 12 OR 16 BITS, DEPENDENT ON SIZE OF SCANNER

SCANNER OPERATION . . .

- . CC Orders CPD to Enable a Particular Scanner Controller
- . CPD Sends Enable Pulse over a Private Bus
- . Scanner Address Transmitted to Enabled Scanner Controller over CC-PU Bus
- . Scanner Send Enable Verify Pulse back to CPD over Same Private Bus
- . Scanner Responds to Address which Specifies a Unique Group of Sixteen Ferroids to be Interrogated
- . Scanner Answer Returned to L Register in CC via Scanner Answer Bus
- . ASW-S Signal Returned to CC Buffer Bus Registers

Block diagram of 512 point scanner ...



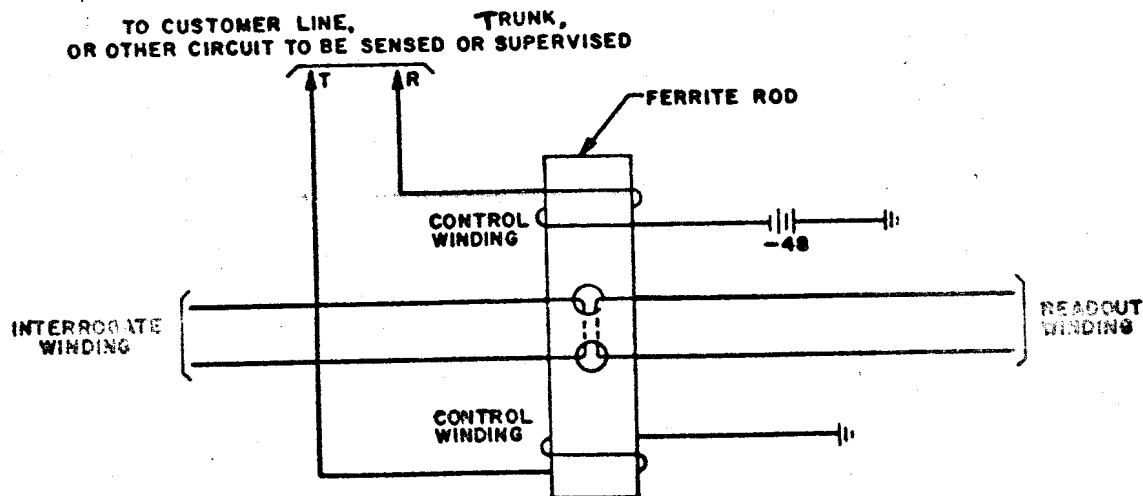
Enable Signal

EN00
EN01
EN10
EN11

Communication Route

Controller 0 from address bus 0
Controller 0 from address bus 1
Controller 1 from address bus 0
Controller 1 from address bus 1

Typical ferrod arrangement . . .

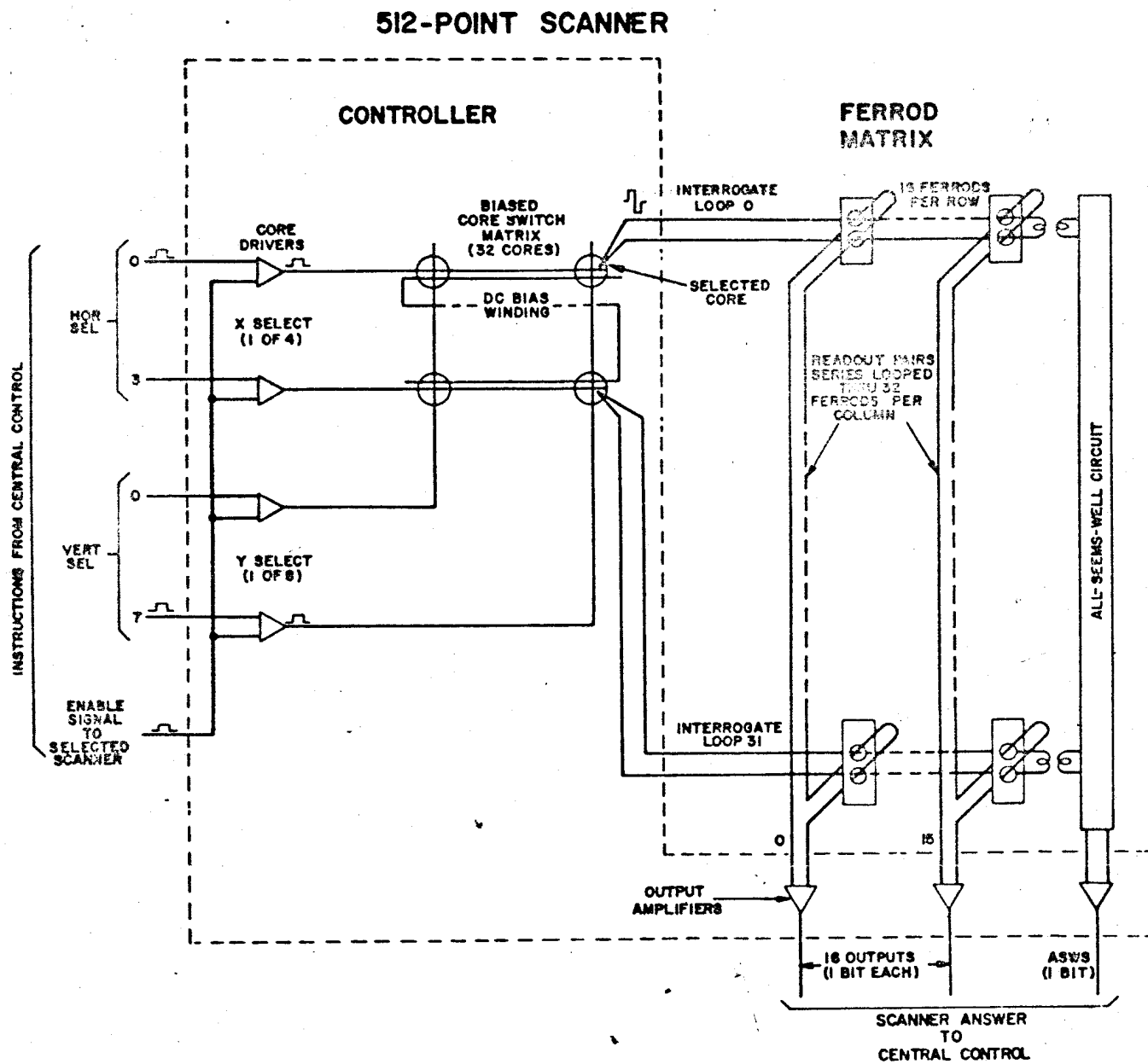


When a pulse is applied to the interrogate winding while the control windings are energized, practically no signal is induced in the readout winding and the readout is said to be 0. This is because the magnetic flux caused by the current in the multiturn control windings saturates the ferrite rod; consequently, the magnetic coupling between the single-turn interrogate and readout windings is greatly reduced. On the other hand, when a pulse is applied to the interrogate winding while the control windings are not energized, a change of flux is induced in the area immediately surrounding the two holes in the ferrite rod. A pulse is induced in the readout winding and the readout is said to be 1. Thus, when an interrogate pulse is applied, the presence or absence of a readout pulse indicates whether the circuit being observed is open or closed, respectively.

CUSTOMER LINE OR TRUNK
ON HOOK
OFF HOOK

READOUT
"1"
"0"

Scheme for Coincident Current Selection of One Group of Sixteen Scanpoints



MODES OF OPERATION . . .

- . Normal
 - . Either Controller may Interrogate Ferrod Matrix
- . Marked-In-Trouble
 - . One Controller is Recorded in Memory as being in Trouble
 - . Cannot use for Interrogating Ferrod Matrix in Normal Call Actions
- . Quarantine
 - . Power is Removed from Controller by Program or manually
 - . Only One Controller in Quarantine Mode at a Time

SIGNAL DISTRIBUTOR . . .

Used to . . .

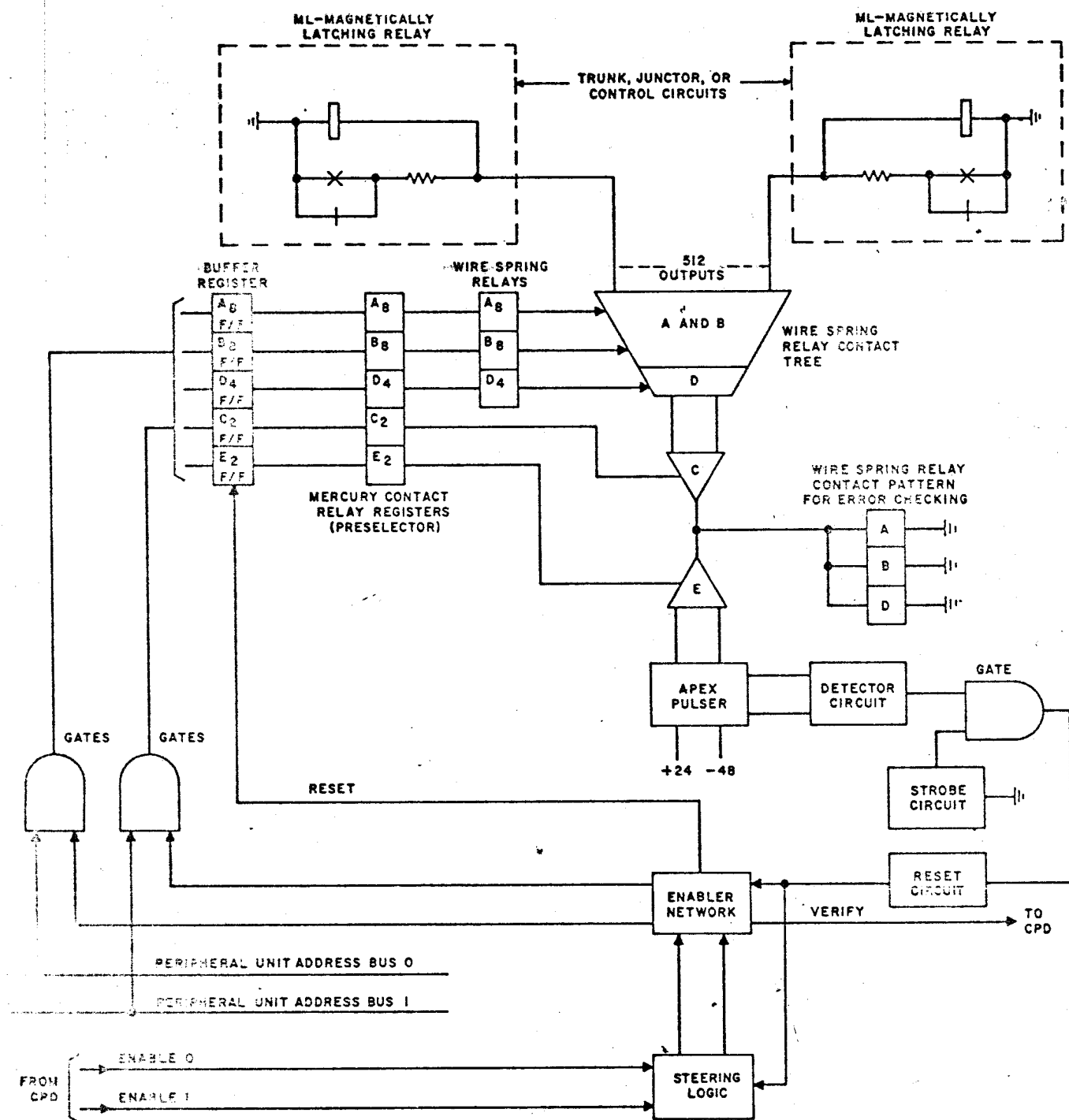
- . Select and control magnetically latching relays in universal trunk circuits.
- . Operate relays in miscellaneous other circuits.

Composed of . . .

- . Two controllers and a relay tree.
- . Each controller normally operates in its own unique half of the relay tree.

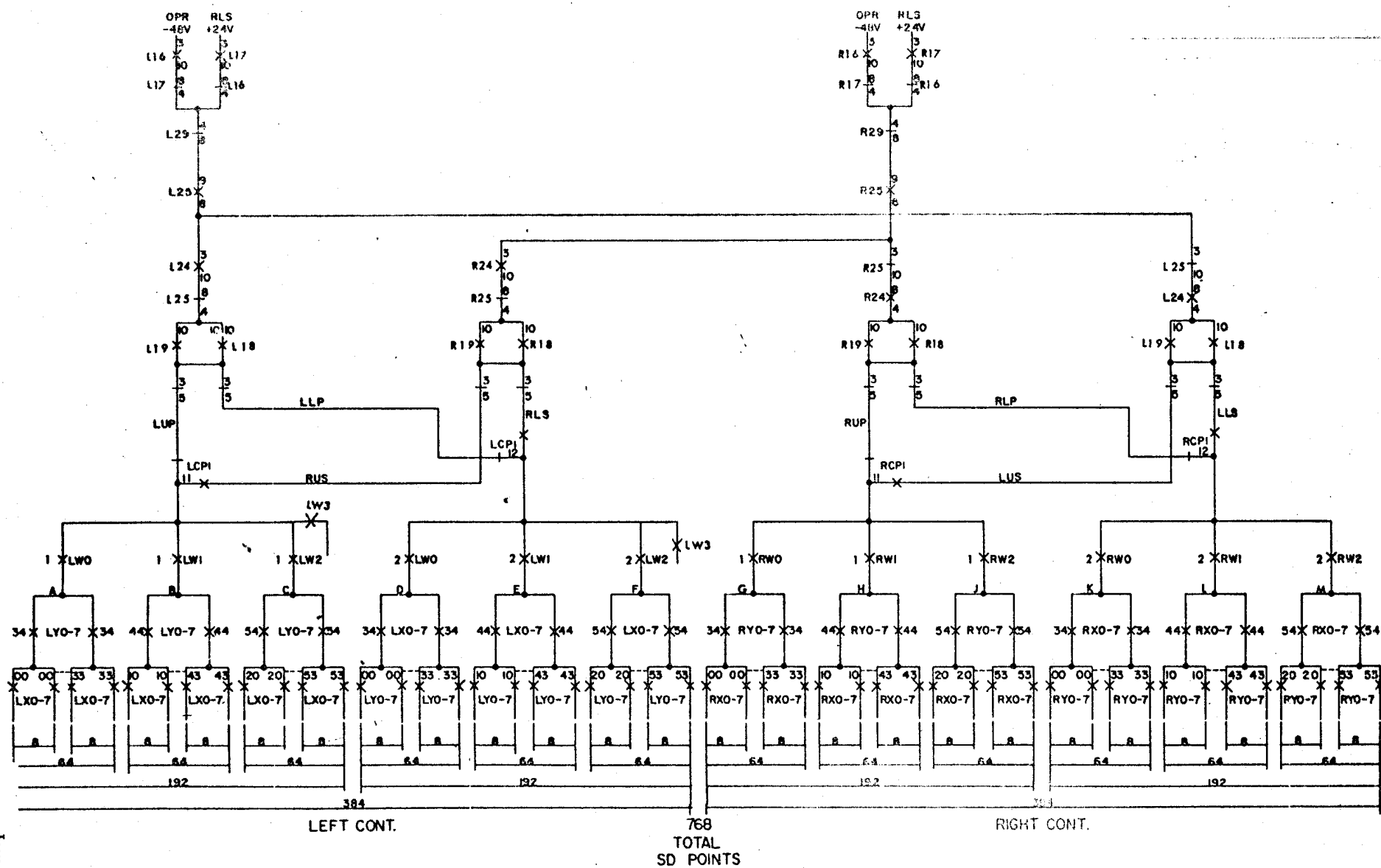
SD CONTROLLER OPERATION . . .

- . CC Orders a CPD to Enable a Particular SD Controller
- . The CPD Enables a SD over One of the Four Private Enable Buses
- . The Enable Signal Sets an Enable Flip Flop which will:
 - . Trigger Enabler Network
 - . Inhibit other Enable Pulses for One SD Cycle
 - . Mark the Controller Busy
 - . Selects a Reset Lead for the Controller
- . The Triggered Enabler Circuit will:
 - . Stretch (2.5 Micro-sec.) the Enable Signal which Allows the Buffer Register Flip Flops to Receive Address Information from the CC-PU Address Bus
 - . Generate an Enable Verify Signal to CPD after 2.5 Micro-sec.
- . Relay Tree will Select One ML Relay
- . An Apex Pulser will:
 - . Apply -48 Volts to Operate ML Relay
 - . Apply +24 Volts to Release ML Relay
- . A Detector will Sense Relay Operation by Step Current through 1200 ohm Resistor in Series with EBM Contact of ML Relay and will Reset the Controller to Idle State



Basic Signal Distributor





For training purposes only

UTF SIGNAL DISTRIBUTOR RELAYS

ADDRESS REGISTER RELAYS	GROUP	ADRS BITS	FUNCTION
L/R 08-15	A	8 - 15	OPR R/LX0-7 FOR X SELECTION
L/R 00-07	B	0 - 7	OPR R/LY0-7 FOR Y SELECTION
L/R 20-23	D	20 - 23	OPR LWO-3 FOR W SELECTION, IF BIT 27 = 1 SELECT MTC RELAYS
L/R 18-19	C	18 (Upper) - (lower) 19	SELECT QUARTERS OF MATRIX FIELD 19 18 17 16 0 1 UPPER 1 0 LOWER
L/R 16-17	E	16 (OPR) - (RLS) 17	SELECT OPR OR RLS FOR ML RELAYS 17 16 1 0 RLS 0 1 OPR
L/R 24-25	H	24 (LH) - (RH) 25	SELECT CONTROLLER 25 24 0 1 LEFT 1 0 RIGHT
L/R 26-27	T	26 (Norm) - (Maint) 27	TYPE 27 26 ORDER 0 1 NORM 1 0 MTC

CONTACT MATRIX RELAYS	SLAVES OF	MULTIPLE CONTACTS FOR
LX0-7	L08-15	X SELECTION
LY0-7	L00-07	Y SELECTION
LWO-2	L20-22	W SELECTION OR SELECT MTC RELAY LW/LW/LW 27 26 25 24 1 0 0 1 RQ 1 0 1 0 RTA 1 1 0 0 R28

APEX RELAYS	FUNCTION
R/LCO	LIMITS TIME + 24V RLS PULSE. PREVENTS OPRN OF ML ON RLS PULSE
R/LSO	BY THEIR OPR TIMES, PREVENT DETECTOR CKT FROM OPR ON NOISE IN EARLY PART OF SD CYCLE
R/LSR	

MAINTENANCE RELAYS	FUNCTION
LTA	TEST POINT ACCESS MODE
L28	RLS MTC RELAYS, RETURN LEFT CONTROLLER TO NORMAL MODE
LQ	QUARANTINE MODE
LCPO	GIVES CONTROL OF LW, LX & LY RELAYS TO RIGHT CONT. FOLLOWS LQ RELAY
LCPI	COMBINE CONTACT MATRIX TO RIGHT CONT. FOLLOWS LQ RELAY

CONTROLLER RESET RELAYS	FUNCTION
R27	OPR WHEN LEFT CONT. MTC RELAY OPRN SENSED. RESETS RIGHT CONTROL
L29	OPR AFTER SUCCESSFUL ML RELAY ACTION. RESETS LEFT CONTROLLER
LPW	OPR WHEN POWER ON IN LEFT CONTROLLER

SELECTION		MTCE		HALF		W			QTR		OPER.		X								Y								
GROUP		T		H		D			C		E		A								B								
ADDRESS		27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
CONTROLLER 0	L	MTCNOR																											
	REL	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	APEX	L27	L26	-	Norm	LW3	LEAD																						
	NOISE	L27	L26	-	Norm	LW3	LW2	RW1	LW0	LP	LUP	RLS	OPR	LX7	LX6	LX5	LX4	LX3	LX2	LX1	LX0	LY7	LY6	LY5	LY4	LY3	LY2	LY1	LY0
CONTROLLER 1	R	MTCNOR																											
	REL	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	APEX	R27	R26	-	Norm	LW3	RW2	RW1	RW0	LP	PR	RLS	OPR	RX7	RX6	RX5	RX4	RX3	RX2	RX1	RX0	RY7	RY6	RY5	RY4	RY3	RY2	RY1	RY0
	NOISE	R27	R26	-	Comb	LW3	LW2	LW1	LW0	LS	RLS	OPR	LX7	LX6	LX5	LX4	LX3	LX2	LX1	LX0	LY7	LY6	LY5	LY4	LY3	LY2	LY1	LY0	

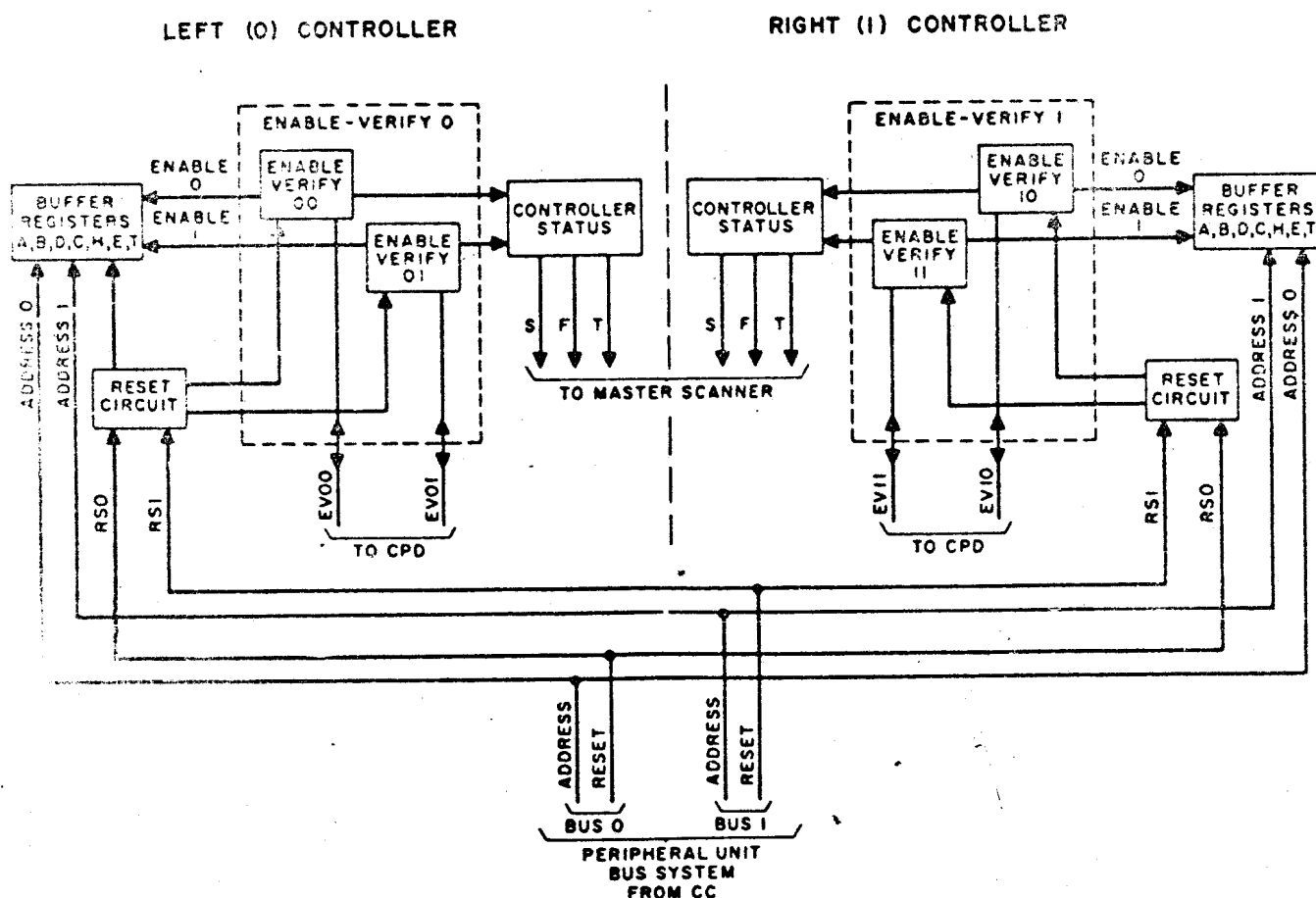
	RW2	RW1	RW0	LW2	LW1	LW0	
R UP	J	H	G	C	B	A	LEAD
R LP	M	L	K	F	E	D	

EXT MATRIX		
N	R	LW3
P	S	LW3A

SIGNAL DISTRIBUTION
LEAD SELECTION CHART

RESET OF CONTROLLER FLIP-FLOPS BY CC . . .

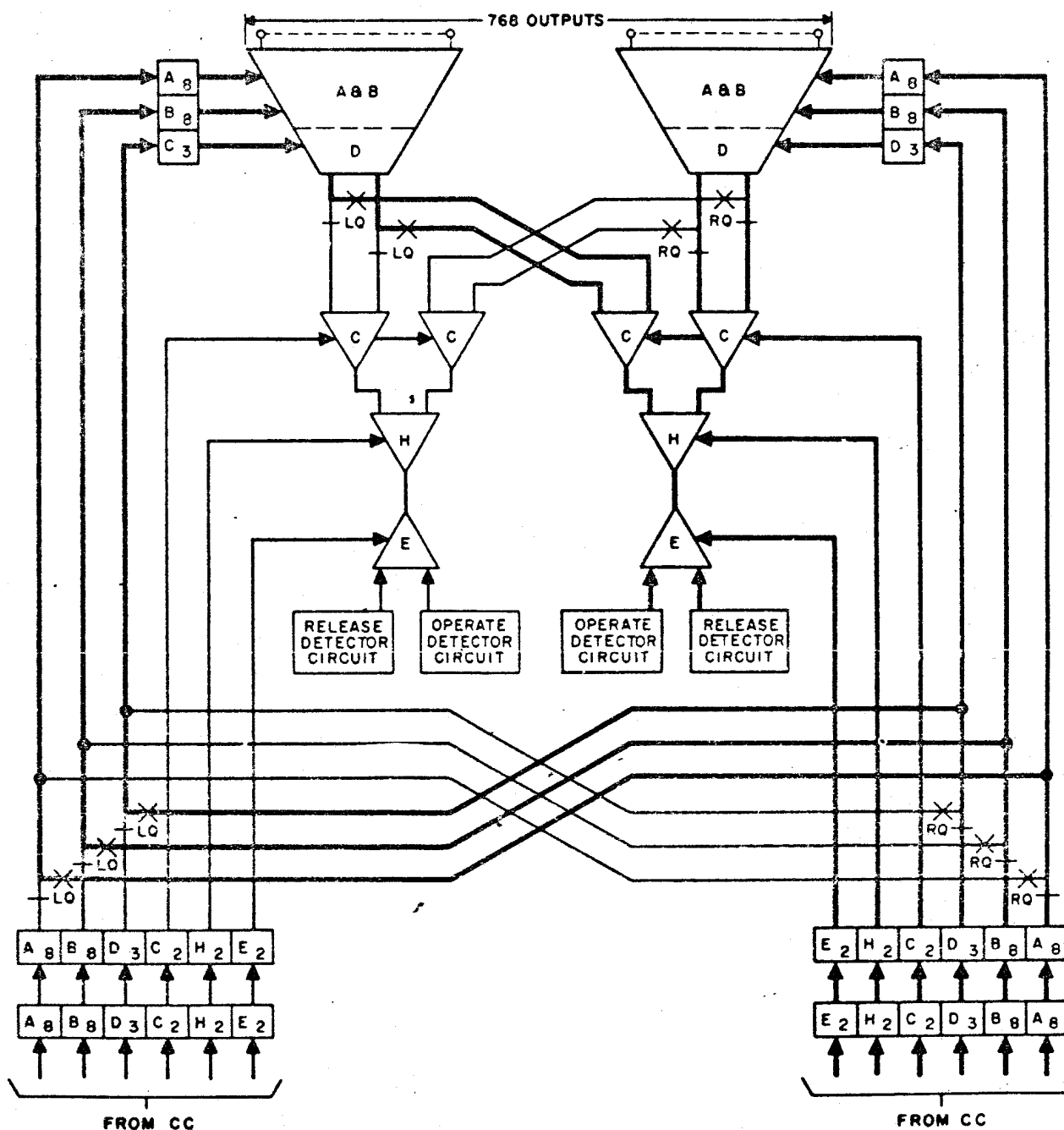
- Normally the SD controller detects the release or operation of a ML relay and resets all flip-flops.
- Periodically the busy-idle status of each controller is checked by CC via the S, F and T scampoints.
- If a controller is found to be busy longer than 19 milliseconds CC resets all flip-flops in that controller.
- No controller selection is made when CC sends a reset thus the buffer register and enable flip-flops of all controllers are subject to being reset.



MODES OF OPERATION . . .

Quarantine Mode of Operation (QM) . . .

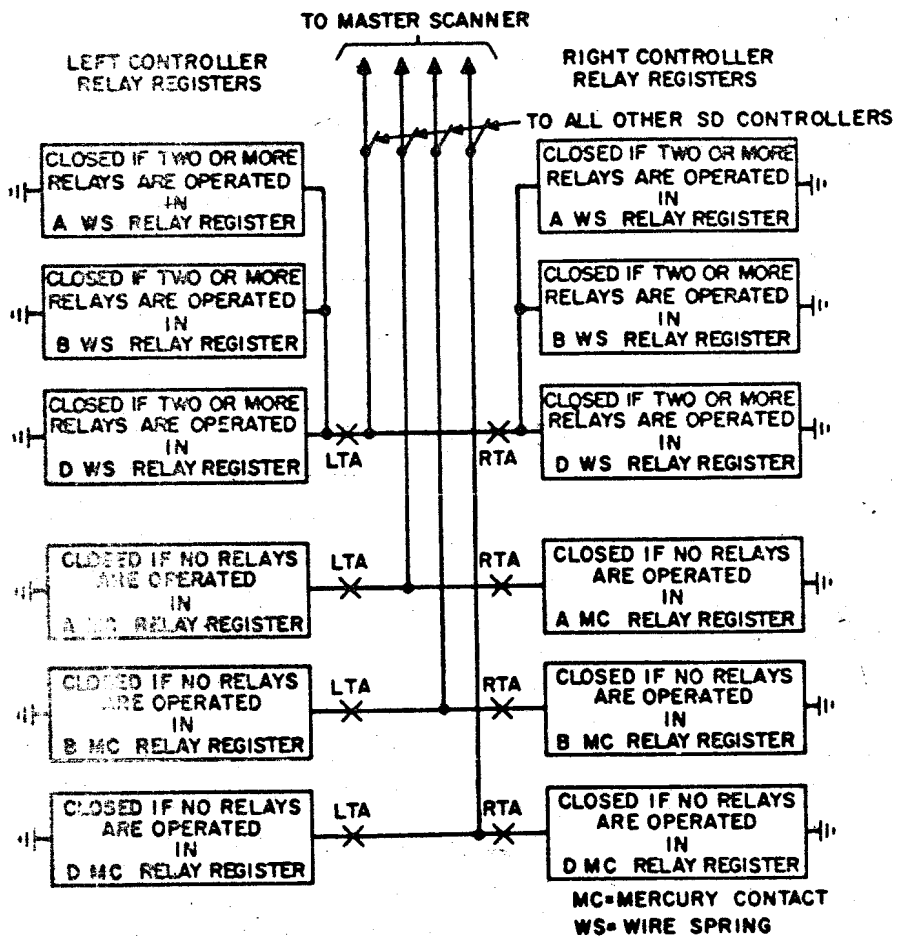
- . LQ or RQ relay operated which will:
 - . Remove faulty controller from service.
 - . Give other controller access to all ML relays.
- . The buffer register H selection will now determine in which half of relay tree the ML relay will be operated.



MODES OF OPERATION . . .

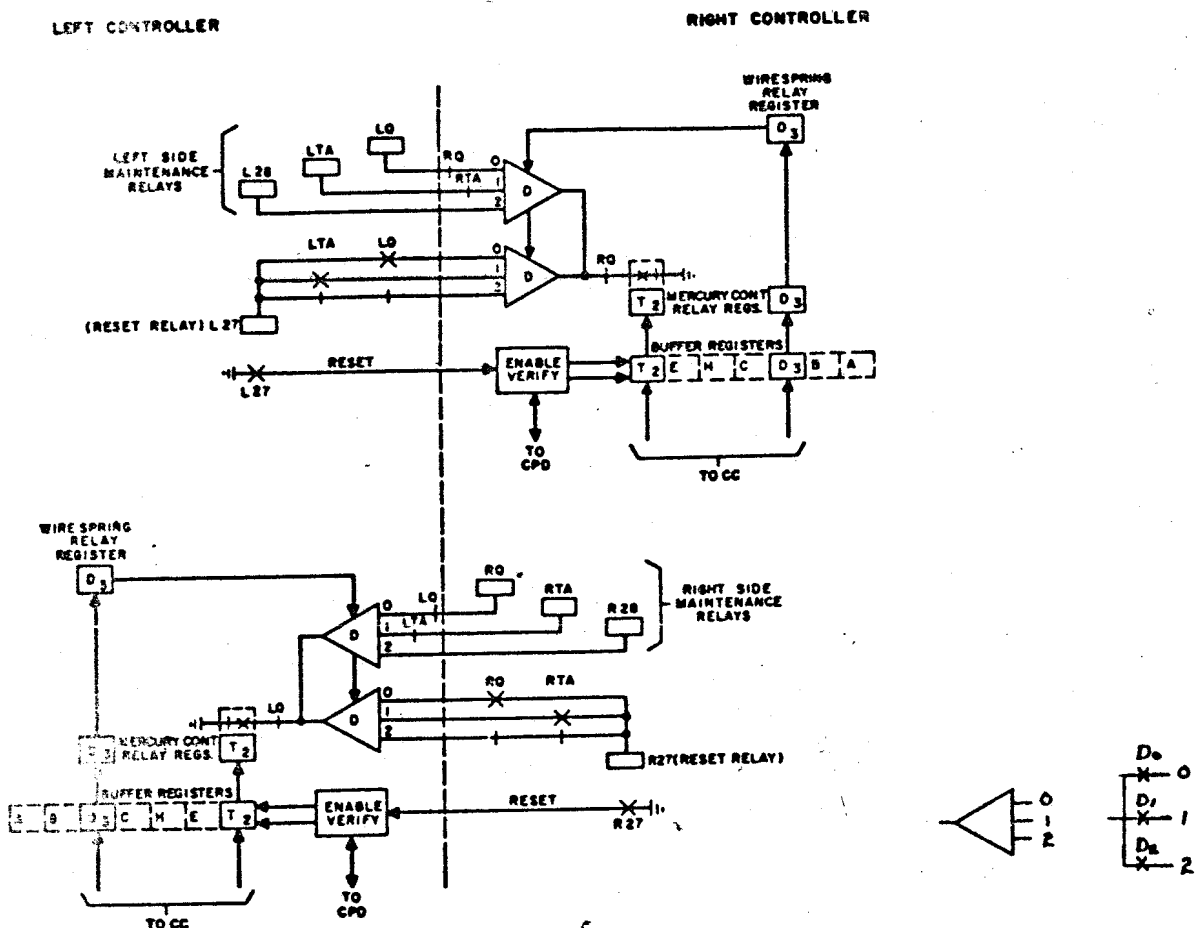
Test Point Access Mode (TPAM) . . .

- . LTA or RTA Relay Operated
- . Access to ML relays not affected.
- . Internal SD scampoints are connected to the diagnostic bus.
- . When tests are being done on the SD the address may be incomplete.
- . If incomplete address is received the SD must be reset by CC.
- . ML relays may or may not be operated depending only upon address sent from CC.



OPERATION OF MAINTENANCE RELAYS . . .

- . Each controller controls the maintenance relays of its mate.
- . SD addressed in normal manner.
- . T and D selections choose which maintenance relay will be operated.
- . L/R Q and L/R TA relay lock up through contacts of released L/R 28 relay to select Q or TPA modes.
- . Operation of L/R 28 relay returns the SD to normal mode.
- . L/R 27 relay resets controller.

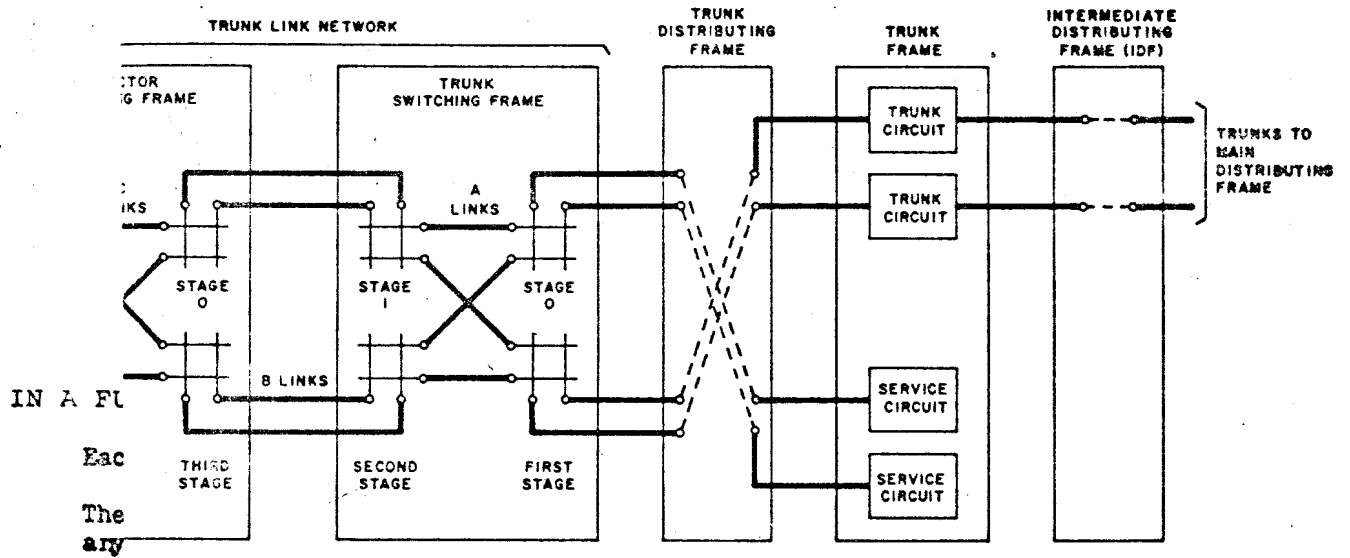


IN A FU

Ea

Th

li



Network Switching Matrix, Simplified
Diagram

IN A FULLY EQUIPPED LLN . . .

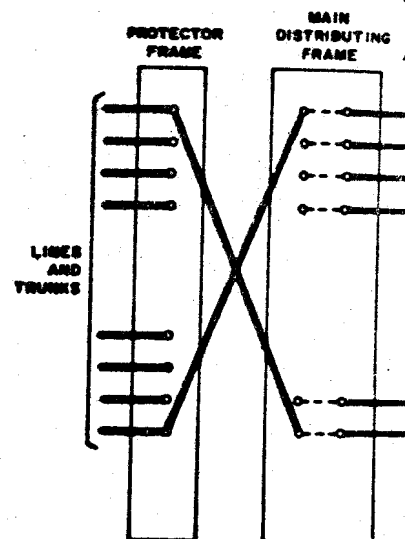
Each input line has access to every output junctor.

There is one and only one path (unique combination of A, B and C links) between a given input line and a given output junctor.

In a LSF concentrator each of the inputs (lines) has access to all of the 16 outputs (B links).

One and only one B link connects each concentrator of the LSF to one of the 16 grids in the JSF.

In a JSF grid each of 64 inputs (B links) has access to all of 64 outputs (junctors)



IN A FULLY EQUIPPED TLN . . .

Each trunk appearance has access to every output junctor.

There are four paths between any given trunk appearance (TNN) and any given junctor.

In a TSF grid each of the inputs (TNN's) has access to all of the B link outputs.

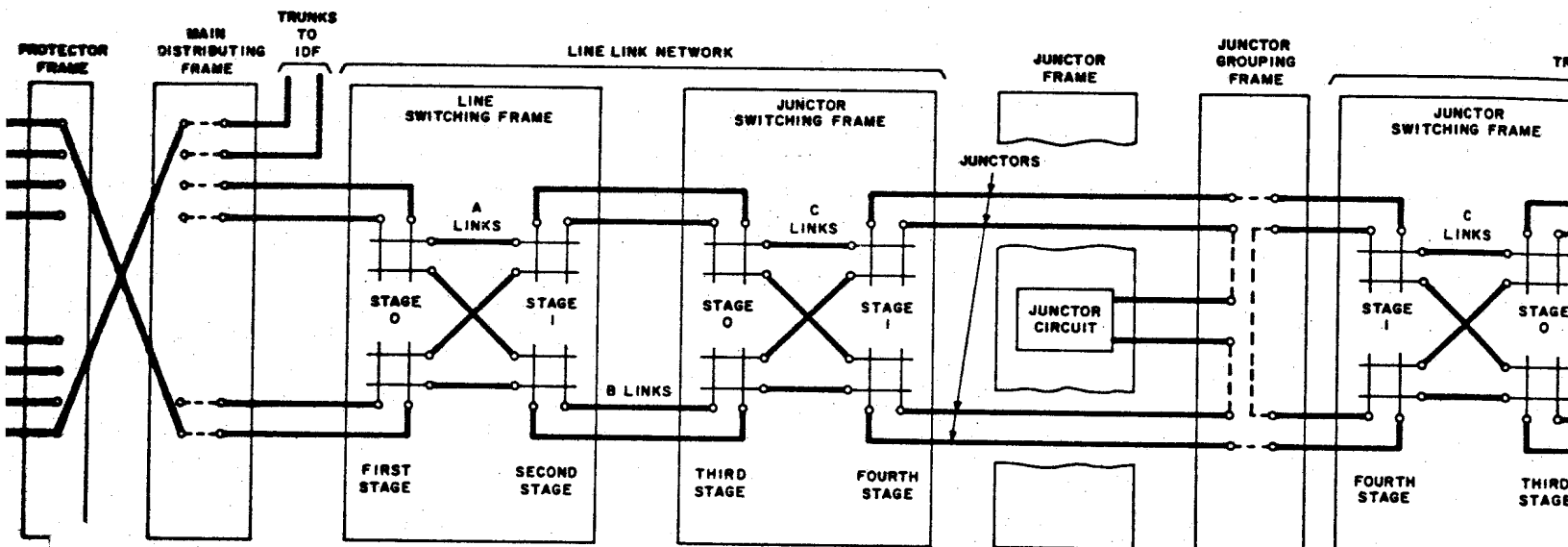
Four B links connect each grid of the JSF to four different grids in the TSF.

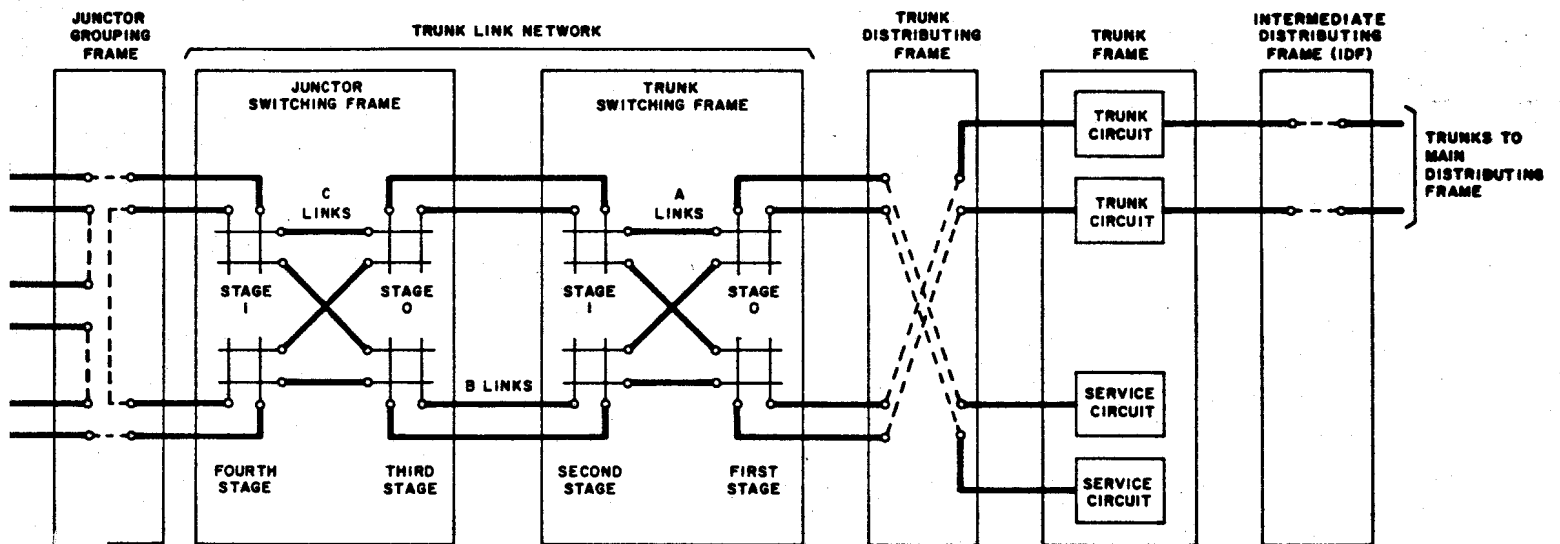
64 outputs per grid in TSF

16 grids in JSF

4 inputs per grid in JSF

In a JSF grid each of 64 inputs (B links) has access to all of 64 outputs (junctors).

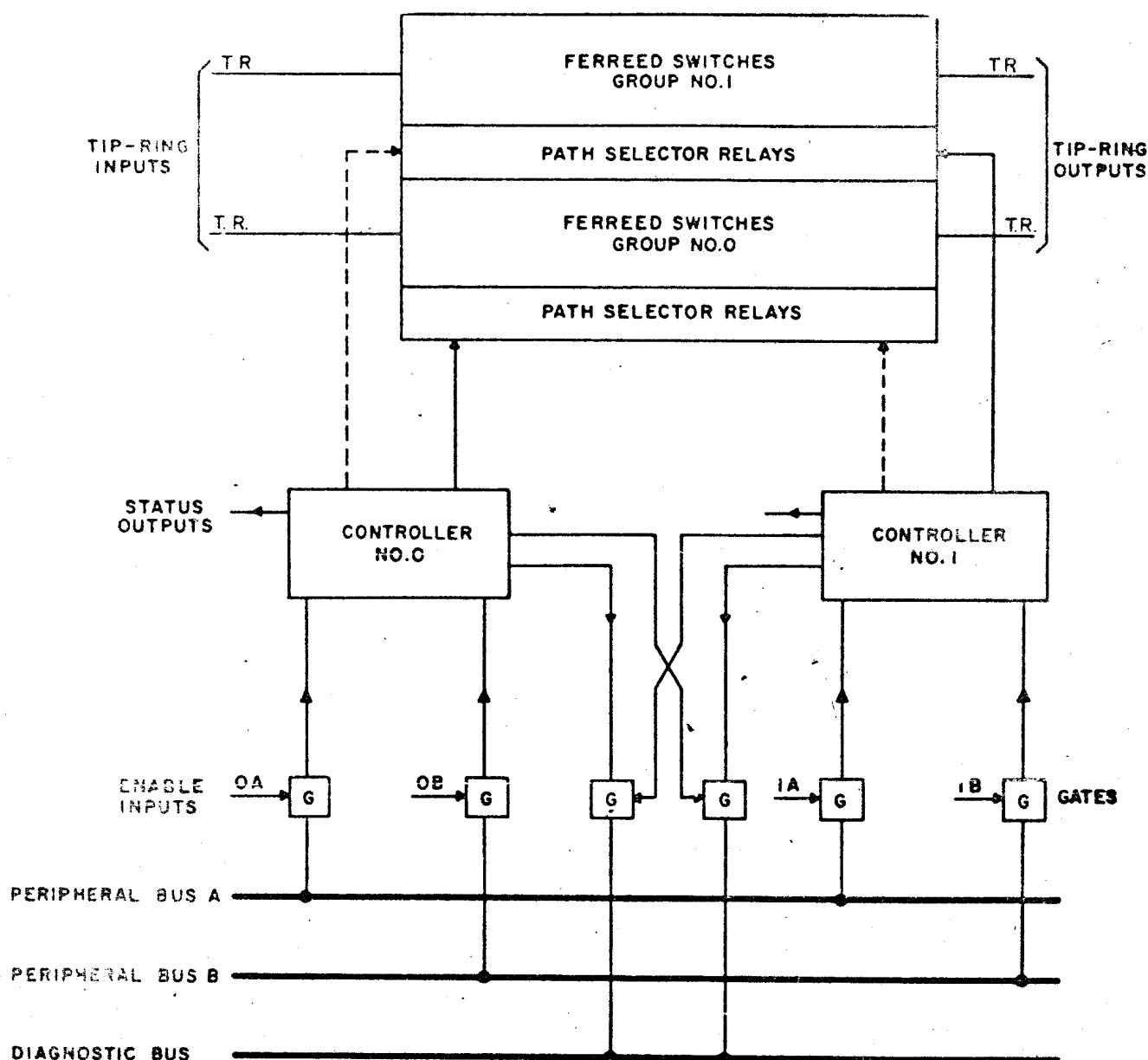


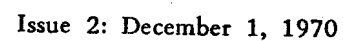


Network Switching Matrix, Simplified Diagram

NETWORK DUPLICATION . . .

- . Each switch frame contains two controllers.
- . Switches in a frame are divided into two equal groups.
- . Each group is assigned a controller.
- . Under normal conditions a controller operates only its assigned group.
- . Two path selections can be made simultaneously within a frame.
- . When a controller is in trouble the mate takes control of both groups of switches.





NETWORK PATHS ARE SELECTED BY CC . . .

- . CC maintains a network map which stores the busy-idle state of all A, B, and C links.
- . CC maintains a path memory which stores a record of all paths in use or reserved and their end terminals (lines, junctors or trunks).
- . CC searches the network map to select an idle path.
- . CC updates the network map and path memory.
- . CC prepares network instructions.
- . CC loads orders into a peripheral order buffer (POB).
- . At intervals of 25 milliseconds instructions are read from the POB and transmitted to appropriate network controllers.
- . Controllers cause the appropriate crosspoints to close.
- . Path selection in a frame is controlled by wirespring relays in network controllers.
- . Operation of a particular set of wire spring relays determines the crosspoint windings to be pulsed.

MODES OF OPERATION . . .

Normal Mode . . .

Both controllers active

Each controls its own group

Test Point Access (TPAM) . . .

Twelve internal test points for one controller are connected to the diagnostic bus by a relay

Quarantine Mode (QM) . . .

Controller is prevented from operating any path selection relays

No enable verify signal returned

Can receive enable and address signals

Manual Power Removed Mode (MPRM) . . .

Initiated manually at frame

Combined Mode (CM) . . .

Controller put in CM if its mate is in QM or MPRM

Controller in CM assumes all control

CONTROLLER STATUS

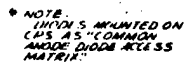
. Controller Scanpoint States

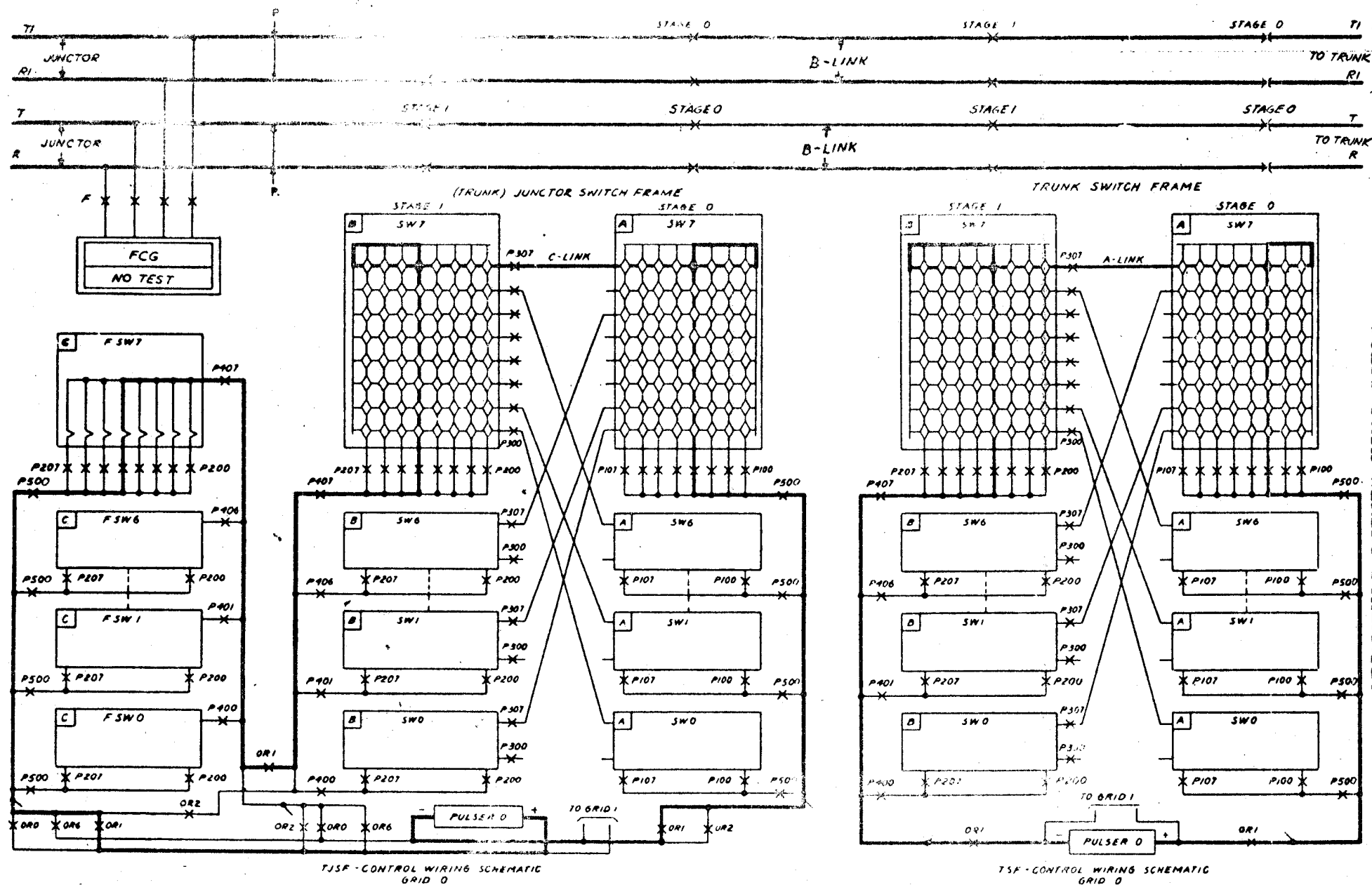
SCANPOINTS			STATE OF NETWORK CONTROLLERS
S	F	T	
0	0	0	SUCCESS OR IDLE
0	1	0	ENABLED
1	0	0	RESET
1	1	0	FCG FAILURE (JSF ONLY)
1	1	1	POWER REMOVED
0	1	1	TEST POINT ACCESS MODE
0	0	1	QUARANTINE AND TEST POINT ACCESS MODE
1	0	1	QUARANTINE MODE

. FCG Failure

- . FCG failure state is established when an FCG failure has been detected by last order received.
- . Every 25 M sec. (before POB's are unloaded) a pulse is applied to FCG bus lead.
- . Pulse received by all junctor switch frames.
- . Pulse used to determine outcome of an FCG test previously executed.
- . Affects states of scanpoints accordingly.
- . Scanpoints checked for failures.

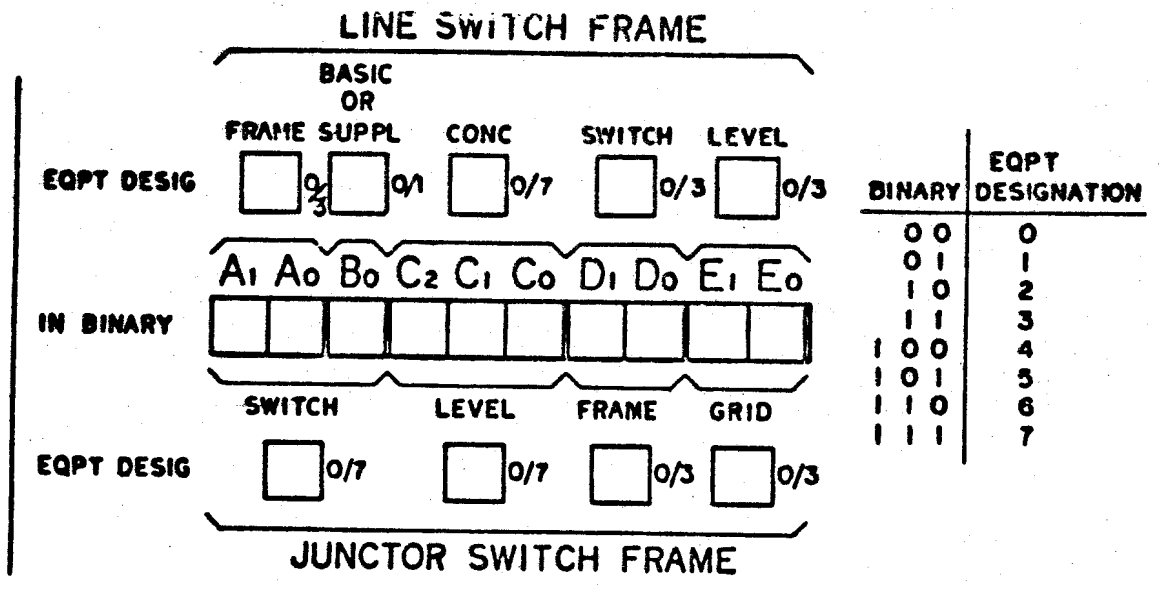






LLN B-LINK WIRING PATTERN

4:1



LINE LINK NETWORK SIZES

LSF CONC RATIO	MAX. NO. LSFs PER LLN	RATIO OF LINE TERMINALS TO JUNCTORS	MAX. NO. CUSTOMER LINES PER LLN	MAX. NO. LLNs PER OFFICE	MAX. NO. LINES PER OFFICE
FOR HEAVY CUSTOMER USAGE					
2 to 1	4	2.0 to 1	2048	16	32,768
2 to 1	5	2.5 to 1	2560	16	40,960
2 to 1	6	3.0 to 1	3072	16	49,152
2 to 1	7	3.5 to 1	3584	16	57,340
2 to 1	8	4.0 to 1	4096	16	65,536
FOR REGULAR CUSTOMER USAGE*					
4 to 1	4	4 to 1	4096	16	65,536
4 to 1	5	5 to 1	5120	12-4/5	65,536
4 to 1	6	6 to 1	6144	10-2/3	65,536
4 to 1	7	7 to 1	7168	9-1/7	65,536
4 to 1	8	8 to 1	8192	8	65,536
*LSFs for a 4 to 1 concentration ratio are made up of one home and one mate frame.					

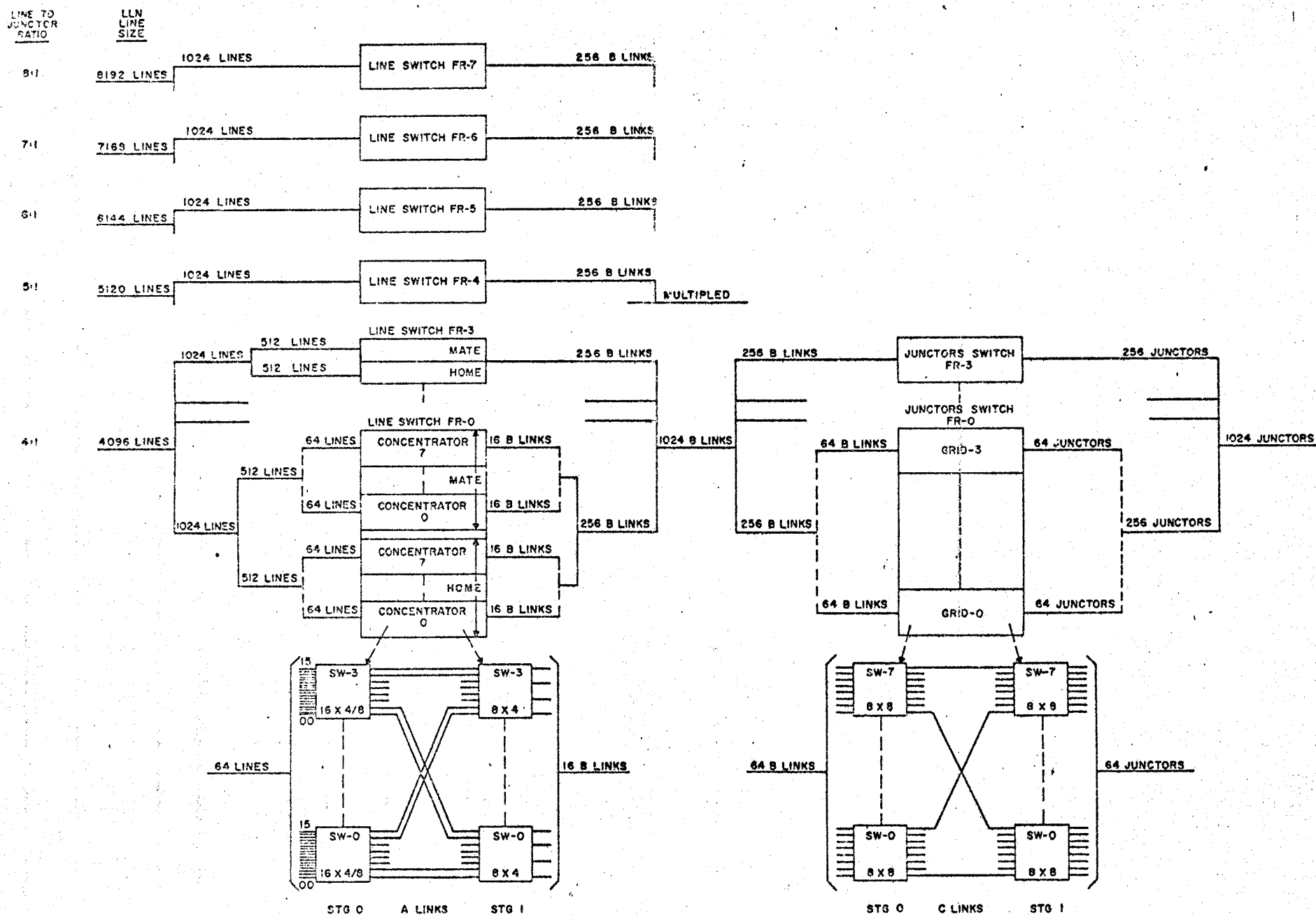
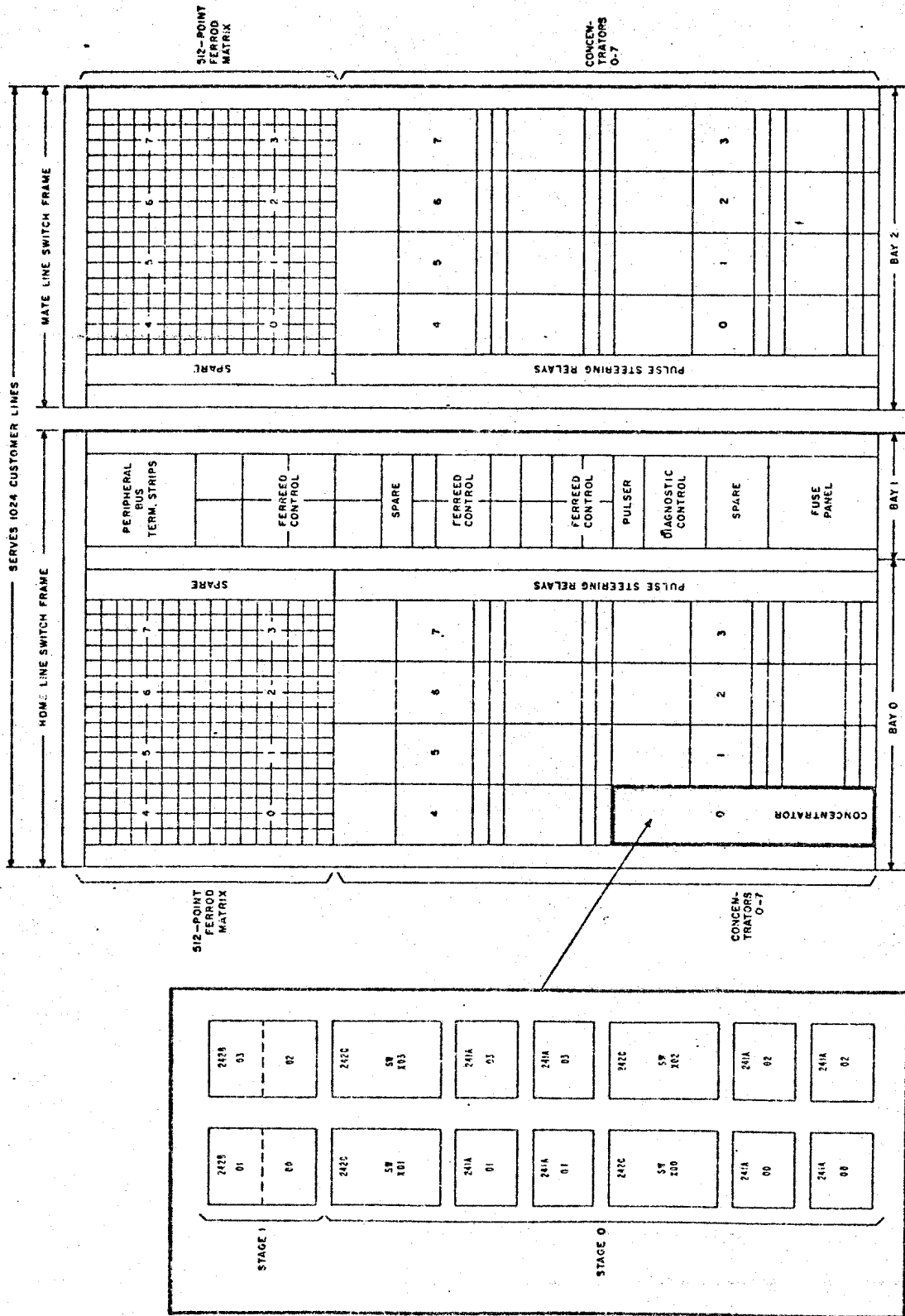
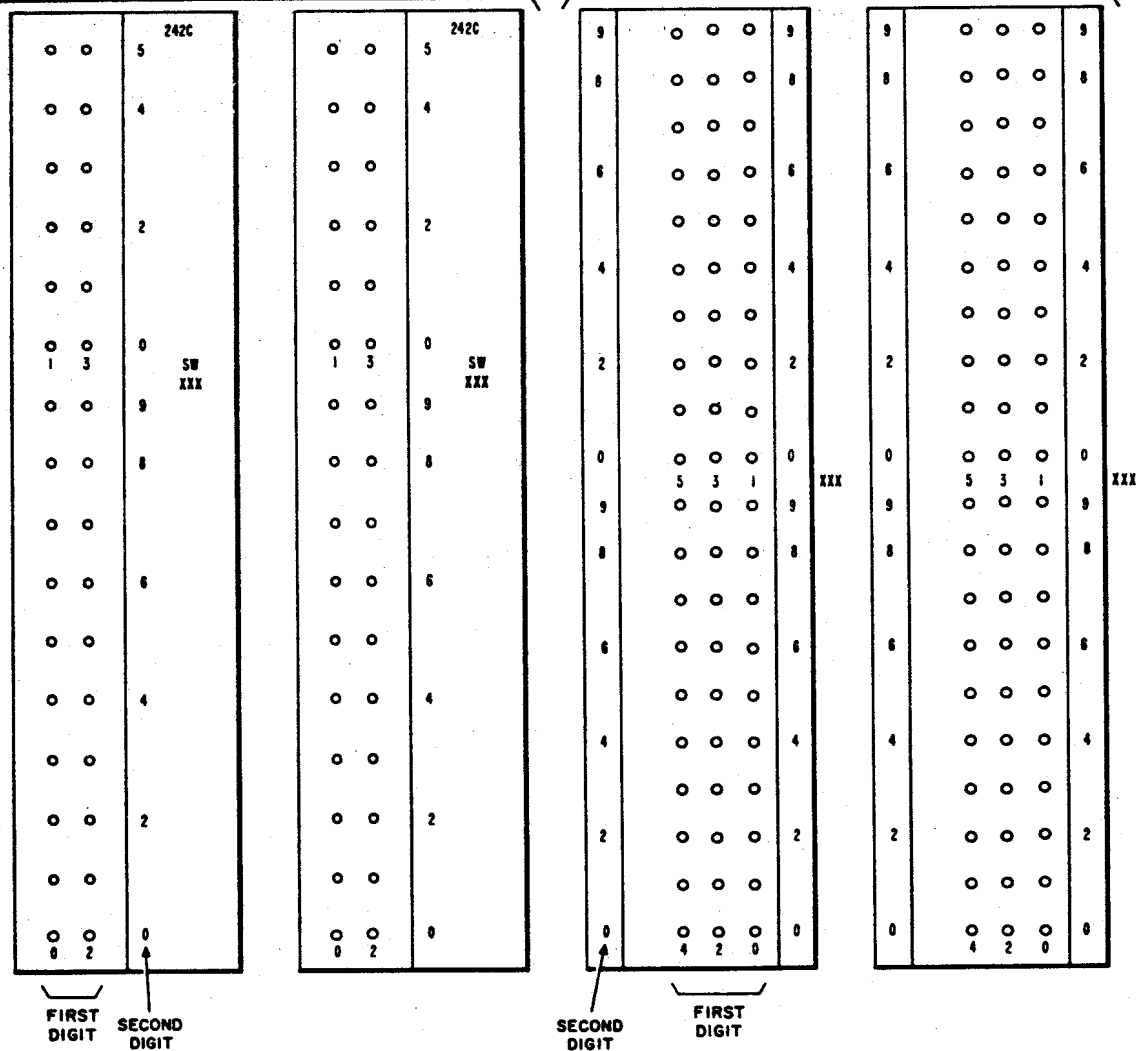


Fig. 42 - Line-Link Networks Equipped With Line Switching Frames (4:1 LCR)



FRONT REAR
(TOP OR BOTTOM HALF OF STAGE 0 PART OF A CONCENTRATOR) (TOP OR BOTTOM HALF OF STAGE 0 PART OF A CONCENTRATOR)



242C and 241A Switches, Terminal Layout

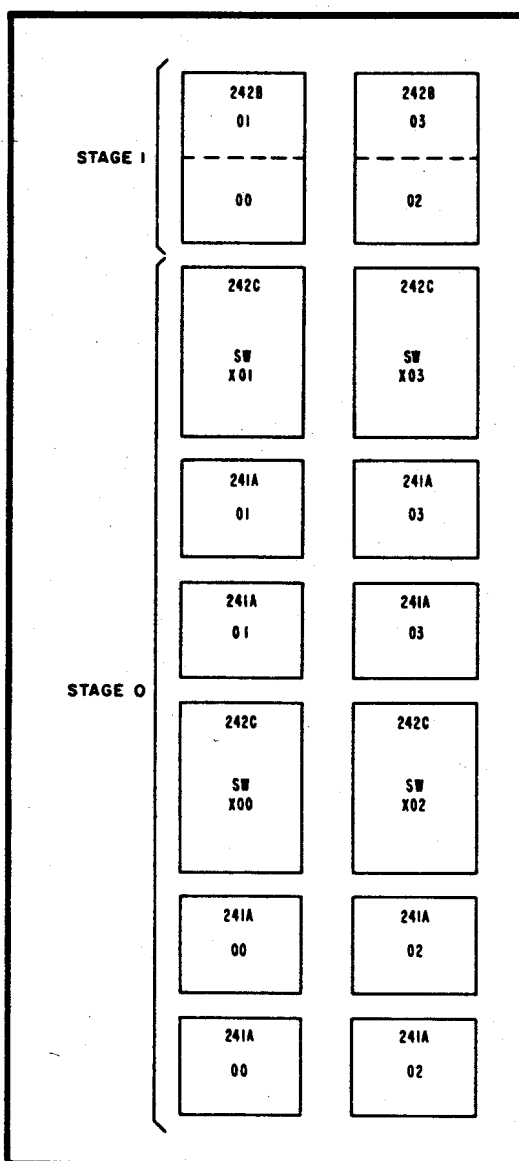
9	0	0	0
8	0	0	0
6	0	0	0
4	0	0	0
2	0	0	0
0	0	0	0
9	0	0	0
8	0	0	0
6	0	0	0
4	0	0	0
2	0	0	0
0	0	0	0
2	0	0	0
0	0	0	0

COUNT					
○	○	○	○	○	3
○	○	○	○	○	2
				0	
○	○	○	○	○	1
○	○	○	○	○	0

COU
00

COL 00					
○	○	○	○	○	3
○	○	○	○	○	2
				0	
○	○	○	○	○	1
○	○	○	○	○	0

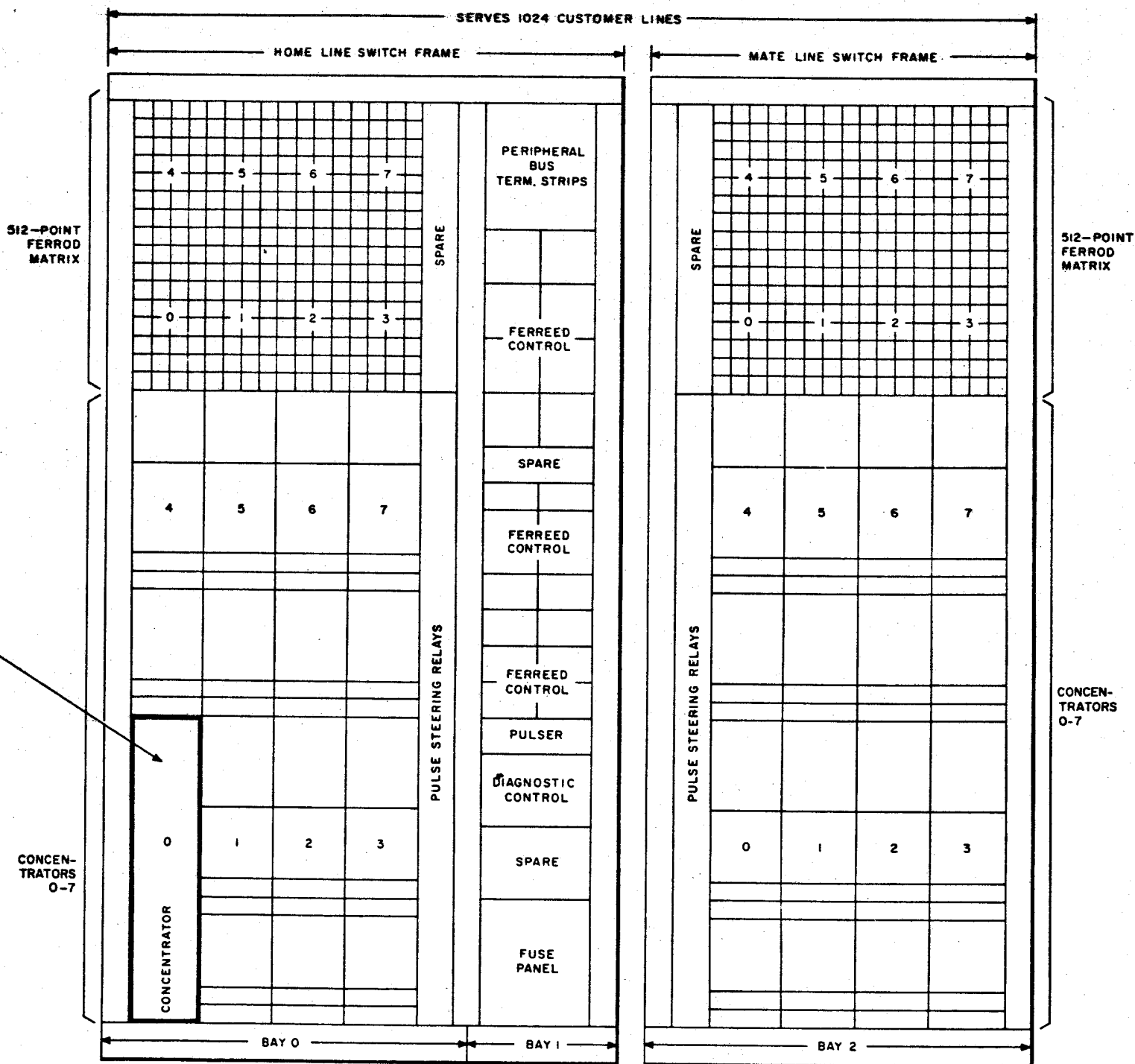
COU
00



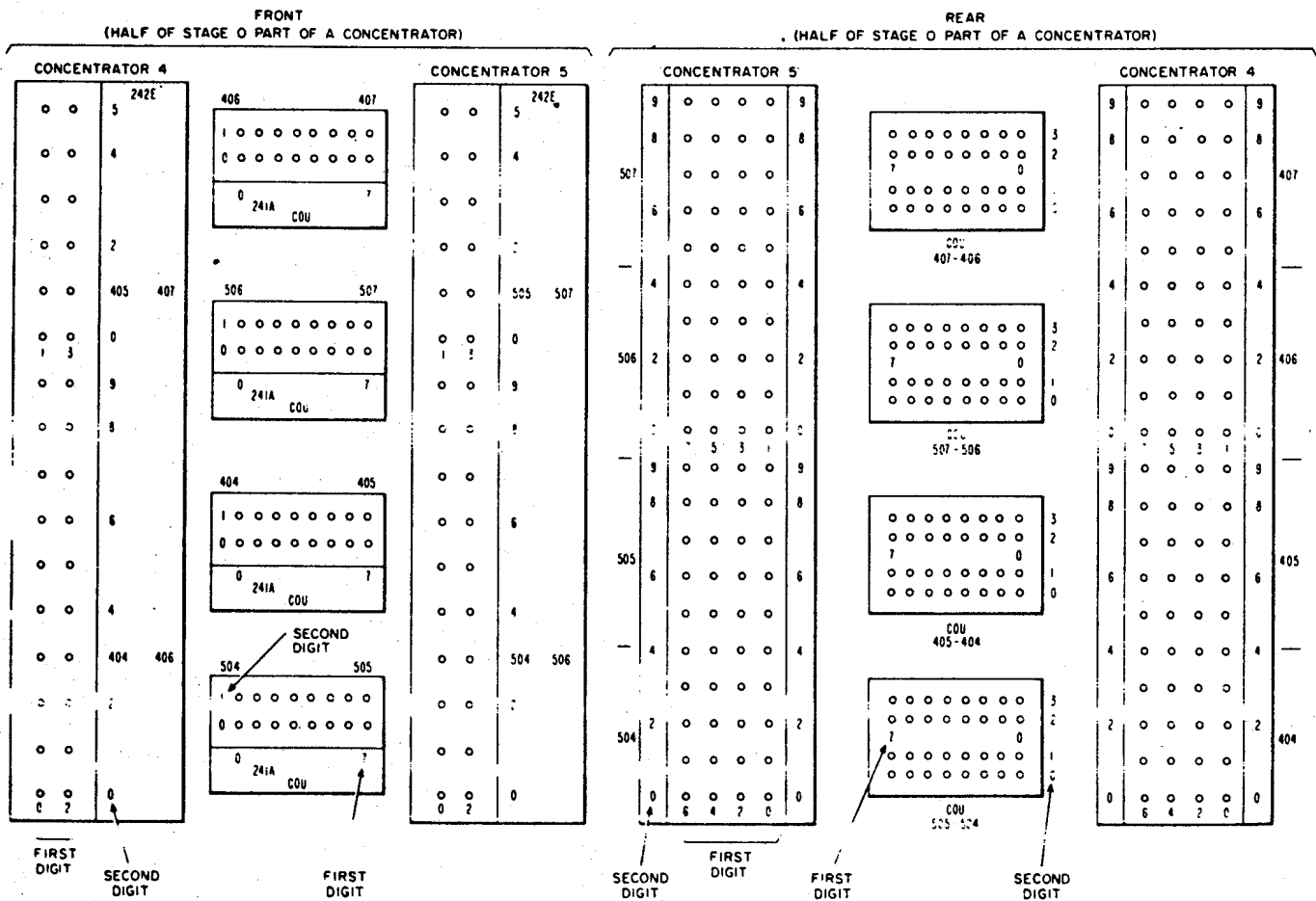
**512-POINT
FERROD
MATRIX**

CONCENTRATORS
0-7

CONCENTRATOR



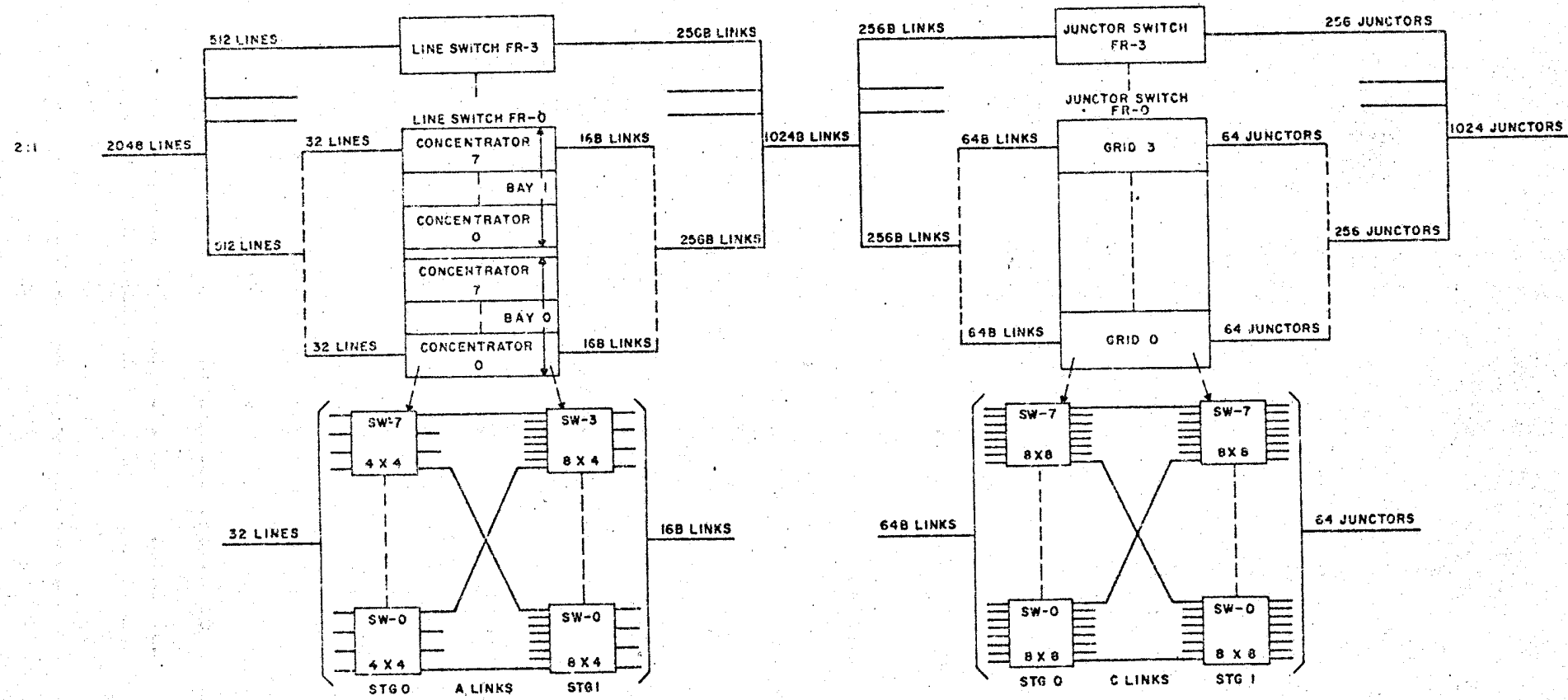
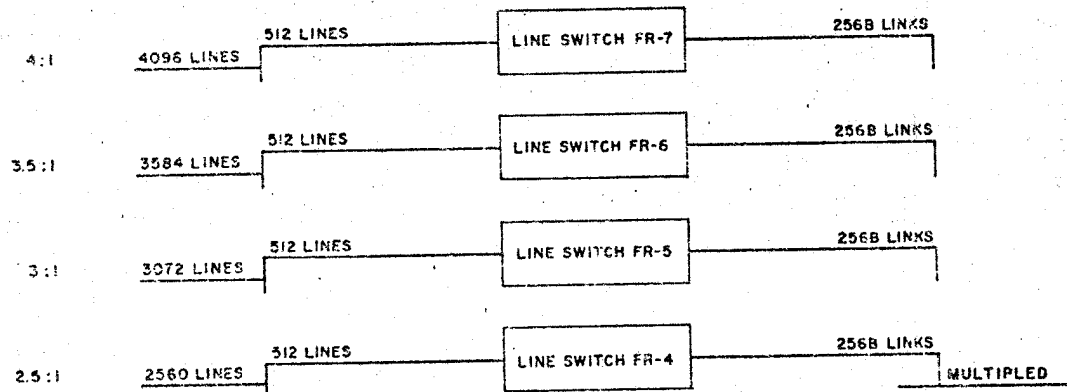
Line Switching Frame with 4:1 Concentrators,
Front View



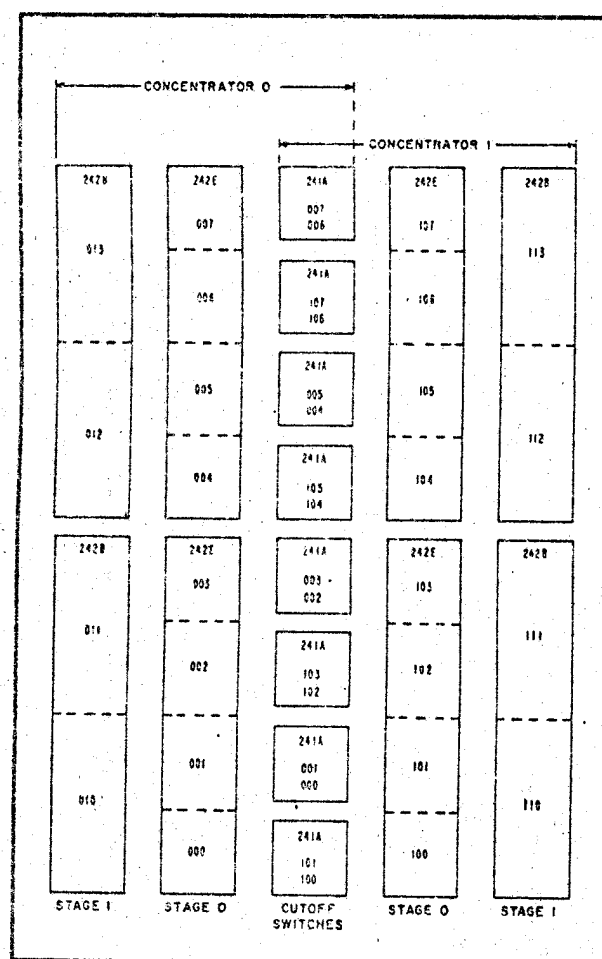
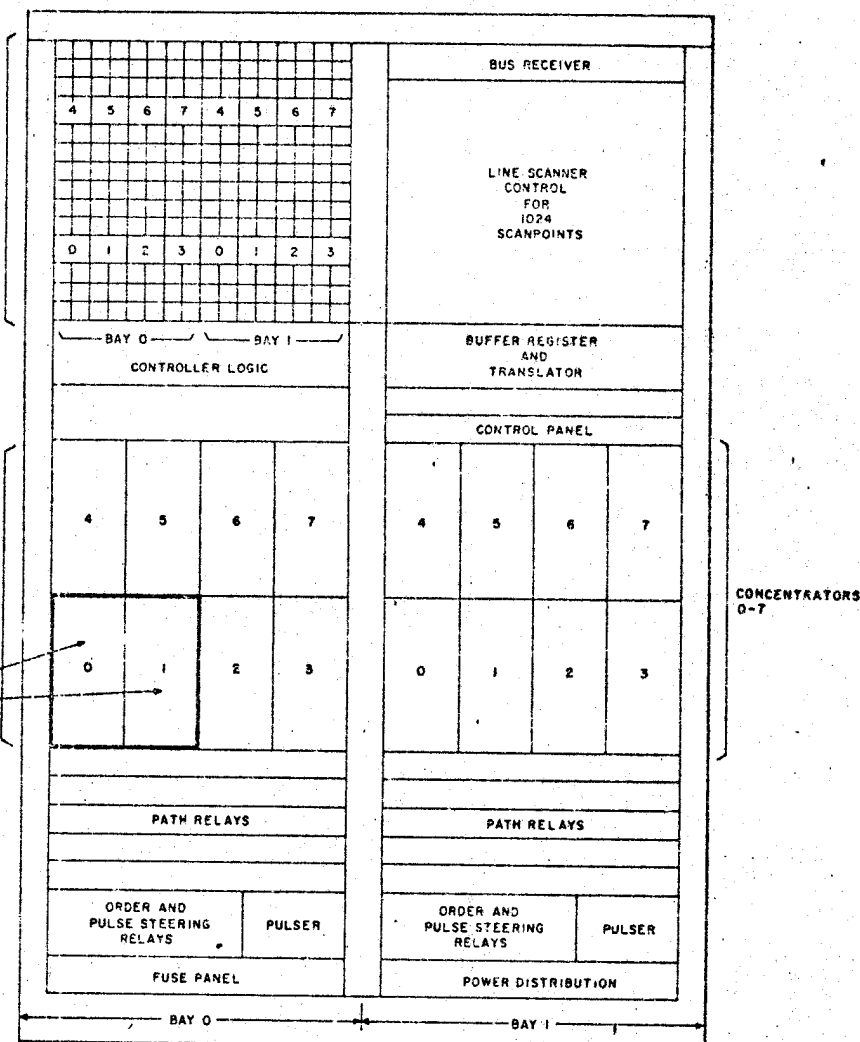
242E and 241A Switches, Terminal Layout

LINE TO
JUNCTOR RATIO

LLN LINE SIZE



**Fig. 38 - Line-Link Networks With Line Switching
Frames (2:1 Line Concentration Ratio)**

512-POINT
FERROD
MATRIXCONCENTRATORS
0-7

NOTE:

THE HOME FRAME IS SHOWN. THE MATE FRAME IS IDENTICAL EXCEPT THAT IT DOES NOT CONTAIN LINE SCANNER CONTROL CIRCUITS.

Line Switching Frame with 2:1 Concentrators,
Front View

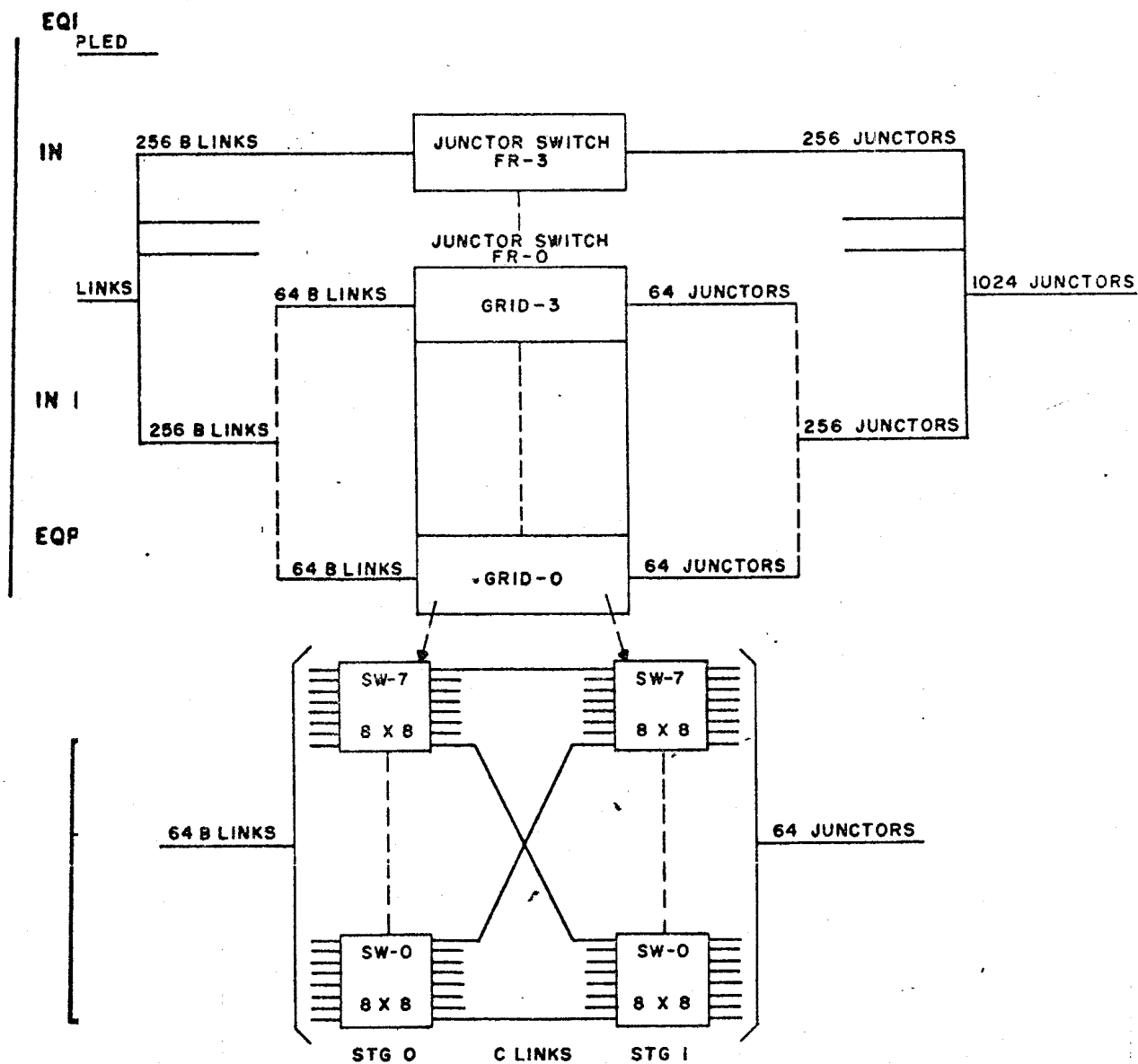
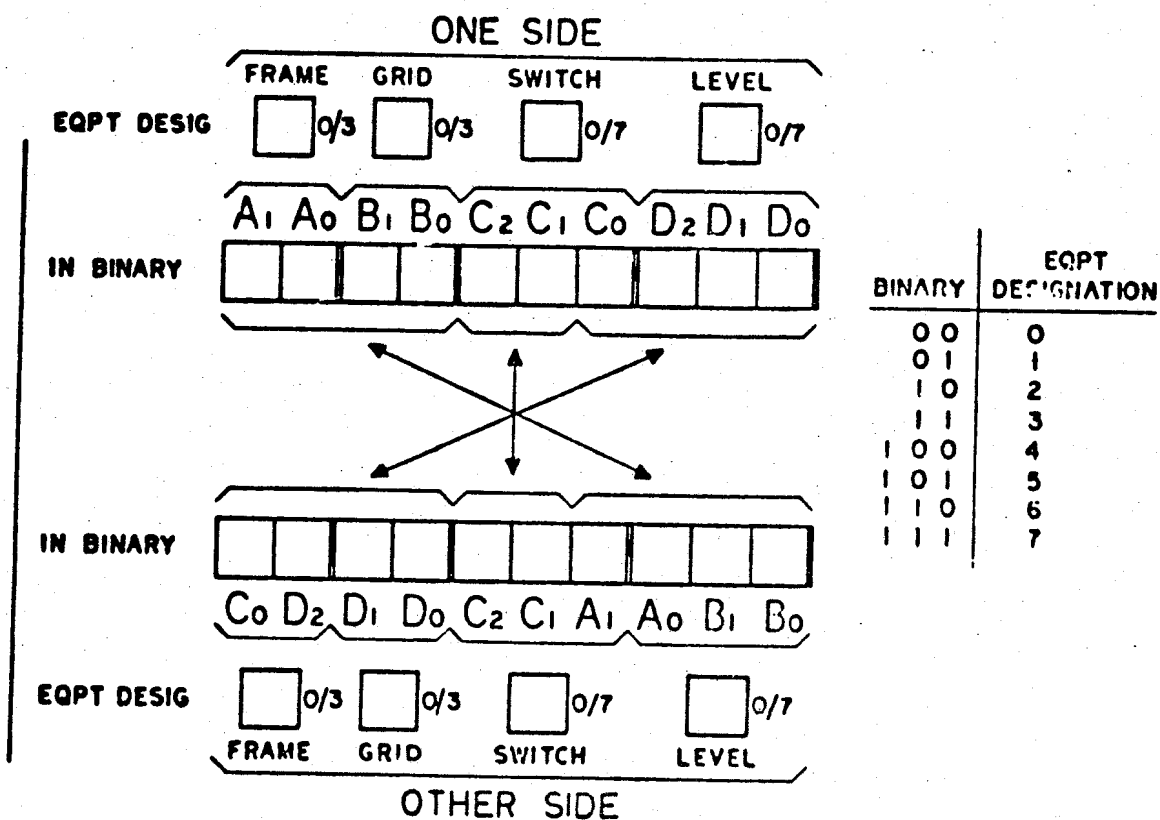


Fig. 46 - Trunk-Link Networks

TLN B-LINK WIRING PATTERN

i.i

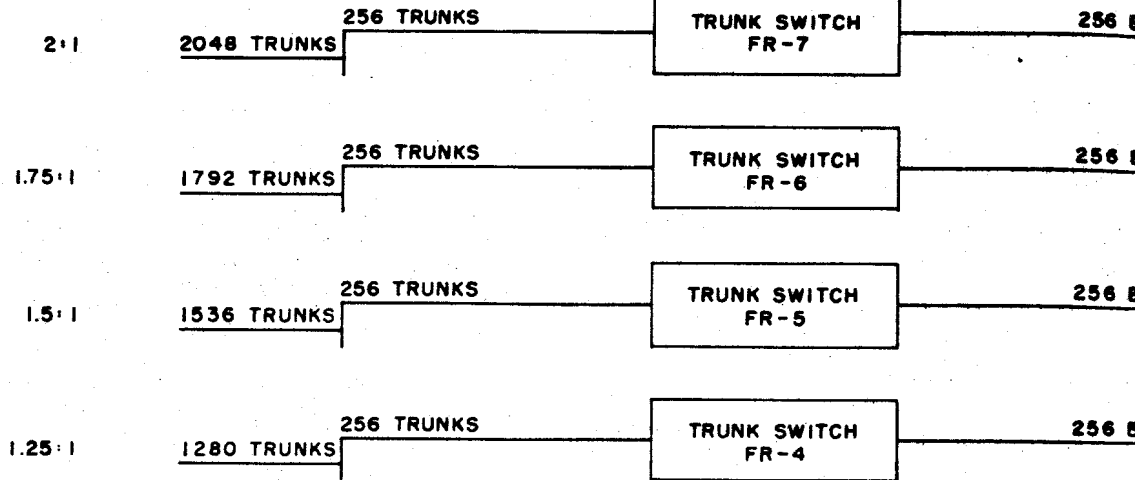


TRUNK LINK NETWORK SIZES

RATIO OF TRUNK TERMINALS TO JUNCTORS	MAX. NO. TSFs PER TLN	MAX. NO. TERMINALS PER TLN	MAX. NO. JUNCTORS PER TLN	MAX. NO. TLNs PER OFFICE	MAX. NO. TRUNKS
1.00 to 1	4	1024	1024	16	16,384
1.25 to 1	5	1280	1024	16	20,480
1.50 to 1	6	1536	1024	16	24,576
1.75 to 1	7	1792	1024	16	28,672
2.00 to 1	8	2048	1024	16	32,768

TRUNK TO
JUNCTOR RATIO

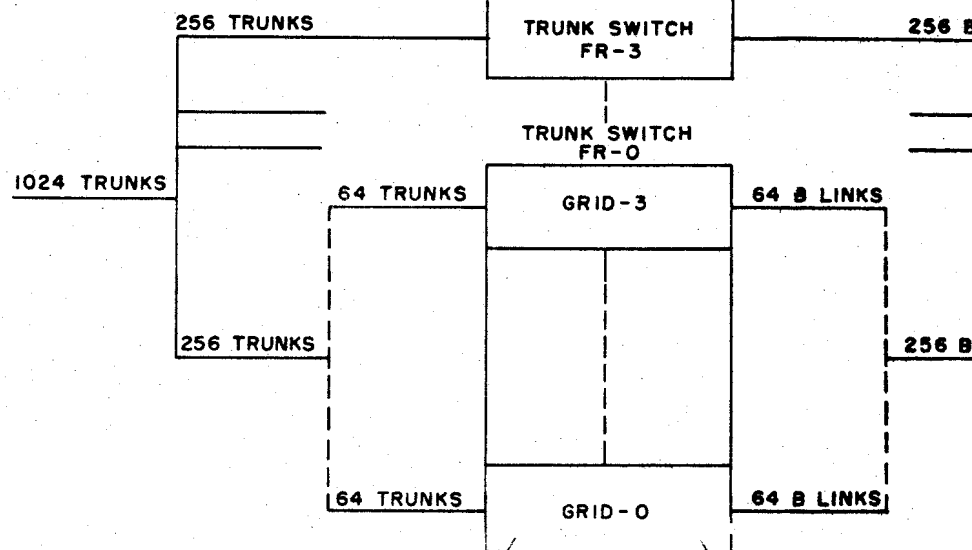
TLN
TRUNK SIZE



EQPT
DESIGNATION

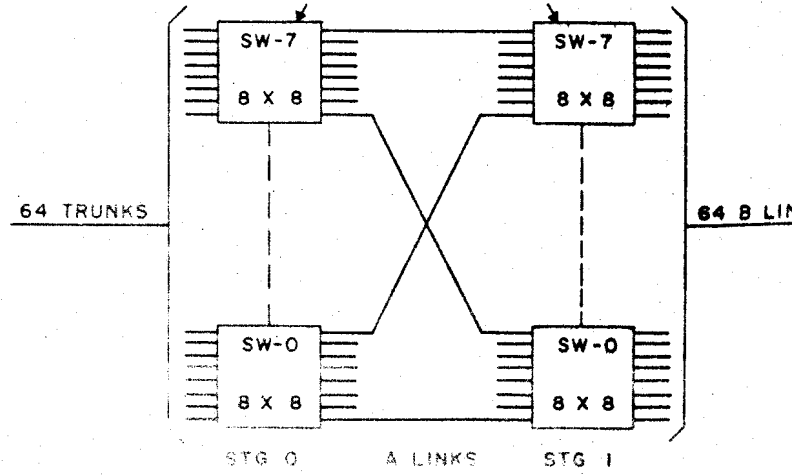
0
1
2
3
6
7

1:1



X. NO.
UNKS

384
480
576
672
768



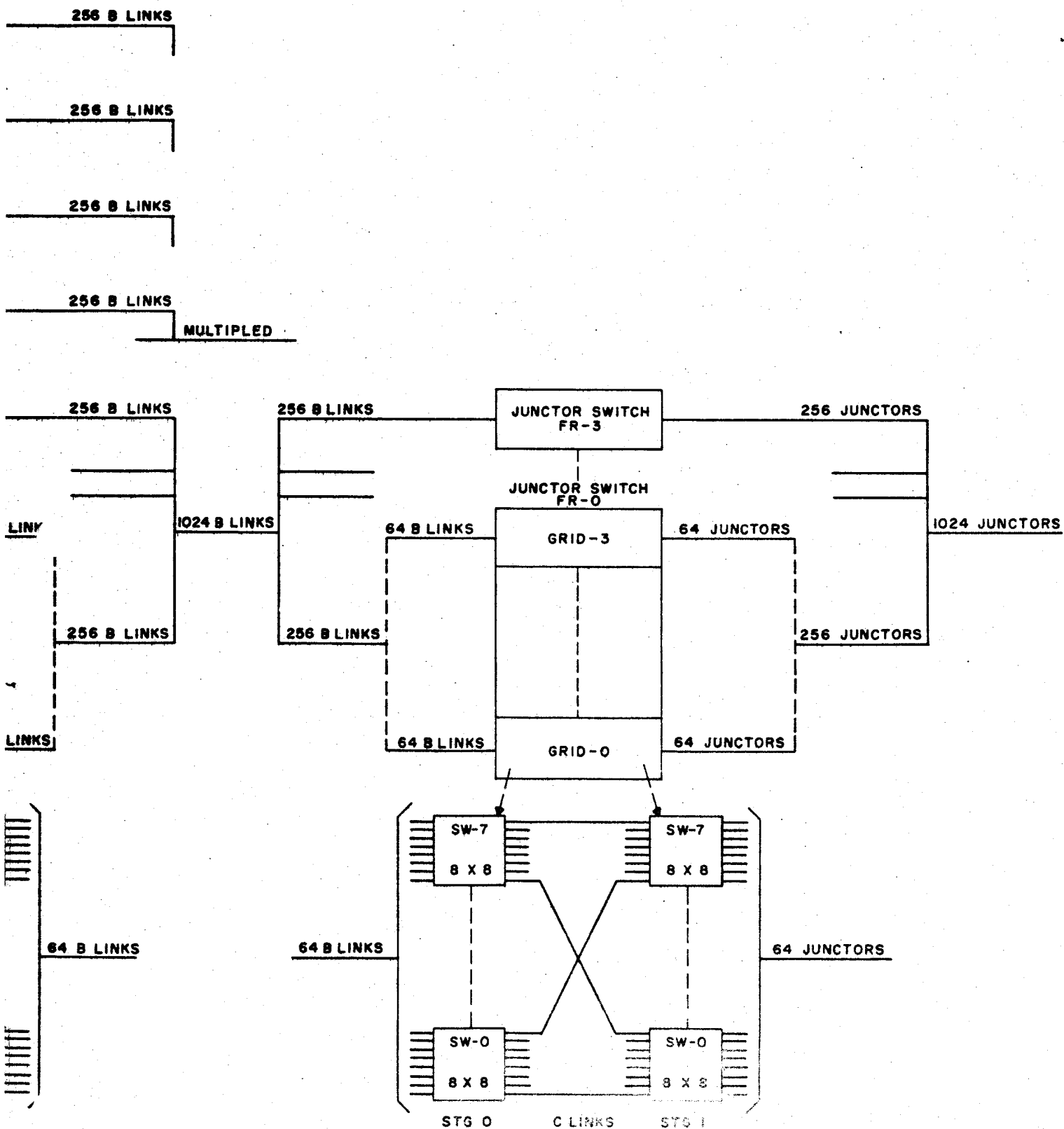


Fig. 46 - Trunk-Link Networks

JUNCTOR GROUPING FRAME . . .

Interconnects TLN's and LLN's

JGF Make up:

Junctors arranged in subgroups of 16 quads each.

Subgroups terminated in connectors or plug-ended patch cords.

JGF has 8 horizontal sections.

Each section has 9 double connectors (two rows) and 9 patch cords.

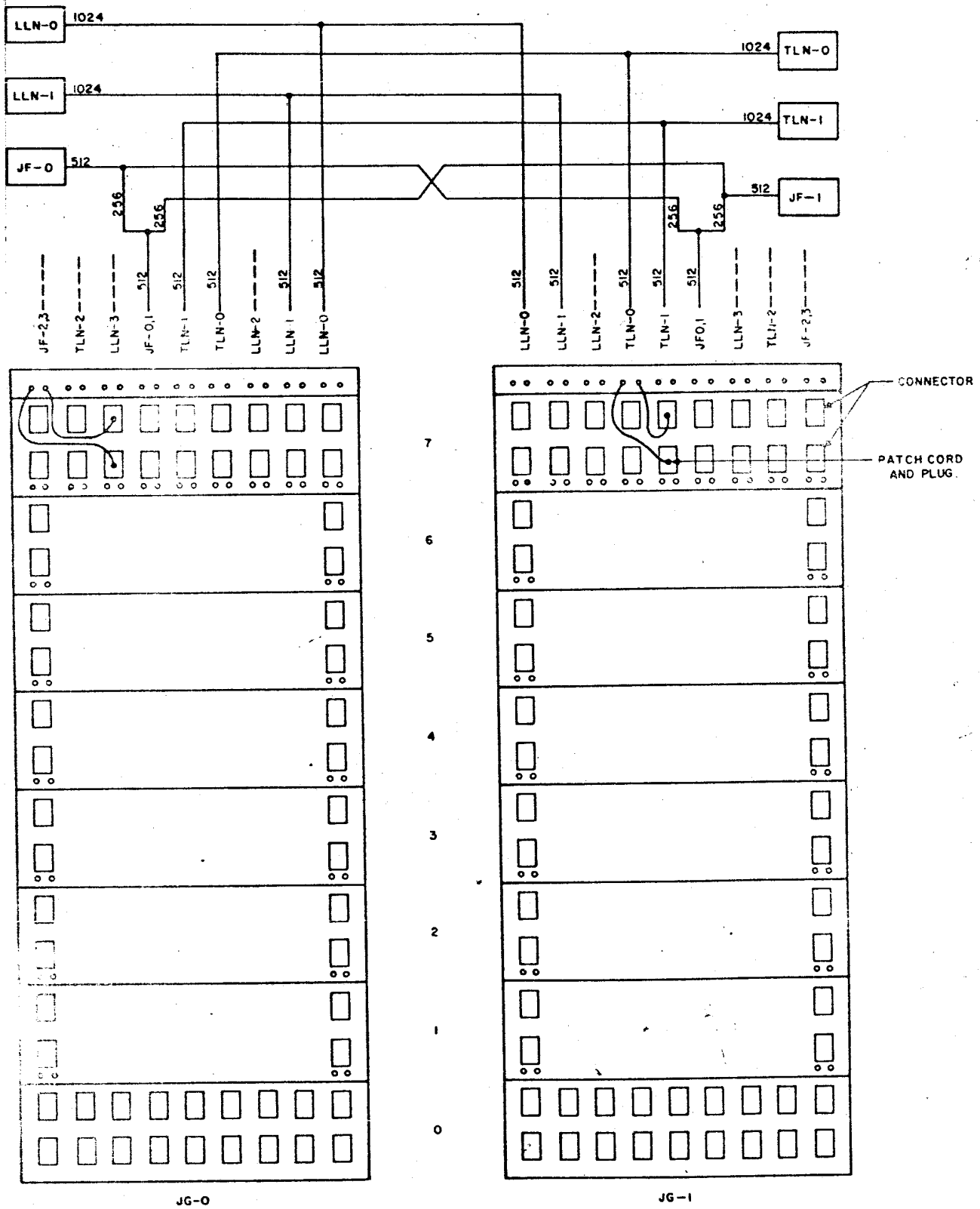
Connectors and patch cords form 9 vertical files on the frame.

Each file has 16 plugs and 16 connectors for a capacity of $32 \times 16 = 512$ junctors.

Total bay capacity of $9 \times 512 = 4608$ junctors.

The 1,024 junctors from each TLN network, are in 2 files.

Plugs or connectors terminate junctors with same switch number and same switch level number.



Typical Junctor Grouping Frame Layout

JUNCTOR GROUPING FRAME ARRANGEMENTS

HOW TO FIND . . .

B Links: LLN on TM 9-11; TLN on TM 9-19

JUNCTOR SWITCH FRAME SWITCHES 0 - 7	JUNCTOR GROUPING FRAME		
	ODD OR EVEN JGF	TERMIN- ATE ON	JGF SHELF NO.
LEVEL 0	E	* PLUG	JGF SHELF NUMBER IS EQUAL TO JSF SWITCH NUMBER
" 1	O		
" 2	E		
" 3	O		
" 4	E	* JACK	TO FIND THE SHELF NUMBER OF A JACK: CONVERT THE JSF SWITCH NUMBER TO BINARY, AND COMPLEMENT THE LEAST SIGNIFICANT BIT
" 5	O		
" 6	E		
" 7	O		

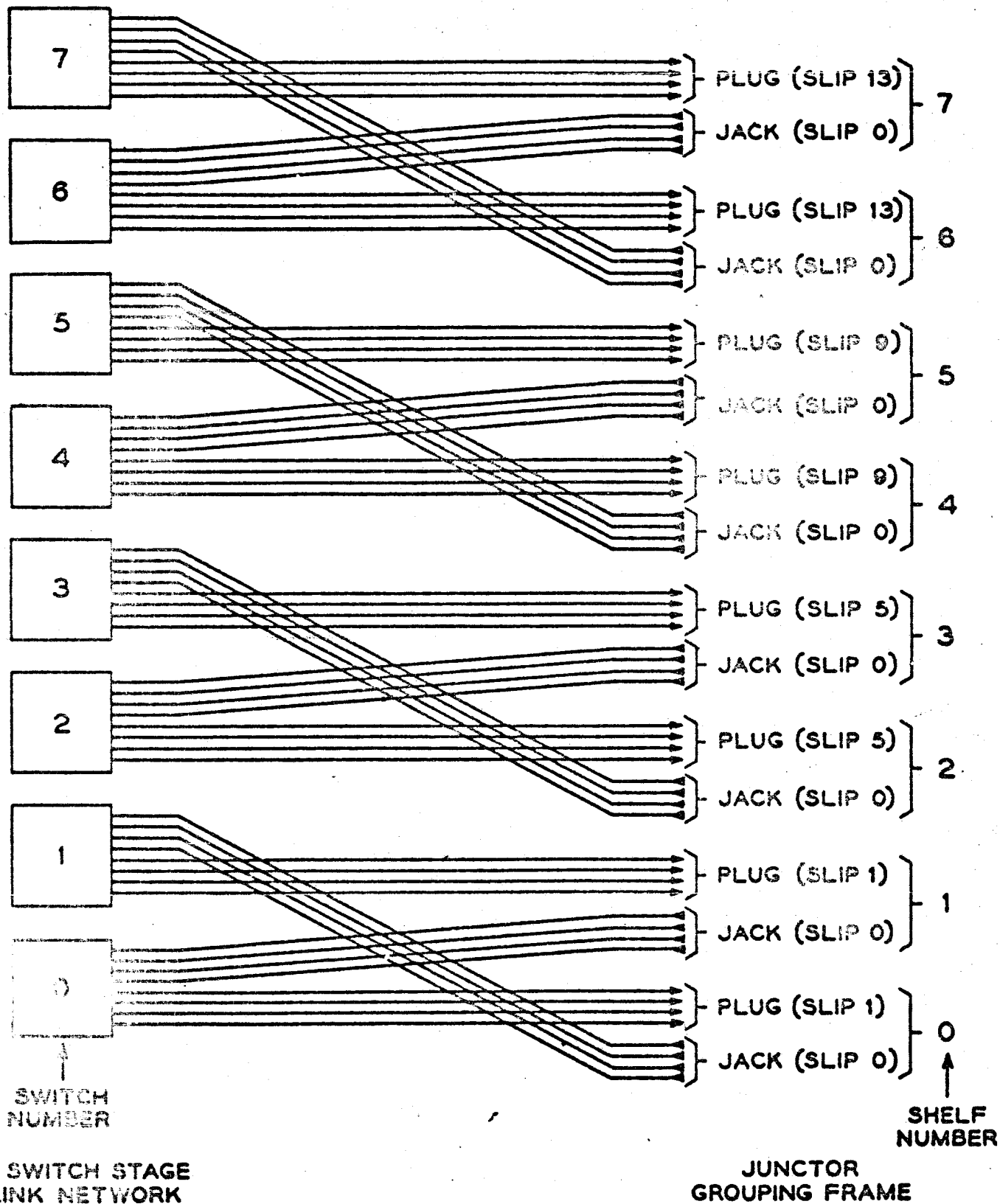
* JACK AND PLUG NUMBERS AS STENCILED ON THE JGF CORRESPOND TO THE LEVEL NUMBERS. (EVEN NUMBERED JACKS AND PLUGS ON EVEN NUMBERED JGF's AND ODD NUMBERED JACKS AND PLUGS ON ODD NUMBERED JGF's)

JUNCTOR FRAME (JUNCTOR CIRCUIT SUBGROUPS)	JUNCTOR GROUPING FRAME *		
	HORIZ SHELF	JACK NO. (T&R)	PLUG NO. (Tl&Rl)
HMP 1&2	0	FROM EVEN JF #	FROM EVEN JF #
HMP 3&4	1	BAY 0 GOES TO JACK 4	BAY 0 GOES TO PLUG 0
HMP 5&6	2	BAY 2 GOES TO JACK 5	BAY 2 GOES TO PLUG 1
HMP 7&8	3	FROM ODD JF #	FROM ODD JF #
HMP 9&10	4		
HMP 11&12	5		
HMP 13&14	6		
HMP 15&16	7	BAY 2 GOES TO JACK 7	BAY 2 GOES TO PLUG 3

ALL JACKS SLIP 0		PLUGS							
TERMINALS		SLIP 1		SLIP 5		SLIP 9		SLIP 13	
FRAME GRID		SHELF 0 & 1		SHELF 2 & 3		SHELF 4 & 5		SHELF 6 & 7	
ROW	COL.	POW	COL.	FRAME	GRID	FRAME	GRID	FRAME	GRID
33	← 33		32		22		12		02
32	← 32		31		21		11		01
31	← 31		30		20		10		00
30	← 30		23		13		03		33
23	← 23		22		12		02		32
22	← 22		21		11		01		31
21	← 21		20		10		00		30
20	← 20		13		03		33		23
13	← 13		12		02		32		22
12	← 12		11		01		31		21
11	← 11		10		00		30		20
10	← 10		03		33		23		13
03	← 03		02		32		22		12
02	← 02		01		31		21		11
01	← 01		00		30		20		10
00	← 00		33		23		13		03

TERMINAL LAYOUT
PLUGS AND JACKS
OF JGF
BACK VIEW

ROWS	COLUMNS				
	0	1	2	3	
3	R	•	•	•	•
	T	•	•	•	•
2	R	•	•	•	•
	T	•	•	•	•
1	R	•	•	•	•
	T	•	•	•	•
0	R	•	•	•	•
	T	•	•	•	•



Junctor group assignments.

TABLE A
TYPICAL NO. 1 ESS TRUNK CIRCUITS

CLASS	TITLE	SC	SD	TYPE
Interoffice	Outgoing (local and tandem) — reverse battery supervision	2	3	P
	Incoming (local and tandem) — reverse battery supervision	2	3	P
	2-way, E&M lead supervision — mf pulsing	3	4	P
Operator	2-way switchboard No. 3CL in distant building — reverse battery supervision, inband coin, and rering signals	2	3	P
	Outgoing to switchboard No. 3CL in distant building — high-low supervision, reverse battery ringback, coin control on tip and ring	4	5	W
	Outgoing — coin zone dialing to switchboard No. 3CL in distant building, polar double-duplex supervision	6	10	W
	Outgoing — local coin overtime and stuck coin trunk to switchboard No. 3CL in distant building	6	10	W
	Incoming — no-test Simplex controlled ringing and reverse battery supervision	3	3	P
	Incoming from switchboard No. 3CL in distant building — third wire coin control, simplexed rering signal	4	4	P
Miscellaneous	Outgoing — verification request and intercept — reverse battery high-low supervision	2	6	W
	Outgoing — to local test desk No. 14, sleeve lead supervision	3	2	P
	Outgoing — to repair service desk No. 2 high-low supervision	3	4	P
	Incoming — from local test desk No. 14 or from local test cabinet No. 3, sleeve lead supervision	6	4	W
	Intraoffice trunk circuit	2	2	P
Note: P plug-in W wired-in				

TABLE B
TYPICAL NO. 1 ESS SERVICE CIRCUITS

CLASS	TITLE	SC	SD	CPD	TYPE
Receivers	Customer dial pulse receiver circuit	4	5		W
	TOUCH-TONE calling detector circuit	9	0		W
	MF receiver circuit	8	2		W
	Trunk dial pulse receiver circuit	1	2		W
	Revertive pulsing receiver circuit	2	2	1	W
Transmitters	MF transmitter circuit	4	1	6	W
	Trunk dial pulse transmitter circuit	2	5		W
	Revertive pulsing transmitter circuit	3	3	3	W
	PCI transmitter circuit	3	4	3	W
Ringing circuits	Ringing circuits for individual, 2-party, coin, and PBX lines	3	4		W
	Ringing circuit for superimposed, reverting, ringing, and off- and on-hook ringback	3	9		W
Miscellaneous	Coin control circuit	4	4	1	W
	Conference circuit	4	12		W
	Network access circuit	2	2		P
	Tone or recorded announcement circuit	2	2		P
	Interrupter applique circuit	2 per unit	2 per circuit		W
	Tone presence detector circuit	3	3		W
	Auxiliary line circuit	0	1		W
Test circuits	Combined milliwatts and loop around test circuit	2	1		P
	Line insulation test circuit	3	11	2	W
	MF test environment circuit	1	3		W
	TOUCH-TONE detector test circuit	4	3	4	W
	Test circuit for ringing and coin control circuits	4	8		W
	Test circuit for customer dial pulse receiver	3	6	2	W
	Continuity polarity test circuit	2	6		P
Note: P plug-in W wired-in					

OCTAL-DECIMAL INTEGER CONVERSION TABLES

OCTAL VALUES 000 THROUGH 777 (000 THROUGH 511 DECIMAL)																	
	0	1	2	3	4	5	6	7		0	1	2	3	4	5	6	7
000	000	001	002	003	004	005	006	007	400	256	257	258	259	260	261	262	263
010	008	009	010	011	012	013	014	015	410	264	265	266	267	268	269	270	271
020	016	017	018	019	020	021	022	023	420	272	273	274	275	276	277	278	279
030	024	025	026	027	028	029	030	031	430	280	281	282	283	284	285	286	287
040	032	033	034	035	036	037	038	039	440	288	289	290	291	292	293	294	295
050	040	041	042	043	044	045	046	047	450	296	297	298	299	300	301	302	303
060	048	049	050	051	052	053	054	055	460	304	305	306	307	308	309	310	311
070	056	057	058	059	060	061	062	063	470	312	313	314	315	316	317	318	319
100	064	065	066	067	068	069	070	071	500	320	321	322	323	324	325	326	327
110	072	073	074	075	076	077	078	079	510	328	329	330	331	332	333	334	335
120	080	081	082	083	084	085	086	087	520	336	337	338	339	340	341	342	343
130	088	089	090	091	092	093	094	095	530	344	345	346	347	348	349	350	351
140	096	097	098	099	100	101	102	103	540	352	353	354	355	356	357	358	359
150	104	105	106	107	108	109	110	111	550	360	361	362	363	364	365	366	367
160	112	113	114	115	116	117	118	119	560	368	369	370	371	372	373	374	375
170	120	121	122	123	124	125	126	127	570	376	377	378	379	380	381	382	383
200	128	129	130	131	132	133	134	135	600	384	385	386	387	388	389	390	391
210	136	137	138	139	140	141	142	143	610	392	393	394	395	396	397	398	399
220	144	145	146	147	148	149	150	151	620	400	401	402	403	404	405	406	407
230	152	153	154	155	156	157	158	159	630	408	409	410	411	412	413	414	415
240	160	161	162	163	164	165	166	167	640	416	417	418	419	420	421	422	423
250	168	169	170	171	172	173	174	175	650	424	425	426	427	428	429	430	431
260	176	177	178	179	180	181	182	183	660	432	433	434	435	436	437	438	439
270	184	185	186	187	188	189	190	191	670	440	441	442	443	444	445	446	447
300	192	193	194	195	196	197	198	199	700	448	449	450	451	452	453	454	455
310	200	201	202	203	204	205	206	207	710	456	457	458	459	460	461	462	463
320	208	209	210	211	212	213	214	215	720	464	465	466	467	468	469	470	471
330	216	217	218	219	220	221	222	223	730	472	473	474	475	476	477	478	479
340	224	225	226	227	228	229	230	231	740	480	481	482	483	484	485	486	487
350	232	233	234	235	236	237	238	239	750	488	489	490	491	492	493	494	495
360	240	241	242	243	244	245	246	247	760	496	497	498	499	500	501	502	503
370	248	249	250	251	252	253	254	255	770	504	505	506	507	508	509	510	511

OCTAL VALUES FROM 1000 TO 30,000,000 IN MULTIPLES OF 1000
(512 TO 6,291,456 DECIMAL)

X	1X	2X	3X	4X	5X	6X	7X
1000	512	1024	1536	2048	2560	3072	3584
10,000	4096	8192	12,288	16,384	20,480	24,576	28,672
100,000	32,768	65,536	98,304	131,072	163,840	196,608	229,376
1,000,000	262,144	524,288	786,432	1,048,576	1,310,720	1,572,864	1,835,008
10,000,000	2,097,152	4,194,304	6,291,456				

Note 1: Register limit - 37, 777, 777 (octal), 8, 388, 607 (decimal)

Note 2: The following procedure is used to convert octal to decimal. Divide octal number into its component parts, i.e., three least significant digits, plus ten thousands, etc. Add decimal equivalents of component parts together per tables. Use the following procedure:

$$12,167 \text{ (octal)} = 167 + 2,000 + 10,000$$

$$167 \text{ (octal)} = 119 \text{ (decimal)}$$

$$2000 \text{ (octal)} = 1024 \text{ (decimal)}$$

$$10,000 \text{ (octal)} = 4096 \text{ (decimal)}$$

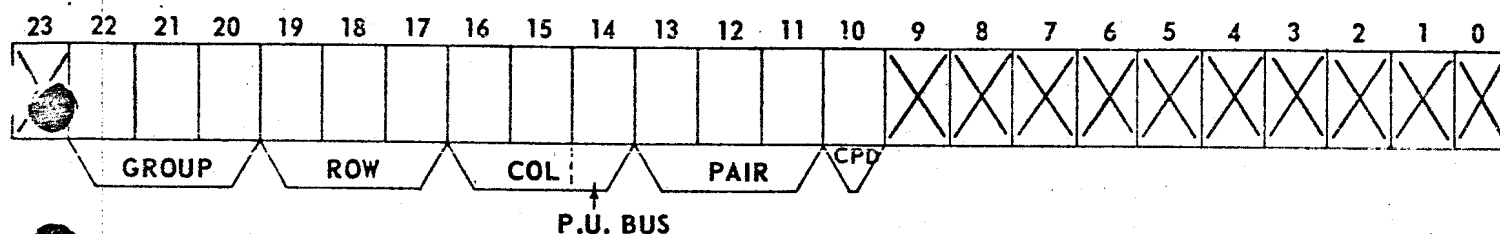
$$12,167 \text{ (octal)} = 5239 \text{ (decimal)}$$

Appendix D

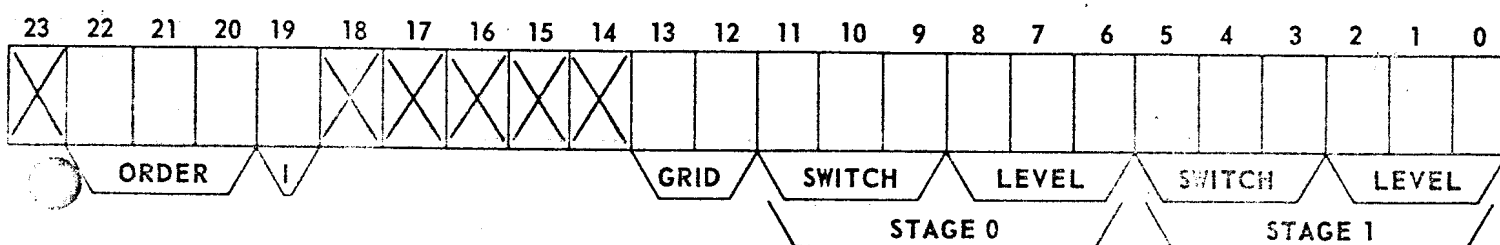
Table of Powers of Two

2^n	n	2^{-n}
1	0	1.0
2	1	0.5
4	2	0.25
8	3	0.125
16	4	0.062 5
32	5	0.031 25
64	6	0.015 625
128	7	0.007 812 5
256	8	0.003 906 25
512	9	0.001 953 125
1 024	10	0.000 976 562 5
2 048	11	0.000 488 281 25
4 096	12	0.000 244 140 625
8 192	13	0.000 122 070 312 5
16 384	14	0.000 061 035 156 25
32 768	15	0.000 030 517 578 125
65 536	16	0.000 015 258 789 062 5
131 072	17	0.000 007 629 394 531 25
262 144	18	0.000 003 814 697 265 625
524 288	19	0.000 001 907 348 632 812 5
1 048 576	20	0.000 000 953 674 316 406 25
2 097 152	21	0.000 000 476 837 158 203 125
4 194 304	22	0.000 000 238 418 579 101 562 5
8 388 608	23	0.000 000 119 209 289 550 781 25
16 777 216	24	0.000 000 059 604 644 775 390 625
33 554 432	25	0.000 000 029 802 322 387 695 312 5
67 108 864	26	0.000 000 014 901 161 193 847 656 25
134 217 728	27	0.000 000 007 450 580 598 923 828 125
268 435 456	28	0.000 000 003 725 290 298 461 914 062 5
536 870 912	29	0.000 000 001 862 645 149 230 957 031 25
1 073 741 824	30	0.000 000 000 931 322 574 615 478 515 625
2 147 483 648	31	0.000 000 000 465 661 287 307 739 257 812 5
4 294 967 296	32	0.000 000 000 232 830 643 653 869 628 906 25
8 589 934 592	33	0.000 000 000 116 415 321 828 934 814 453 125
17 179 869 184	34	0.000 000 000 058 207 660 913 467 407 228 562 5
34 359 738 368	35	0.000 000 000 029 103 830 456 733 703 613 281 25
68 719 476 736	36	0.000 000 000 014 551 915 228 366 851 808 640 625
137 438 953 472	37	0.000 000 000 007 275 957 614 183 425 903 320 312 5
274 877 906 944	38	0.000 000 000 003 637 978 807 091 712 951 660 156 25
549 755 813 888	39	0.000 000 000 001 818 989 403 643 856 475 830 078 125

ENABLE DATA

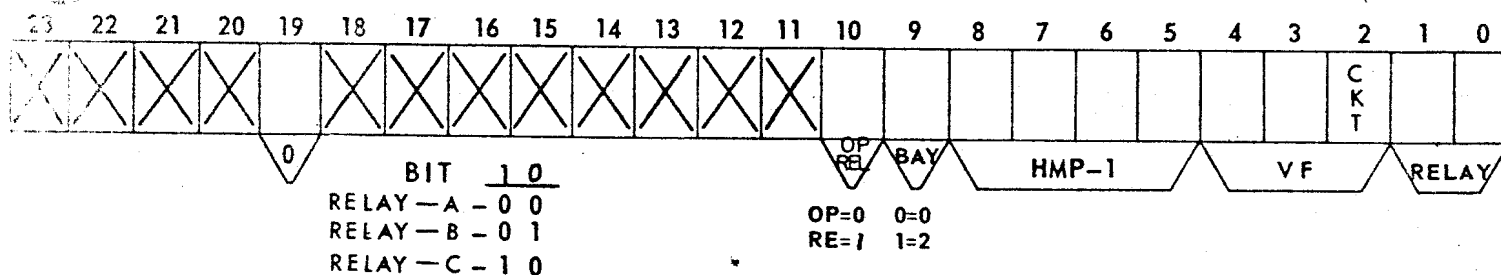


NETWORK ORDER

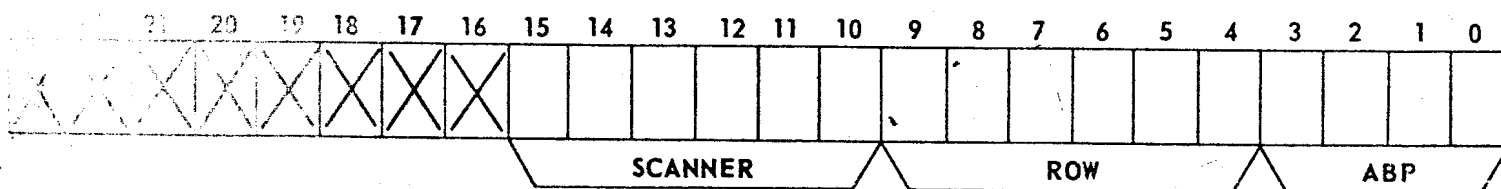


22	21	20	TSF	JSF
0	0	0		REMOVE NT
0	0	1	CONNECT	CONNECT
0	1	0		CONN W/FCG
0	1	1		TEST
1	0	1		
1	1	0		OPERATE NT
1	1	1		

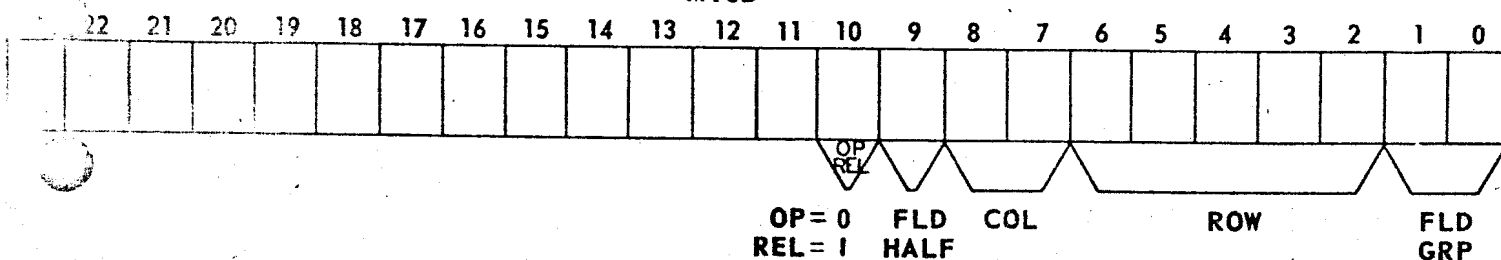
UTSD ORDER



SCANNER



MTSD



MSN

32	0	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	U		0	1	Master Scanner Fr.							Row				Column					
Scan Point																					

TSN

	U		1	H M	Universal Trk. Fr.	B	HMP-1	VF	Ckt	LT
						Row		Column		

JSN

	U		0	0	H/M	Junctor Fr.	B	HMP-1	VF	Ckt	AB
							Row		Column		

LSN

D	U			Line Link N				LSF				Row				Ans Bus Pos					
---	---	--	--	-------------	--	--	--	-----	--	--	--	-----	--	--	--	-------------	--	--	--	--	--

LEN (2:1)

Line Link N				LSF				B	Conc			Switch [less bit 4]			Lev					
-------------	--	--	--	-----	--	--	--	---	------	--	--	---------------------	--	--	-----	--	--	--	--	--

LEN (4:1)

Line Link N				LSF				B	Conc			Switch			Level					
-------------	--	--	--	-----	--	--	--	---	------	--	--	--------	--	--	-------	--	--	--	--	--

TNN

Trk Link Net						TSF			Grid			Switch			Level					
--------------	--	--	--	--	--	-----	--	--	------	--	--	--------	--	--	-------	--	--	--	--	--

JNN

Net						JSF			Grid			Switch			Level					
-----	--	--	--	--	--	-----	--	--	------	--	--	--------	--	--	-------	--	--	--	--	--

TCN

Trunk-Frame												B	HMP-1			VF	Ckt			
-------------	--	--	--	--	--	--	--	--	--	--	--	---	-------	--	--	----	-----	--	--	--

DN (Trans)

NOGR												Digits 5, 6, & 7 (-111 ₁₀) in OCT									
------	--	--	--	--	--	--	--	--	--	--	--	---	--	--	--	--	--	--	--	--	--

CPD

Grp			Row			Column			CPD No.			H		
-----	--	--	-----	--	--	--------	--	--	---------	--	--	---	--	--

U- Unzero hopper bit (always equal to 1)

H/M - Home (0) or Mate (1) bit

LT- LT side bit, Line to Trunk side (1) or Trunk to Trunk side (0)

AB- Plug(1) or Jack(0) bit for Junctor Frame

D-Dial tone speed test bit

H-Half of CPD frame 0 (left or Unipolar) or 1 (right or Bipolar)

LINE SCAN

The program performs the following function:

<u>S</u>	<u>L</u>	<u>M</u>	<u>S+L</u>	<u>(S+L)'</u>	<u>(S+L)'.M</u>
0	0	0	0	1	0
0	0	1	0	1	1
0	1	0	1	0	0
0	1	1	1	0	0
1	0	0	1	0	0
1	0	1	1	0	0
1	1	0	1	0	0
1	1	1	1	0	0

Every "1" in the resulting function represents a customer who has gone off-hook, was idle at the last look, [note $(S+L)' = S' \cdot L$] and is not denied service by line load control.

Where S = scanner readings 0 = off-hook 1 = on-hook

L = last look line bits 0 = idle 1 = busy

M = line load control mask 0 = deny service 1 = permit origination

The program uses the following table and sequence of orders to implement this function.

HDCL address of table

21	16	15	0
Scanner row A	- - -		
B	L bit row A		
C	B		
D	C		

bits 0 - 15 are L bits

bits 16 - 21 are scanner address

Line Scan

MF
 MX HDCL
 WJ UPDATE
 MAS 0, X
 WK 0/SL

*

KMKUS 1, XW	KZ → CF MK 1, Z, ULC MAS 1, XW	Note 1 Row B	Note 5 ----- Note 3 Row A
TUPMK LLMSK	SL TCAU 0, J, J PMK LLMSK	Note 2 Row B	Note 6 ----- Note 4 Row A
KMKUS 1, XW	KZ MK 1, X, ULC MAS 1, XW	Note 3 Row B	Note 5 Row A Note 1 Row C
TUPMK LLMSK	SL TCAU 0, J, J PMK LLMSK	Note 4 Row B	Note 2 Row C Note 6 Row A
KMKUS 1, XW	KZ MK 1, X, ULC MAS 1, XW	Note 5 Row B	Note 3 Row C Note 1 Row D
TUPMK LLMSK	SL TCAU 0, J, J PMK LLMSK	Note 6 Row B	Note 2 Row D Note 4 Row C

Note 1 Address scanner from K ADDEND

2 Scanner reading gated into L (SL)

3 (Line bits "or" scanner reading) goes into K

4 Mask originations with line load control mask

5 Gate K into Z, setting C FF (KZ)

6 Transfer on AU, i.e., transfer on an origination

* Not legitimate ESS instructions. Second column is for descriptive purposes only.

TRUNK SCAN

The program performs the following function:

S T1 T2 S $\oplus$ T1 (S $\oplus$ T1).T2

0	0	0	0	0	Every "1" in the resulting function represents a mismatch between a scanner reading and last look, which requires call processing action.
0	0	1	0	0	
0	1	0	1	0	
0	1	1	1	1	
1	0	0	1	0	
1	0	1	1	1	
1	1	0	0	0	
1	1	1	0	0	

Where S = scanner readings 0 = off-hook 1 = on-hook

T1 = last look trunk bits 0 = busy 1 = idle

T2 = ignore reading if trunk is under control of a register; otherwise accept for supervision 0 = ignore 1 = accept

The program uses the following table and sequence of orders to implement the function.

HDCL	Address of Table			
	21	16	15	0
TABLE	Scanner Row A	-----	T2 Bits Row A	
	-----		T1 Bits Row A	
	Scanner Row B	-----	T2 Bits Row B	
	-----		T1 Bits Row B	
	Scanner Row C	-----	T2 Bits Row C	
	-----		T1 Bits Row C	
	Scanner Row D	-----	T2 Bits Row D	
	-----		T1 Bits Row D	

Bits 0 - 15 are T bits
Bits 16 - 21 are scanner address

Trunk Scan

MF Set up enable
 MX HDCL Set table address
 WJ UPDATE Prepare address of program
 to process changes
 MAS 0, X Note 1, Row A
 WK 0 Initialize K register

*

KMKXS	2, XW	KZ MK 2, XW, XL MAS 2, XW	Note 1 Row B	Note 5 ----- Note 3 Row A
TUPMK	-1, X	SL TCAU 0, J, J PWX -1, X	Note 2 Row B	Note 6 ----- Note 4 Row A
KMKXS	2, XW	KZ MK 2, XW, XL MAS 2, XW	Note 3 Row B	Note 5 Row A Note 1 Row C
TUPMK	-1, X	SL TCAU 0, J, J PMK -1, X	Note 4 Row B	Note 2 Row C Note 6 Row A
KMKXS	2, XW	KZ MK 2, XW, XL MAS 2, XW	Note 5 Row B	Note 3 Row C Note 1 Row D
TUPMK	-1, X	SL TCAU 0, J, J PMK -1, X	Note 6 Row B	Note 2 Row D Note 4 Row C

Note 1 Address scanner from K ADDEND

2 Scanner reading gated into L (SL)

3 Exclusive OR T1 bits with scanner reading in L goes into K

4 AND changes in K with T2 bits

5 Gate K into Z, setting C FR

6 Transfer on AU, i.e., transfer on changes to be processed

* Not legitimate ESS instructions. Second column is for descriptive purposes only.

"WHERE TO FIND" CHART

KNOW		WHERE		EXAMPLE	
Compool Equivalence	Compool Symbol	PKIA003 Part I Compool Equivalence - Symbol Table	Compool Equivalence 1000040	Symbol SERSTP ERSTOP	
Compool Symbol	Compool Equivalence (CS Addresses) (PS Addresses)	PKIA003 Part I Compool Symbol - Equivalence Table	Compool Symbol ERSTOP	Equivalence Table 1000040	
	Pidents that use the Compool Symbol	PKIA003 Part I Compool Symbol - Pidents that use the Compool Symbol	Global/Ext'n (000)	Compool Symbol ERSTOP	Pidents that use the Symbol SIRER
CS Address	Compool Symbol	See Compool Equivalence			
Global Address	Pident that Contains the Global Vector Address Vector	PKIA002 Global Map	Global ERRSTP	Pident SIRER	Vector Address 1017164 Vector 0000401000040
	Where used in a Given Pident	Symbol Reference Section of the Particular Pident	Flags T	Equivalence 1000040	Symbol XERSTP References 1000117
PD, PF, PR	Pidents included in the Document	PDIA001 Section 3 Part B	PD, PF, Or PR 126	Description/Pident General Purpose Programs Sire 01	
Pident	PD, PF, PR	PDIA001 Section 3 Part A	Pident SIRER	PD, PF, Or PR 126	Description Interrupts Director
	Globals Contained In Pident	Special Pident - Global Map	Pident SIRER	Globals ECH100, ECJ100, ERRSTP	
	PS Module PS Starting/Ending Addresses	PKIA002 Twister Map	Pident SIRER	***** Address Range 1000000 1000107	***** PS Module 0
PS Address	Compool Symbol	See Compool Equivalence			
	Pident	PKIA002 Address Map	Address Range 1000000 1000107	***** Pident SIRER	
Symbolic Address	Where Used in a Given Pident	See Global Address - Use Same Document			
Table Identification (M4 XXXX, Y4 XXXX, Etc.)	Layout of Table	PKIA003 Part II Look Up Table (Tident) Desired	Table Identification (Tident) Address or Equivalence 00010703 Symbol UT DP (Tident B6) Length of Table 25		
Vector Address	Global Pident Vector	PKIA002 Transfer Vector Map	Vector Address 1017164	Vector 0000401000040 (Transfer Inst.) (Address in Dafield)	Global ERRSTP Pident SIRER

I A C	M	PS EL SL	C J	p = PS1 PL m = M e = ES1 EL c = C s = PS1 ES1 SL 1 = I1 IA1 IW		A : R + 1 → R J = PAR + 1 → J W : DA + R → R S : DA → R R + B, F, J, K, X, Y, Z PS1 ES1 SL : DA → L		P A R E	CMK CMKU CWR PMK UWK XWK PMX (Y, Z) UMX (Y, Z) IMK UMK XMK PMX (Y, Z) UMX (Y, Z)	S, I, IA, IW PL, PS, SL, C	S, A, W; SL; M(p) → B (K - [M(p) · λP] ^c) _{H, S} → CF	
				p is computed before any A, S or W Option is carried out		S, A, W; SL; M(p) → B; (K - [M(p) · λP] ^c) _H 1 CH → CH						
OPERATION CODES				OPTIONS		SYMBOLIC DESCRIPTION OF EXECUTION		L O G I C A L	S, I, IA, IW PL, PS, SL, C	S, A, W; SL; M(p) → B (K - [M(p) · λP] ^c) _H 1 CH → CH		
										S, A, W; SL; M(p) → B (K - [M(p) · λP] ^c) _H 1 CH → CH		
M O V E	BR			S, I, IA, IW; PS, SL		S, A, W; SL	ES : DA → L; B → M(p)	S H I F T	I PL, PS, SL, C	S, A, W; SL; M(p) → B (K - [M(p) · λP] ^c) _H 1 CH → CH		
	BR			S, I, IA, IW PS, ES, EL, C		S, A, W e' : λ ^c → B, M(p) ; e : λ ^c · λ 1 B · λ' → B, M(p)				S, A, W; SL; M(p) → B (K - [M(p) · λP] ^c) _H 1 CH → CH		
	BR (J, X, Y, Z)			S, I, IA, IW PL, PS, SL, ES, SL, C		S, A, W; SL e' : [F · λP] ^c → B, M(p) ; e : (F ^c · λ) 1 (B · λ') → B, M(p)				S, A, W; SL; M(p) → B (K - [M(p) · λP] ^c) _H 1 CH → CH		
	BR			S, I, IA, IW; PS, SL		S, A, W; SL; PS : DA → L ; M(p) → B				S, A, W; SL; M(p) → B (K - [M(p) · λP] ^c) _H 1 CH → CH		
	BR, MCII			S, I, IA, IW PL, PS, SL, C		S, A, W; SL; M(p) → B ([M(p) · λP] ^c) _{H, S} → CF	With MCII interrupts of levels H through K are inhibited			S, A, W; SL; M(p) → B (K - [M(p) · λP] ^c) _H 1 CH → CH		
	BR, F			S, I, IA, IW PL, PS, SL, C		F ₀ → p ₁ ; S ₀ → R ; W ₀ → R ; A ₀ R + 1 → R SL : M(p) → B ; ([M(p) · λP] ^c) _{H, S} → CF				S, A, W; SL; M(p) → B (K - [M(p) · λP] ^c) _H 1 CH → CH		
	BR			S, I, IA, IW; C		S, A, W; M(p) → B ; [M(p)] ^c → L, CF				S, A, W; SL; M(p) → B (K - [M(p) · λP] ^c) _H 1 CH → CH		
	BR (J, X, Y, Z)			S, I, IA, IW; PL, PS, SL, C		S, A, W; SL; M(p) → B ; [M(p) · λP] ^c → F, CF				S, A, W; SL; M(p) → B (K - [M(p) · λP] ^c) _H 1 CH → CH		
	BR			S, I, IA, IW PL, PS, SL, C		S, A, W; SL; M(p) → B [M(p) · λP] ^c → K	Must not be followed by AKR, SKR or one of the following orders with K in the R field: CWR, AWRP TR...			S, A, W; SL; M(p) → B (K - [M(p) · λP] ^c) _H 1 CH → CH		
	BR, MCII					Same as BR, but CS may be changed. See note next to MCII				S, A, W; SL; M(p) → B (K - [M(p) · λP] ^c) _H 1 CH → CH		
A D D	BR, MCII			S, I, IA, IW		S, A, W ; + 0 → B, M(p)		T R A N S F	I, IA	S, A, W; M(p) → B ; X → L ([M(p) · λP] ^c) _H 1 CH → CH		
	BR, MCII					S, A, W ; (PAR + 1) → B, M(p)				S, A, W; M(p) → B ; X → L ([M(p) · λP] ^c) _H 1 CH → CH		
	BR			I PL, PS, ES, EL, SL, C		SL e' : [p · λP] ^c → B, CF ; e : p ^c · λ 1 B · λ' → B, CF				S, A, W; M(p) → B ; X → L ([M(p) · λP] ^c) _H 1 CH → CH		
	BR			I , C		p ^c → L, CF				S, A, W; M(p) → B ; X → L ([M(p) · λP] ^c) _H 1 CH → CH		
	BR (J, X, Y, Z)			I : PL, PS, SL, C		SL ; [p · λP] ^c → F, CF				S, A, W; M(p) → B ; X → L ([M(p) · λP] ^c) _H 1 CH → CH		
	BR, SKR			I ; PL, PS, SL, C		SL ; K ₁ [p · λP] ^c → K				S, A, W; M(p) → B ; X → L ([M(p) · λP] ^c) _H 1 CH → CH		
	BR, SKR			S, I, IA, IW PL, PS, SL, C		S, A, W; SL; M(p) → B K ₁ [M(p) · λP] ^c → K	See note next to PMK, UMK, XMK			S, A, W; M(p) → B ; X → L ([M(p) · λP] ^c) _H 1 CH → CH		
	BR (F, J, K, L, X, Y, Z)			IL, PS, L		R : [B · λP] ^c → R, CF				S, A, W; M(p) → B ; X → L ([M(p) · λP] ^c) _H 1 CH → CH		
	BR (F, J, K, L, X, Y, Z)			IL, PS, L		CS = 0 : Effective DA + (R · L ^p) ^c → R CS = 1 : No action				S, A, W; M(p) → B ; X → L ([M(p) · λP] ^c) _H 1 CH → CH		
	BR, WRP			PL, C		CS = 0 : Effective DA + (R · L ^p) ^c → R CS = 1 : No action				S, A, W; M(p) → B ; X → L ([M(p) · λP] ^c) _H 1 CH → CH		
C O D E	CMK			I		SL ; (K - [p · λP] ^c) _{H, S} → CF		T R A N S F	I, IA	S, A, W; M(p) → B ; X → L ([M(p) · λP] ^c) _H 1 CH → CH		
	CMKU			PL, PS, SL, C		SL ; (K - [p · λP] ^c) _S → CS (K - [p · λP] ^c) _H 1 CH → CH				S, A, W; M(p) → B ; X → L ([M(p) · λP] ^c) _H 1 CH → CH		

*K does not set the C F/F's.

TABLE I

I	PL	EL	C	p = PL e = EL 1 = I	R = B, F, J, K, X, Y, Z	HFMK QFMK	I; PL, C	K $\nearrow$ DA ₁₉₋₁₄ K $\searrow$ DA ₁₉₋₁₄	M(α) $\rightarrow$ B [M(α) $\cdot$ LP] ^c $\rightarrow$ K $\rightarrow$ K	Must not be followed by an order with K in R field nor by AKR or SKR.
				HUMK QUMK	K $\nearrow$ DA ₁₉₋₁₄ K $\searrow$ DA ₁₉₋₁₄	M(α) $\rightarrow$ B [M(α) $\cdot$ LP] ^c $\rightarrow$ L K $\rightarrow$ K				
				p = DA + R ₁₁ $\alpha = (-1)^{DA_{20}} (DA_{13-0}) + R_{11}$ p and α are computed before H or Q is carried out		HFMK QFMK		K $\nearrow$ DA ₁₉₋₁₄ K $\searrow$ DA ₁₉₋₁₄	M(α) $\rightarrow$ B [M(α) $\cdot$ LP] ^c $\oplus$ K $\rightarrow$ K	
OPERATION CODES			OPTIONS	SYMBOLIC DESCRIPTION OF EXECUTION						
OPERATION CODES	HEM	I	K $\nearrow$ DA ₁₉₋₁₄ K $\searrow$ DA ₁₉₋₁₄	B $\rightarrow$ M(α)						
	HEM	I; EL, C	K $\nearrow$ DA ₁₉₋₁₄ K $\searrow$ DA ₁₉₋₁₄	e' : L' $\rightarrow$ M(α) e : L' $\cdot$ L $\cdot$ B $\cdot$ L' $\rightarrow$ B, M(α)						
	HEM (J, X, Y, Z)	I, EL, PL, C	K $\nearrow$ DA ₁₉₋₁₄ K $\searrow$ DA ₁₉₋₁₄	e' : [F $\cdot$ LP] ^c $\rightarrow$ B, M(α) e : F' $\cdot$ L $\cdot$ B $\cdot$ L' $\rightarrow$ B, M(α)						
	HMB	I	K $\nearrow$ DA ₁₉₋₁₄ K $\searrow$ DA ₁₉₋₁₄	M(α) $\rightarrow$ B						
	HMC	I; PL, C	K $\nearrow$ DA ₁₉₋₁₄	M(α) $\rightarrow$ B; ([M(α) $\cdot$ LP] ^c) _{H, S} $\rightarrow$ CF						
	HMCII		K $\searrow$ DA ₁₉₋₁₄	With HMCII & QMCII: Interrupts of levels H through K are inhibited; B may not be used in R field and the following order must not be one to which a transfer is made.						
	QMC									
	QMCII									
	HML	I; C	K $\nearrow$ DA ₁₉₋₁₄ K $\searrow$ DA ₁₉₋₁₄	M(α) $\rightarrow$ B; [M(α)] ^c $\rightarrow$ L, CF						
	HMF (J, X, Y, Z)	I; PL, C	K $\nearrow$ DA ₁₉₋₁₄ K $\searrow$ DA ₁₉₋₁₄	M(α) $\rightarrow$ B; [M(α) $\cdot$ LP] ^c $\rightarrow$ F, CF						
	HOM	I; EL, PL, C	K $\nearrow$ 1	e' : [K $\cdot$ LP] ^c $\rightarrow$ B, M(p)						
	QOM		K $\searrow$ 1	e : K' $\cdot$ L $\cdot$ B $\cdot$ L' $\rightarrow$ B, M(p)						
	HCOM		K $\nearrow$ 1							
	HTM (J, L, X, Y, Z)	I; PL, C	M(α) $\rightarrow$ B [M(α) $\cdot$ LP] ^c $\rightarrow$ F, K, CF		Must not be followed by AKR, SKR nor by an order with K in the R field.					
HBMK, HSMK	I, PL, C	K $\nearrow$ DA ₁₉₋₁₄ K $\searrow$ DA ₁₉₋₁₄	M(α) $\rightarrow$ B K: [M(α) $\cdot$ LP] ^c $\rightarrow$ K		See note next to HFMK, QFMK...					
		HOMK	I; PL, C	K $\nearrow$ DA ₁₉₋₁₄ K $\searrow$ DA ₁₉₋₁₄	M(α) $\rightarrow$ B; (K-[M(α) $\cdot$ LP] ^c) _{H, S} $\rightarrow$ CF					
QOMK	K $\nearrow$ DA ₁₉₋₁₄ K $\searrow$ DA ₁₉₋₁₄	M(α) $\rightarrow$ B; (K-[M(α) $\cdot$ LP] ^c) _S $\rightarrow$ CS (K-[M(α) $\cdot$ LP] ^c) _H $\rightarrow$ CH								
HTM (Y, Z)	I; C	K $\nearrow$ DA ₁₉₋₁₄ K $\searrow$ DA ₁₉₋₁₄	M(α) $\rightarrow$ B; X $\rightarrow$ L'; [M(α) $\cdot$ LP] ^c $\rightarrow$ X, CF							
QTM (Y, Z)										
HUMX (Y, Z)		K $\nearrow$ DA ₁₉₋₁₄ K $\searrow$ DA ₁₉₋₁₄	M(α) $\rightarrow$ B; X $\rightarrow$ L'; [M(α) $\cdot$ LP] ^c $\rightarrow$ X, CF							

TABLE II

(KADD = K ADDEND)
INSTRUCTION DESCRIPTION - INPUT/OUTPUT ORDERS (PAB = PERIPHERAL ADDRESS BUS)

		RESTRICTIONS **
WA ¹⁶	$[p \cdot X^8]^C \rightarrow B, KADD \rightarrow PAB \rightarrow \text{PERIPHERAL UNIT}$	1, 2, 3, 4
WAS ¹⁶	$[p \cdot X^8]^C \rightarrow B, F, KADD \rightarrow PAB \rightarrow \text{SCANNER};$ SCAN ANSWER $\rightarrow L_{0-15}$	1, 2, 3, 4, 5
WD ¹⁶	$[p \cdot X^8]^C \rightarrow B, F \rightarrow CPD$ (ACTIVATES A SPECIFIED BIPOLAR OR UNIPOLAR OUTPUT)	3
WSF ¹⁶	$[p \cdot X^8]^C \rightarrow B, F, KADD \rightarrow PAB \rightarrow \text{SCANNER};$ ENABLE ADDRESS $\rightarrow F \rightarrow CPD$; SCAN ANSWER $\rightarrow L_{0-15}$	1, 2, 3, 4, 5
MA ¹⁶	$M(p) \rightarrow B_1$	1, 2, 3, 4
MAS ¹⁶	$[M(p) \cdot X^8]^C \rightarrow KADD \rightarrow PAB \rightarrow \text{PERIPHERAL UNIT}$ SCAN ANSWER $\rightarrow L_{0-15}$	1, 2, 3, 4, 5
MD ¹⁶	$M(p) \rightarrow B_1; [M(p) \cdot X^8]^C \rightarrow F \rightarrow CPD$ (ACTIVATES A SPECIFIED BIPOLAR OR UNIPOLAR OUTPUT)	3
MSF ¹⁶	$M(p) \rightarrow B_1; [M(p) \cdot X^8]^C \rightarrow F, KADD \rightarrow PAB \rightarrow \text{SCANNER};$ ENABLE ADDRESS $\rightarrow F \rightarrow CPD$; SCAN ANSWER $\rightarrow L_{0-15}$	1, 2, 3, 4, 5

* F REGISTER IS SET IN SOME PRIOR INSTRUCTION

OPTIONS			
WA	I	MA	S, I, IA, IW
WD	PL, PS, SL, C	MD	PL, PS, SL, C
WAS	I	MAS	S, I, IA, IW
WSF	PL, PS, C	MSF	PL, PS, C

INSTRUCTION DESCRIPTION

WA, MA INSTRUCTIONS

REGISTER BITS

F₁₀₋₁₃ CONTROL EXECUTE TRANSLATOR TO SELECT CPD
F₁₄₋₂₂ PROVIDE ENABLE ADDRESS TO CPD
F_{10,14} SELECT CONTROLLER & PAB AS SHOWN IN NOTE 1 WHEN F₇₈₉ ≠ 101

F₅ = 1: ABSENCE OF ASW - SC GENERATES F INTERRUPT
F₆ = 1: ENABLE VERIFY → Y, IF INCORRECT, IT GENERATES F INTERRUPT

F_{9,8,7} = 001: (K ADD) 0-22 & K₀₋₁₂ → PAB 0-35

= 010: (K ADD) 0-8, 12-15, 20-22 → TRANSLATOR → PAB

= 011: (K ADD) 0-3, 5-9, 12-15, 20-22 → TRANSLATOR → PAB

= 100: (K ADD) 0-13, 20-22 → TRANSLATOR → PAB

= 101: $\left[\begin{array}{l} (K ADD) 0-15 \& K_{0-15} \rightarrow CPD \text{ ADDRESS BUS} \\ K_{16} = 1: \text{TEST PULSE} \rightarrow CPD \text{ ADDRESS BUS} \\ K_{17} = 1: \text{RESET PULSE} \rightarrow CPD \text{ ADDRESS BUS} \end{array} \right]$

= 110: (K ADD) 0-10 → TRANSLATOR → PAB

= 000: (K ADD) 0-22 & (P) PARITY → PAB 0-23

WD, MD INSTRUCTIONS

F₁₀₋₁₃ CONTROL EXECUTE TRANSLATOR TO SELECT CPD

F₁₄₋₂₂ PROVIDE ENABLE ADDRESS TO CPD

F₈ = 1: CONFIRMING PULSE IS SENT (WRMI)

WSF, MSF INSTRUCTIONS

F₁₀₋₁₃ CONTROL EXECUTE TRANSLATORS TO SELECT CPD

F₁₄₋₂₂ PROVIDE ENABLE ADDRESS TO CPD

F_{10,14} SELECT CONTROLLER & PAB AS SHOWN IN NOTE 1

ABSENCE OF ASW - SC GENERATES F INTERRUPT

ENABLE VERIFY → Y, IF INCORRECT, IT GENERATES F INTERRUPT

(K ADD) 0-8 → TRANSLATOR → PAB

NOTE 1: SELECTION OF CONTROLLER & PAB

F₁₀ F₁₄ CONTROLLER PAB

0 0 0 0

0 1 1 1

1 0 1 0

1 1 0 1

LONG BINARY

4:1 LSF

2:1 LSF

TSF, JSF

F₅

MUST = 0

LONG BINARY (CPD)

SIG DIST

SHORT BINARY

WAS, MAS INSTRUCTIONS

REGISTER BITS

F₁₀₋₁₃ CONTROL EXECUTE TRANSLATOR TO SELECT CPD

F₁₄₋₂₂ PROVIDE ENABLE ADDRESS TO CPD

F_{10,14} SELECT CONTROLLER & PAB AS SHOWN IN NOTE 1 WHEN F₇₈₉ ≠ 101

F₅ = 1: ABSENCE OF ASW - SC GENERATES F INTERRUPT

F₆ = 1: ENABLE VERIFY → Y, IF INCORRECT, IT GENERATES F INTERRUPT

F_{9,8,7} = 001: (K ADD) 0-22 & K₀₋₁₂ → PAB 0-35

= 010: (K ADD) 0-8, 12-15, 20-22 → TRANSLATOR → PAB

= 011: (K ADD) 0-3, 5-9, 12-15, 20-22 → TRANSLATOR → PAB

= 100: (K ADD) 0-13, 20-22 → TRANSLATOR → PAB

= 101: $\left[\begin{array}{l} (K ADD) 0-15 \& K_{0-15} \rightarrow CPD \text{ ADDRESS BUS} \\ K_{16} = 1: \text{TEST PULSE} \rightarrow CPD \text{ ADDRESS BUS} \\ K_{17} = 1: \text{RESET PULSE} \rightarrow CPD \text{ ADDRESS BUS} \end{array} \right]$

= 110: (K ADD) 0-10 → TRANSLATOR → PAB

= 000: (K ADD) 0-22 & (P) PARITY → PAB 0-23

LONG BINARY

4:1 LSF

2:1 LSF

TSF, JSF

F₅

MUST = 0

LONG BINARY (CPD)

DATA SCANNER

SCANNER

SHORT BINARY

** FOR RESTRICTIONS - SEE FOLLOWING PAGES

P.

1-10-64	11/1	
1-11-64	11/1	11
1-12-64	11/1	11
1-13-64	11/1	11
1-14-64	11/1	11
1-15-64	11/1	11
1-16-64	11/1	11
1-17-64	11/1	11
1-18-64	11/1	11
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1-90-64	11/1	11
1-91-64	11/1	11
1-92-64	11/1	11
1-93-64	11/1	11
1-94-64	11/1	11
1-95-64	11/1	11
1-96-64	11/1	11
1-97-64	11/1	11
1-98-64	11/1	11
1-99-64	11/1	11
1-100-64	11/1	11

INSTRUCTION DESCRIPTION - MAINTEN

OPERATION CODES	OPTIONS
BQ (H)	S,I,IA,IW ES
BMP	S,I,IA,IW ES,SL
BN	I,IW ES
LQ (H)	S,I,IA,IW PS,ES,EL,C
LN	I,IW PS,ES,EL,C
PN (J,K,X,Y,Z)	I,IA,IW PS,ES,EL,C
PS (KQ,PM,KH)	S,I,IA,IW PS,ES,EL,C
SMAP	S,I,IA,IW SL
EMMS	I C
WNPS	I
WV	I PL,PS,EL,ES,SL,C
EXC	S,I,IA,IW
EEF	—
ESBN	—
EE	—

B-567850

MAINTENANCE
AND
SPECIAL
PURPOSE

WESTERN ELECTRIC CO. INC.
DIVISION OF MANUFACTURE
CENTRAL OFFICE EQUIPMENT

BELL TELEPHONE
LABORATORIES
INCORPORATED

CDS
B-567850
P.

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INSTRUCTION DESCRIPTION - MAINTENANCE AND SPECIAL PURPOSE

OPERATION CODES	OPTIONS	SYMBOLIC DESCRIPTION OF EXECUTION	OPERATION CODES	OPTIONS	SYMBOLIC DESCRIPTION OF EXECUTION
BS (H)	S,I,IA,IW ES	S,A,W $B \leftarrow M_0(P)$	NS		S,A,W $N(P) \leftarrow B$
BMSR	S,I,IA,IW ES,SL	S,A,W $B \leftarrow M(P); [PARITY OF P \oplus B] \leftarrow [N(P)]_{25}$	MBCS	S,I,IA,IW	S,A,W $N(P) \leftarrow B; [N(P)]_{25}$
BN	I,IW ES	W $B \leftarrow N(P)$	MSSP	PS,SL	S,A,W $M(P) \leftarrow B \text{ OR } P \text{ CARRY}$
LS (H)	S,I,IA,IW PS,ES,EL,C	S,A,W $0: X^2 \leftarrow B, M_0(P); 0: X^2 \wedge 1 \wedge B \cdot X \leftarrow B, M_0(P)$	NTA (S)	S,I,IA,IW	S,A,W; $P_{11} \leftarrow 0$ - CERTAIN BITS OF TEST POINTS W GOES INTO THE
LN	I,IW PS,ES,EL,C	W $0: X^2 \leftarrow B, N(P); 0: X^2 \wedge 1 \wedge B \cdot X \leftarrow B, N(P)$	NL	S,I,IA,IW C	S,A,W $N(P) \leftarrow B; [N(P)]_{25}$
PN(J,X,Y,Z)	I,IA,IW PS,ES,EL,C	A,W $0: [P \cdot X]^2 \leftarrow B, N(P); 0: P^2 \wedge 1 \wedge B \cdot X \leftarrow B, N(P)$	NP(J,X,Y,Z)		S,A,W $N(P) \leftarrow B; [N(P)]_{25}$
PS(KB,PH,KH)	S,I,IA,IW PS,ES,EL,C	S,A,W $0: [P \cdot X]^2 \leftarrow B, M_0(P); 0: P^2 \wedge 1 \wedge B \cdot X \leftarrow B, M_0(P)$	NK		S,A,W $N(P) \leftarrow B; [N(P)]_{25}$
SMAP	S,I,IA,IW SL	S,A,W (PARITY OF P) $\rightarrow$ 0 INTERRUPT; $B \leftarrow M(P)$	NKU	S,I,IA,IW	S,A,W; UNCORRECTED ([UNCORRECTED M])
EMMS	I C	$(P)^2 \leftarrow B; (P)_{10-0} \leftarrow$ MATCH CONTROL REGISTER	OKC	PL,PS,SL,C	S,A,W; CORRECTED ([CORRECTED M])
WNPS	I	BITS P_{11-0} CONTROL IN DOUBLE RAIL FASHON SP/PS AT CONTROL LOCATION SPECIFIED BY P_{10-12} IN PROGRAM STORE SPECIFIED BY P_{12-10}	XOKU		S,A,W; UNCORRECTED ([UNCORRECTED M])
WV	I PL,PS,EL,ES,SL,C	$0: [P \cdot X]^2 \leftarrow B, R_p; 0: P^2 \wedge 1 \wedge B \cdot X \leftarrow B, R_p$ WHERE R_p = MISC. PULSE SOURCE REGISTER VON BUFFER BUS	XMKC		S,A,W; CORRECTED ([CORRECTED M])
EXC	S,I,IA,IW	S,A,W $\leftarrow P$ WITH INTERRUPTS INHIBITED. IF INSTRUCTION AT P IS NOT A TRANSFER, GO BACK TO PAR+1. INSTRUCTION AT P MUST NOT CHANGE REGISTER USED TO INDEX THE EXC. ORDER			
ZEP	—	$\leftarrow$ "A" INTERRUPT PROGRAM			
ZBN	—	GO BACK TO NORMAL AFTER AN INTERRUPT			
EE	—	NO OPERATION			

NOTATION: $M_0(X)$ = WORD STORED IN 0 HALF OF MEMORY
 $M_N(X)$ = WORD STORED IN N HALF OF MEMORY
 $N(X)$ = WORD STORED IN NON-MEMORY LOCATION
ADDRESS X
 $X \rightarrow Y$ = X RESULTS IN Y
 $A \leftarrow B$ = A DOES NOT GO INTO B

SYMBOLIC DESCRIPTION OF EXECUTION

I,A,W
 $N(P) \rightarrow 0$ I,A,W
 $N(P) \rightarrow B_1[N(P)]_{\text{PARITY}} - CS$ I,A,W
 $N(P) \rightarrow 0$, OR IF CALL STORE PARITY $[M(P)]_{\text{CS}}$ IS ODD, 0 INTERRUPT OCCURSI,A,W; $P_{11} \rightarrow 0$ - ADDRESS OF CALL STORE IDENTIFIED BY P_{17-12} .
CERTAIN BITS OF CS ADDRESS REGISTER ACTIVATE GROUP A
TEST POINTS WHICH GENERATE A RESPONSE THAT
GOES INTO THE B REGISTER.I,A,W
 $N(P) \rightarrow B_1[N(P)]^C - L, CF$ I,A,W
 $N(P) \rightarrow B_1[N(P) \cdot \lambda^P]^C - F, CF$ I,A,W
 $N(P) \rightarrow B_1[N(P) \cdot \lambda^P] - K$ NEXT ORDER #AKR, SKR,
OR
CWR, AWRP, TR
WHERE R=KI,A,W; UNCORRECTED $M_0(P) \rightarrow B$
 $[UNCORRECTED M_0(P)] \cdot \lambda^P]^C - K$ I,A,W; CORRECTED $M_0(P) \rightarrow B$
 $[CORRECTED M_0(P)] \cdot \lambda^P]^C - K$ I,A,W; UNCORRECTED $M_0(P) \rightarrow B$
 $[UNCORRECTED M_0(P)] \cdot \lambda^P]^C \oplus K - K$ NEXT ORDER #AKR, SKR,
AND R SUSFIELD #KI,A,W; CORRECTED $M_0(P) \rightarrow B$
 $[CORRECTED M_0(P)] \cdot \lambda^P]^C \oplus K - K$ HALF OF MEMORY AT ADDRESS X
HALF OF MEMORY AT ADDRESS X
N-MEMORY LOCATION SPECIFIED BY

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MAINTENANCE
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PROGRAM DOCUMENTATION . . .

PD (Program Description) . . . Describes program with words

PF (Program Flow Chart) . . . Describes program with flow charts

PK (Program Raw Data) . . . Raw data interpretation of a diagnostic program

PR (Program Listing) . . . Actual list of instructions

PF FORMAT . . .

Section A . . . Index

Section B . . . Information Notes, mostly CS data layouts

Section C . . . Functional Flow Charts (FFC's)

Section D . . . Detailed Flow Charts (DFC's)

Section E . . . Subordinate Flow Charts (SFC's)

Section F . . . eNtrance-eXit tables (NX's)

PR FORMAT . . .

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
			00000000R	14	FCHP01	SYN	X.	
0000000	410	00410	0 100000	15		WV	E.15	
0000001	112	00112	00012314	16		KM	E4SIG1+9	GATE ADDEND K TO K
0000002	310	00310	00012421	17	HP01	MX	MCNT	STORE ADDEND K FOR J INT
0000003	350	25350	00012446	18		MK	HT0.XA	
0000004	122	00122	00012421	19		XN	MCNT	READ ENTRY IN TABLE
0000005	242	00242	00012637	20		PMK	HACT	UPDATE PRINTER
0000006	016	00016	00000000R	21		T7RFZ	LP01	INTERSECT ACT BITS
0000007	300	02300	00012525	22		MY	HPQ.F	START LOW PRIORITY
0000010	005	16004	20000000	23		FNTJ	O.Y	

- (1) Relocatable address (in octal) - Actual starting address is found by locating the correct PIDENT in PK-1A002. The actual address of any instruction is found by adding the relocatable address to the starting address of the PIDENT.
- (2) Octal Operation Code - Used by Western Electric during testing.

PR FORMAT . . . (Continued)

- (3) Basically this column contains octal encoding for OP code and option fields
- (4) Octal encoding of the DA field.
- (5) Alter Number - Used by the programmer when he wishes to change the program.
- (6) Location Field - Symbolic address of instruction if one is assigned.
- (7) Operation Field - Contains symbolic instruction codes
- (8) Variable Field - Contains DA, RM and LCJ fields. Uses several "Qualifiers."
- (9) Comment Column - Programmer's Notes

DA FIELD QUALIFIERS . . .

Some numbers or symbols must be labeled to remove ambiguity (such as whether a number is octal or decimal). Certain numbers are derived from other numbers, and it is convenient to be able to express the derivation symbolically. To serve such purposes, a number of letter-period prefixes are understood by the compiler, and hence may be used in the DA (data or address) field of machine instructions. (Other letter-period prefixes, specifically for items, are explained under the TABLES section of the pident listing.)

- (a) Ø. (Octal Qualifier) - Ø. followed by an unsigned integer means the number is octal (to the base 8).
- (b) D. (Decimal Qualifier) - D. followed by an unsigned number means decimal, but has no real effect since all numbers in the DA field are assumed decimal unless labeled octal. (D followed by an item name means displacement).
- (c) C. (Complement) - C.n, where n is an unsigned integer or symbolic name of one, means the number formed by complementing the binary form of n (0s replaced by 1s, 1s replaced by 0s).

DA FIELD QUALIFIERS . . . (Continued)

- (d) E. (Exponent) - E.n, where n is an unsigned integer or symbolic name of one, means 2 raised to the power n, which is equal to the binary number formed by a 1 in bit position n and 0s elsewhere.
- (e) L. and R. (Left and Right) - When prefixed to the address of a program store word or table, L. means left half and R. means right half.
- (f) V. (Value of Field) - V. is used as the first symbol in a macro field (ie, a part of the variable field parameter specification that is bounded by commas) to indicate that the entire field is to be interpreted directly as a number, rather than as the contents of a memory location whose address is that number. For example, if AABB is a symbolic address:

MOVE V.AABB+9,X

means "move the address AABB+9 into X", while the same macro without the V. means "move the contents of the location whose address is AABB+9 into X."

- (g) X. (This Location) - X. is not followed by a symbol or number. It means "the address of this order (the order in which the X. appears)." X. is thus a relocatable symbol if the program is compiled with relocatable addresses.

DA FIELD ARITHMETIC . . .

The operations of addition (+), subtraction (-), multiplication (*), and division (/) are allowed within the DA field. Any nonparenthesized arithmetic expression involving these operations is allowed on absolute numbers or the symbolic names of absolute numbers.

SPECIAL PROGRAM TRICKS

WRITE AT PRESENT ADDRESS ORDERS

If the order immediately following either MCII or MKII specifies in its operation code destination "MEMORY", contains in its LCJ field an "S" (S, ES, or PS), and in addition contains a blank RM field, then the contents of the register specified in the operation code, after possible product masking and/or complementing, replaces or is insertion masked into the contents of the data buffer register B. The new contents of B replaces the contents of the memory location whose address was specified by the previous order, MCII or MKII.

The sequence of actions described above may be accomplished by the following macros, which, when the necessary circuitry is installed, generate two ESS orders:

MCBM:
 MCJM:
 MCYM:
 MCLM:
 MCXM:
 MCYM:
 MCZM:
 MKFM:
 MKJM:
 MKKM:
 MKLM:
 MKXM:
 MKYM:
 MKZM:

ADD ONE TO MEMORY ORDERS

The macros MCBAM and MKAM generate two orders which will algebraically add one to a location in memory.

MCBAM:

The contents of location M replaces the contents of the data buffer register B and, after possible product masking and/or complementing, sets the C control flip-flops. During the immediately following cycle, while interrupts of levels H through K are inhibited, one is algebraically added to the contents of the data buffer register B and the resultant sum replaces the contents of location M.

Available Options: (Group 1 or 2, but not both)

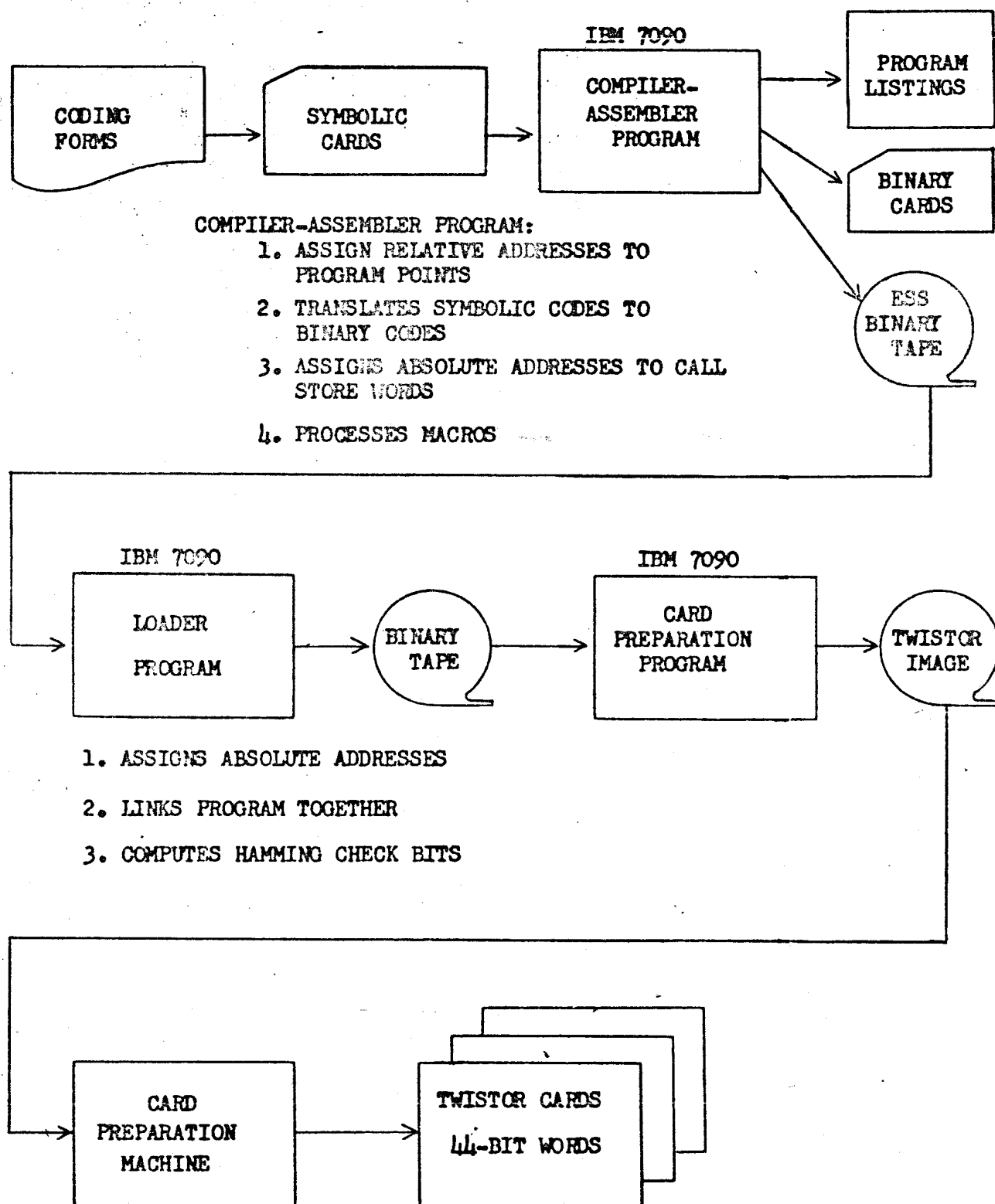
- 1) "S" (set register) option, or indexing with or without "A" or "W"; Masking (PL or PS); Complementing.
- 2) "S" (set L) option; Indexing; Complementing.

Restrictions:

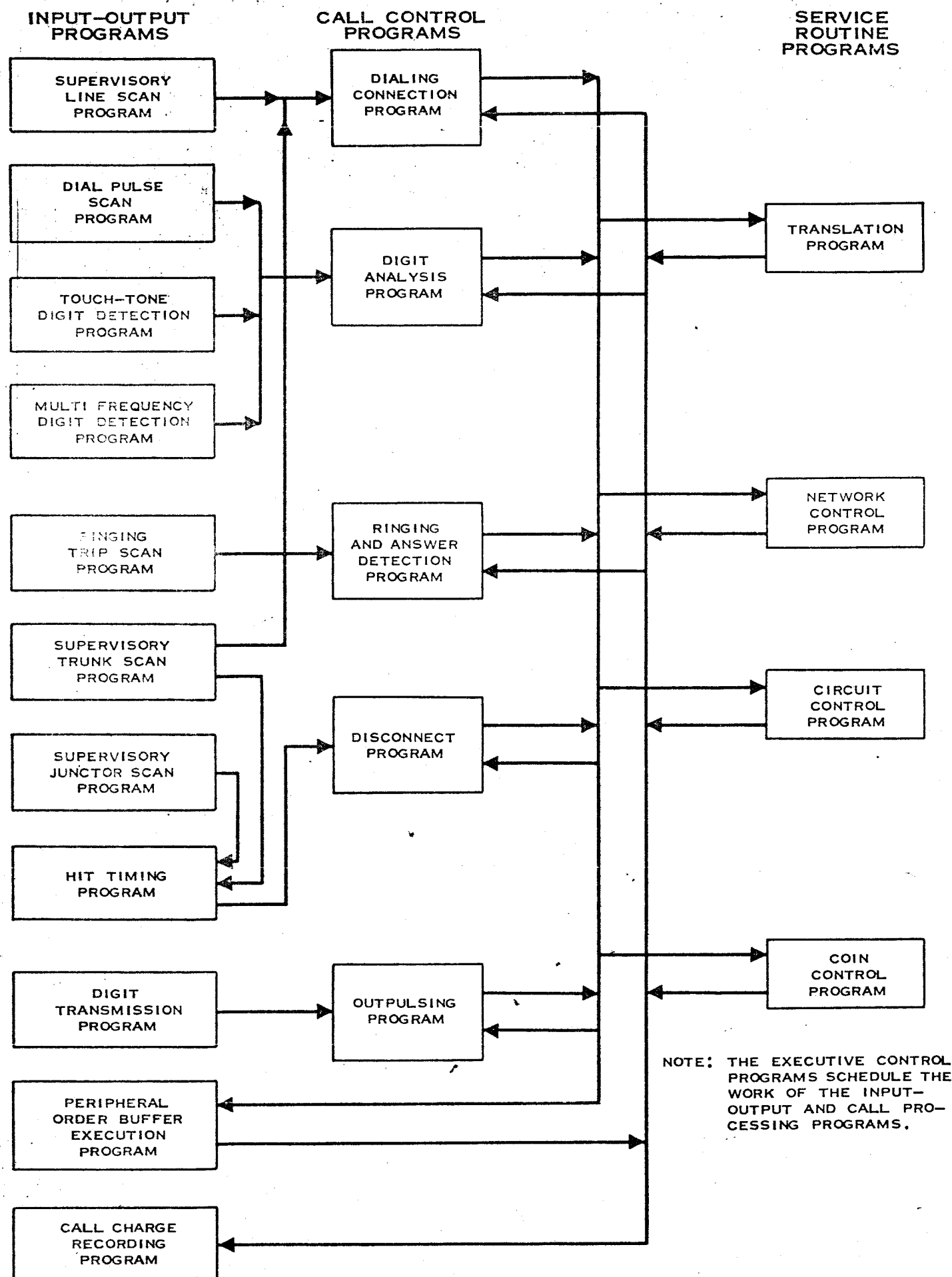
- 1) The data buffer register B may not be used for indexing.

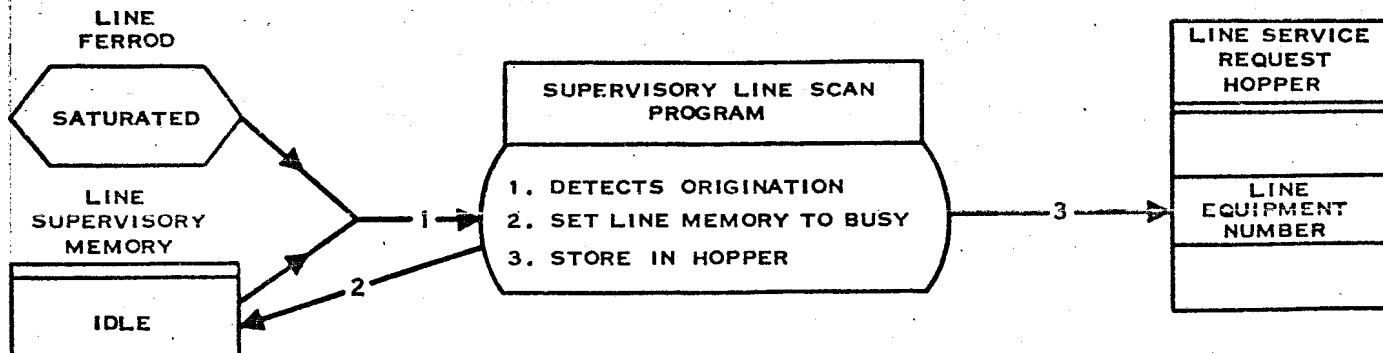
MKKAM:

The contents of location M replaces the contents of the data buffer register B, and after possible product masking and/or complementing replaces the contents of the accumulator K. The sign bit of the C control flip-flops will be set to "1" if the sign bit of location M is a "1". During the immediately following cycle, while interrupts of levels H through K are inhibited, one is algebraically added to the contents of the accumulator K and the resultant sum, after possible product masking and/or complementing replaces or is insertion masked into the contents of the data buffer register B. The new contents of B replaces the contents of the memory location whose address was determined by previous instruction.

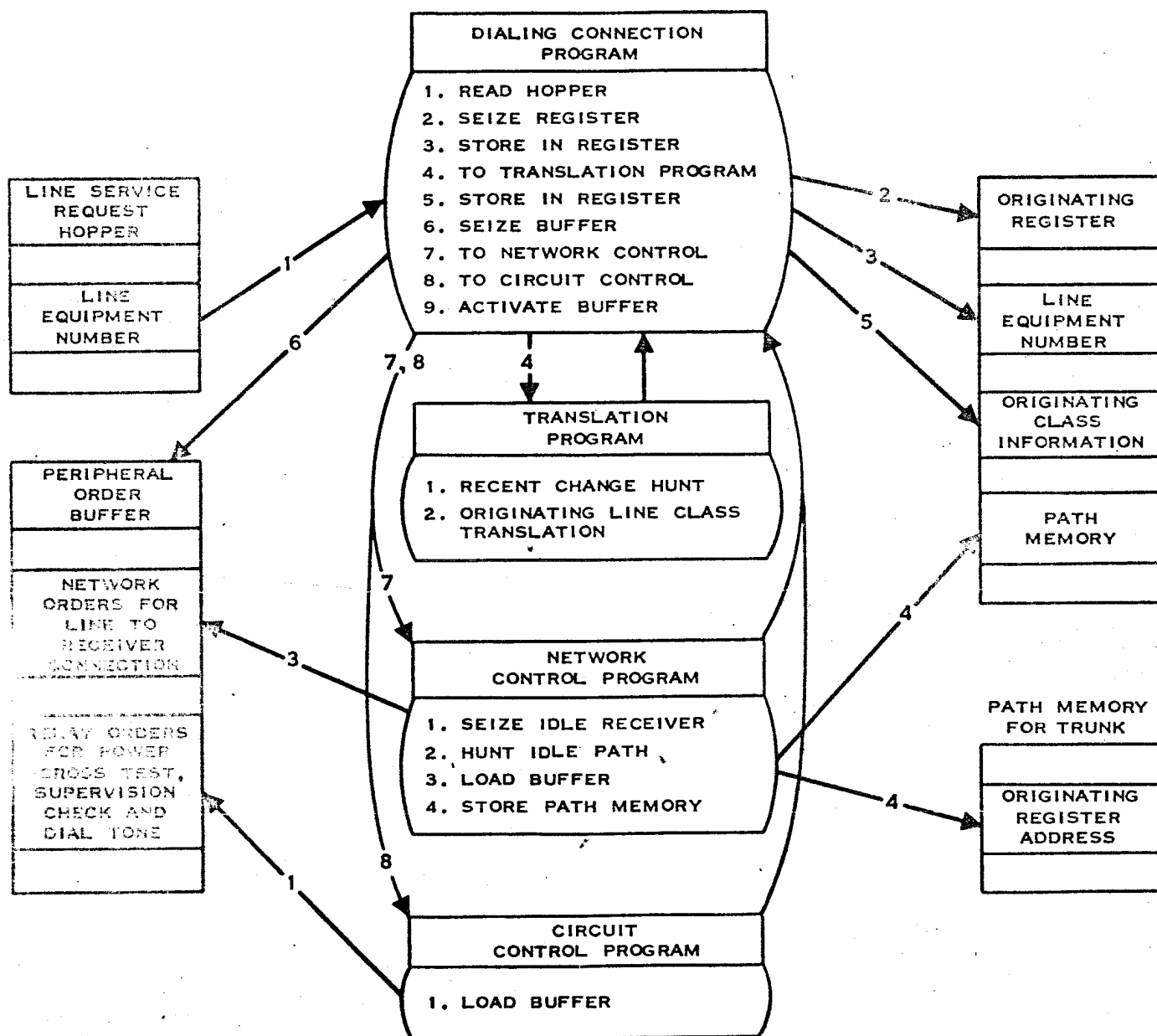


COMPILER - ASSEMBLER

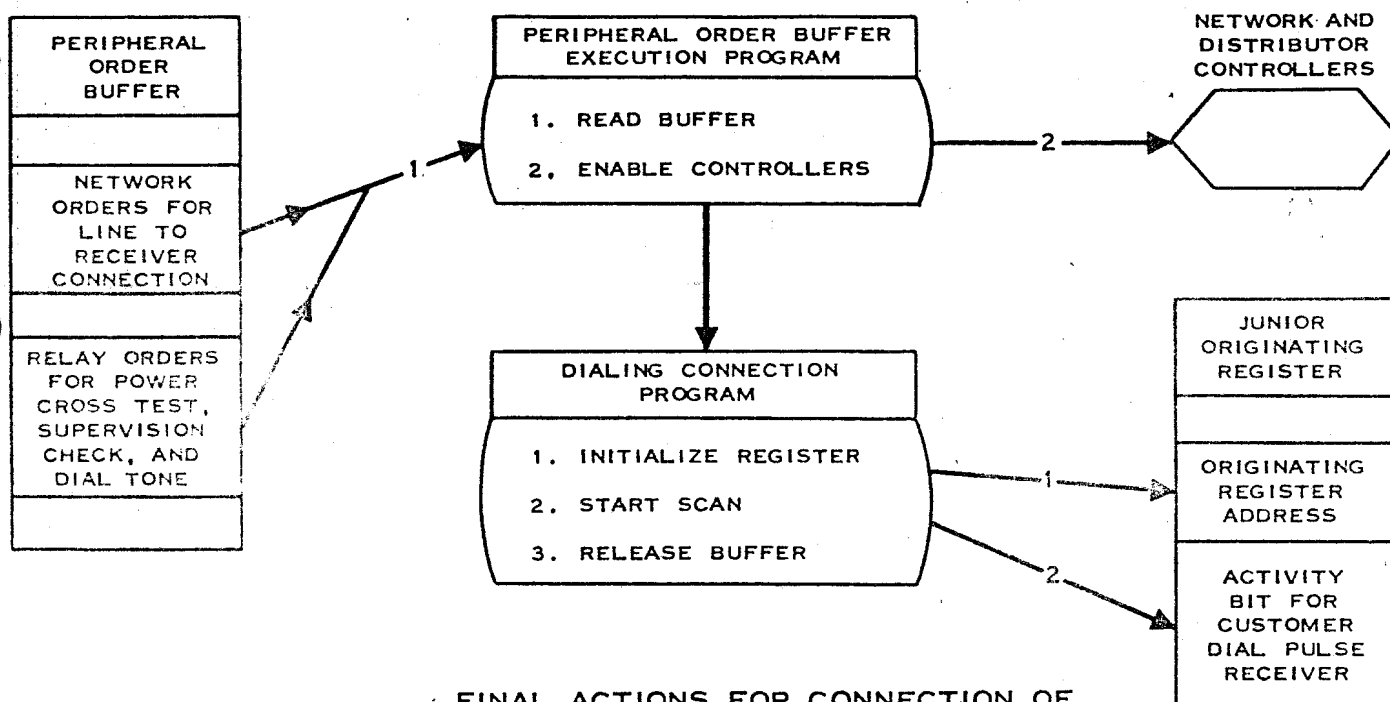




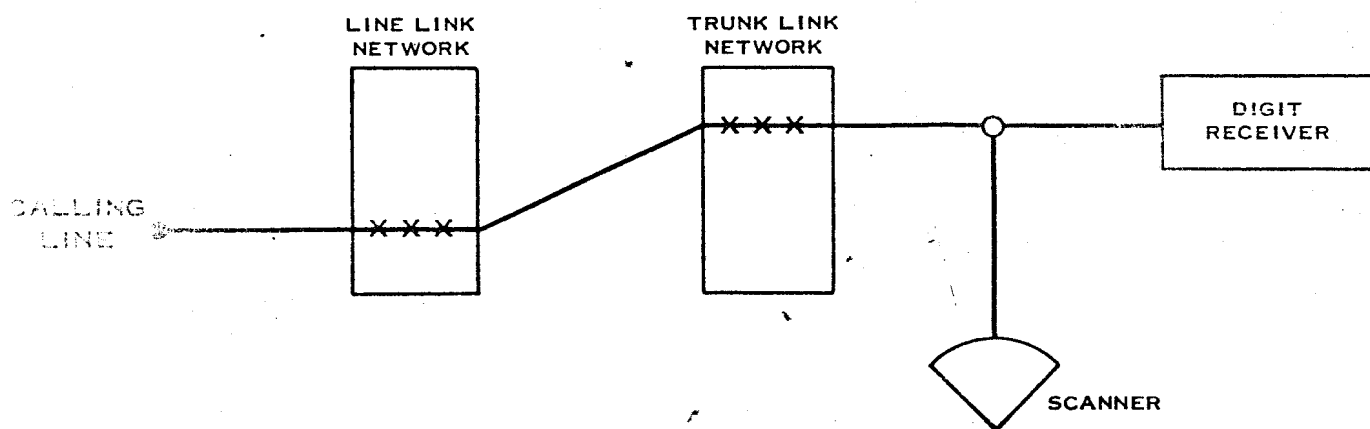
DETECTION OF ORIGINATION



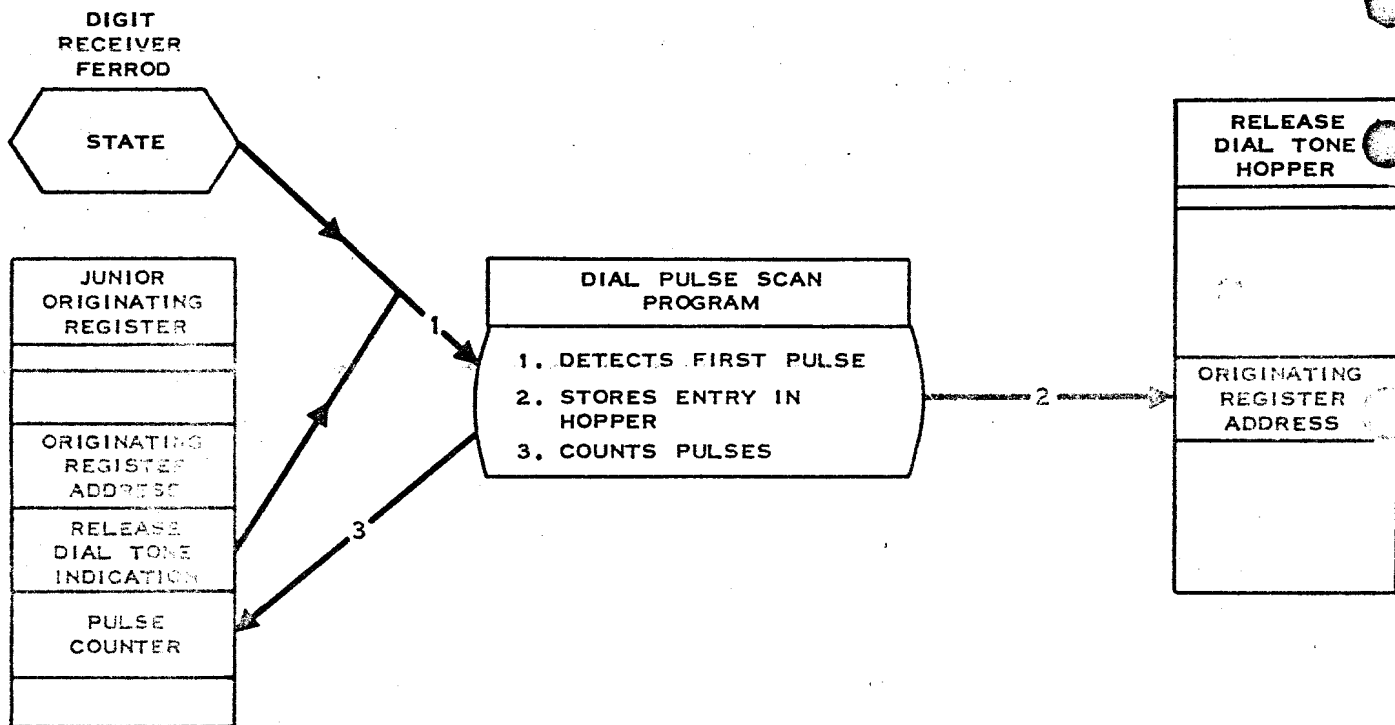
INITIAL ACTIONS FOR CONNECTION OF LINE-TO-DIGIT RECEIVER



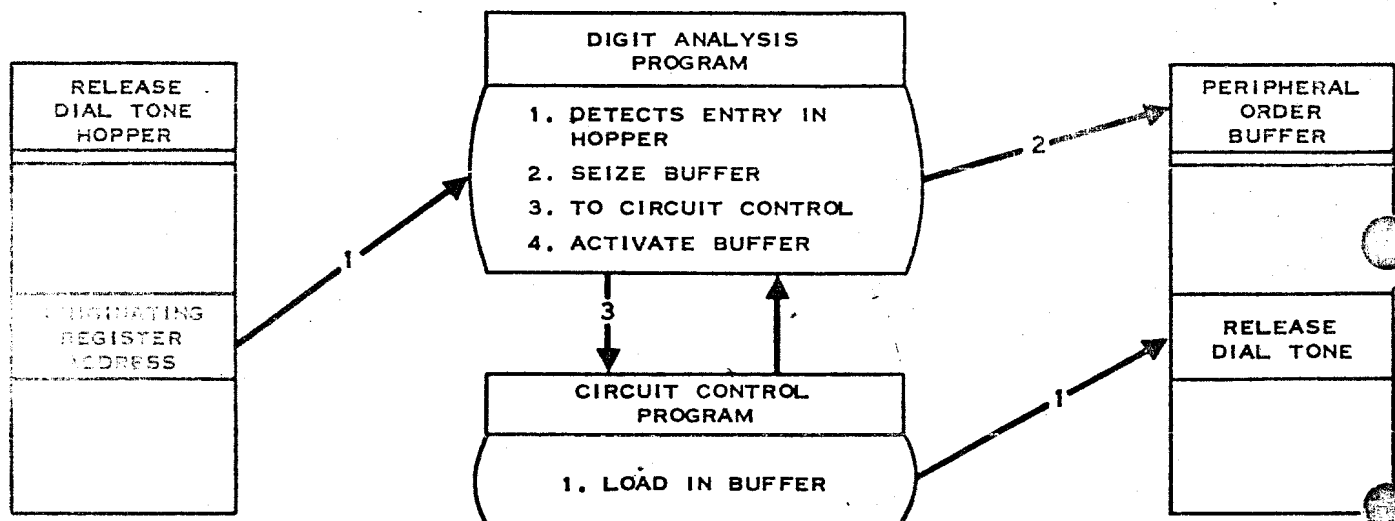
FINAL ACTIONS FOR CONNECTION OF LINE-TO-DIGIT RECEIVER



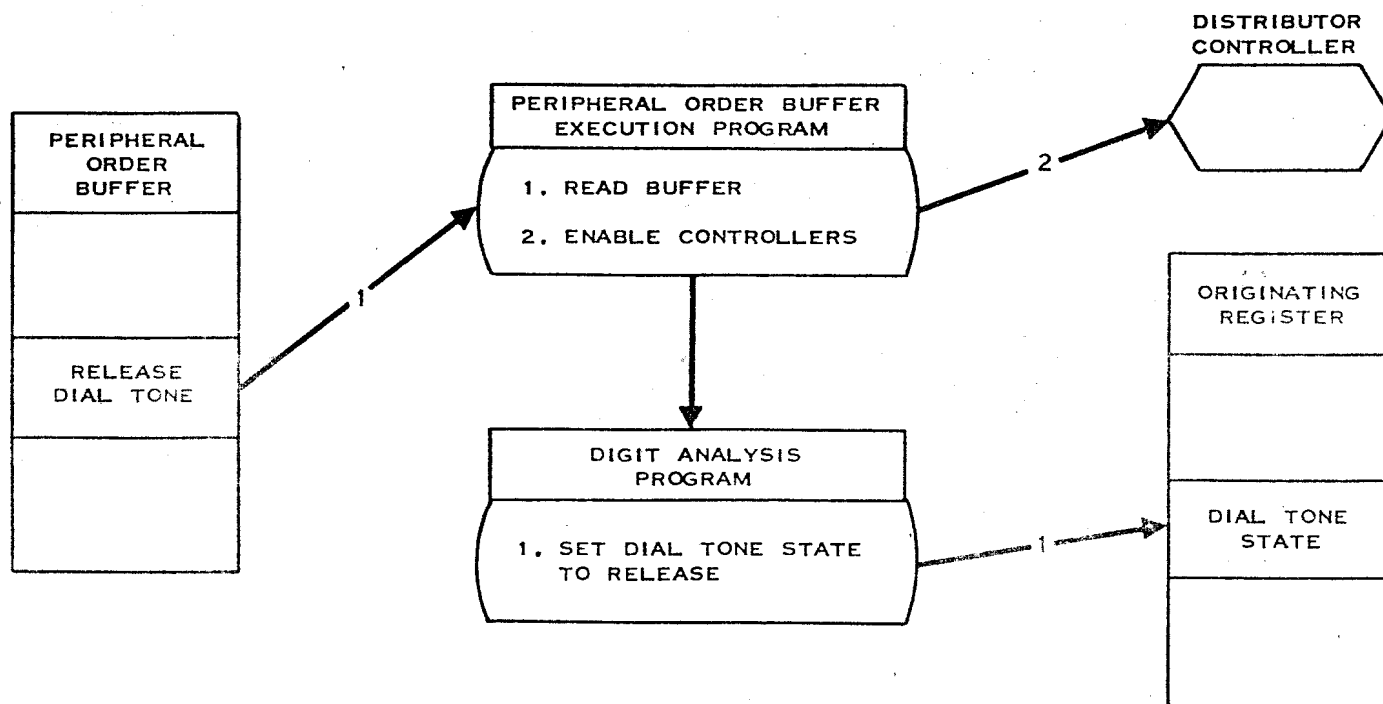
RECEIVER CONNECTION



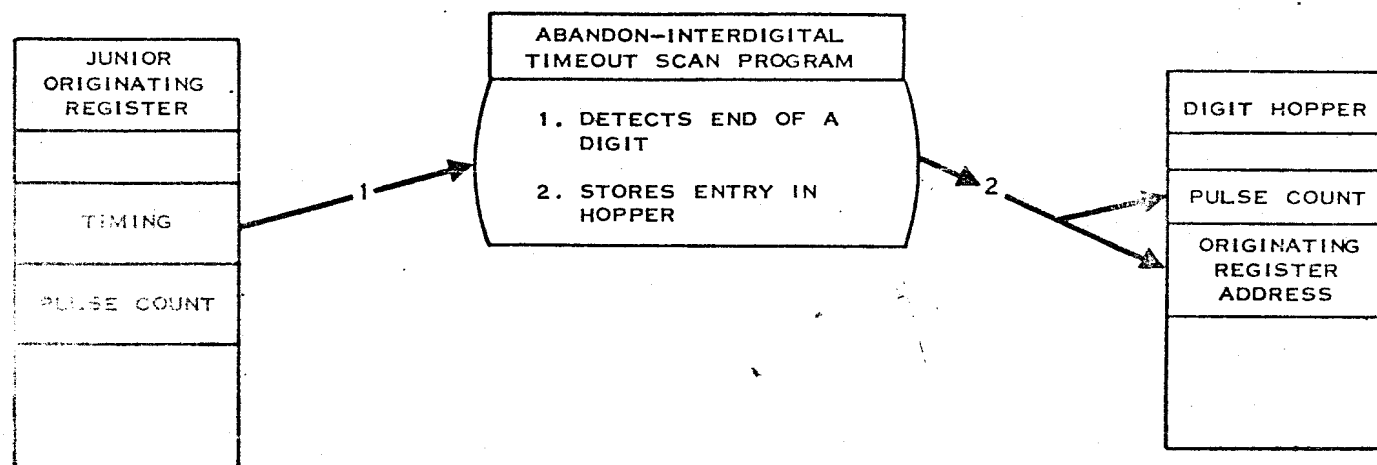
DETECTION OF FIRST PULSE



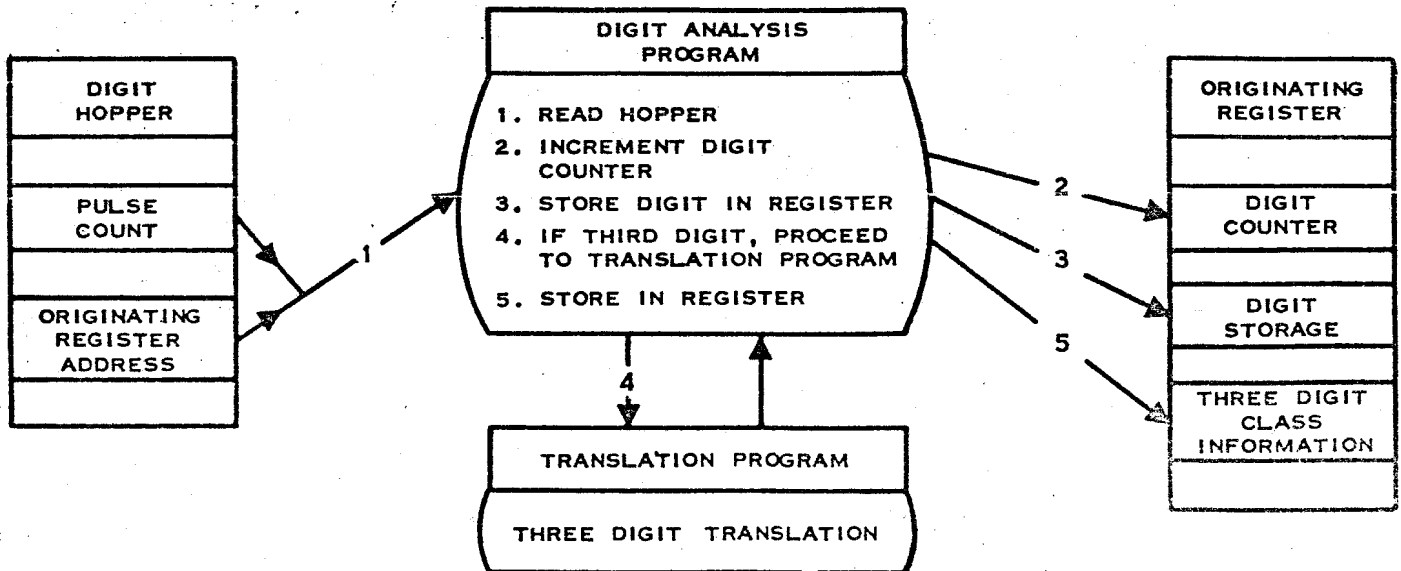
INITIAL ACTIONS FOR THE RELEASE OF DIAL TONE



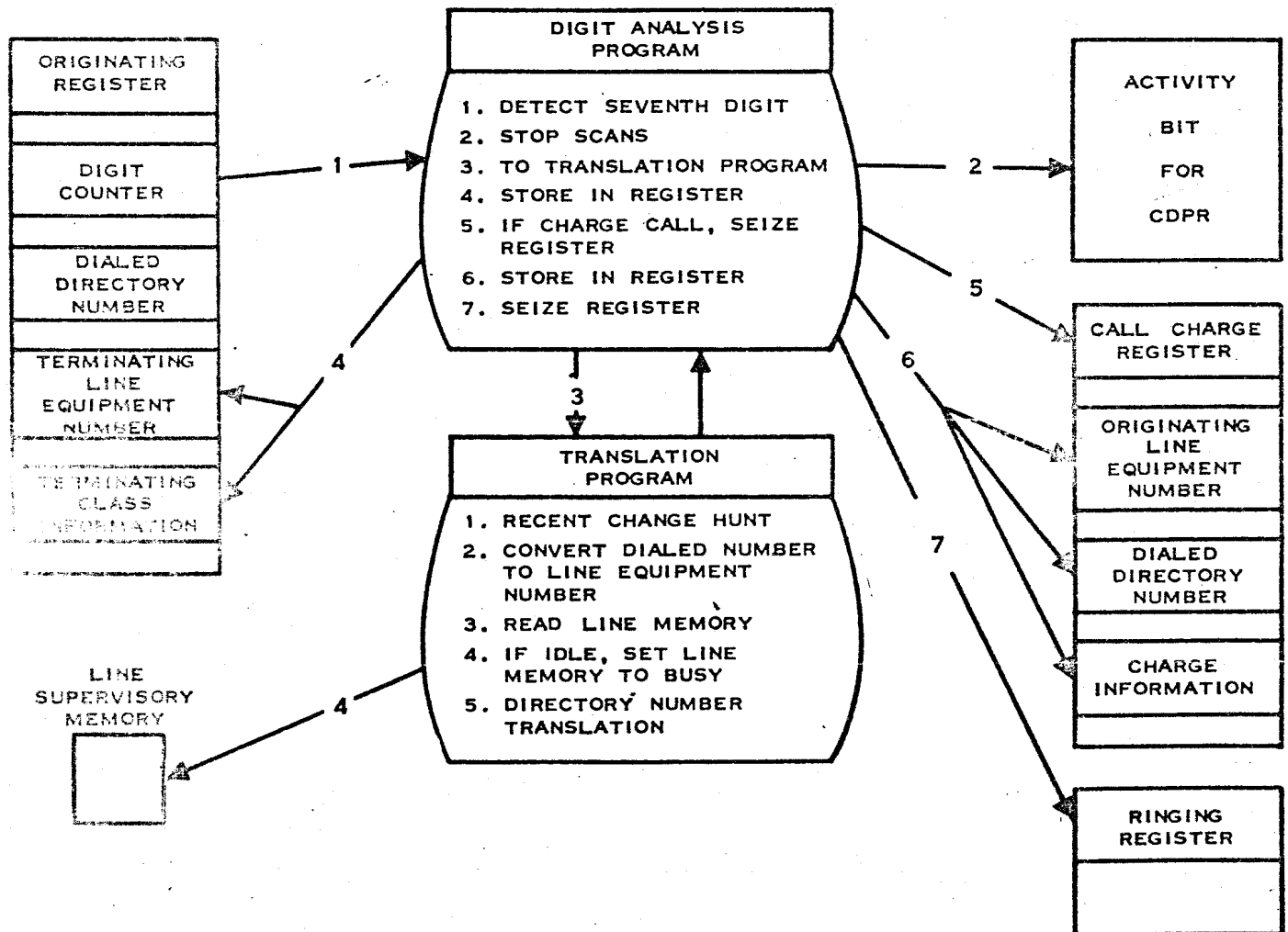
FINAL ACTIONS FOR THE RELEASE OF DIAL TONE



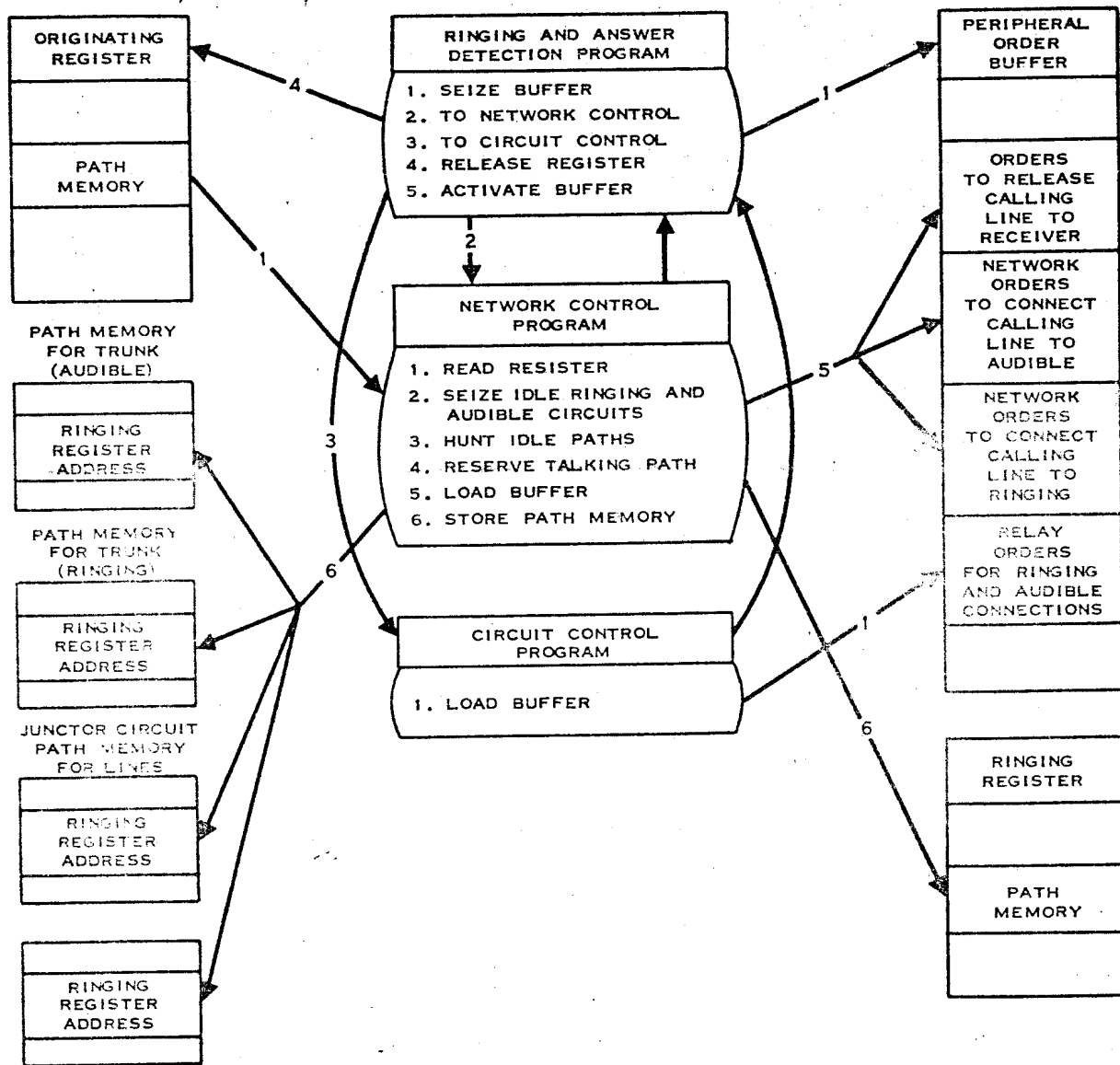
RECEPTION OF DIGITS



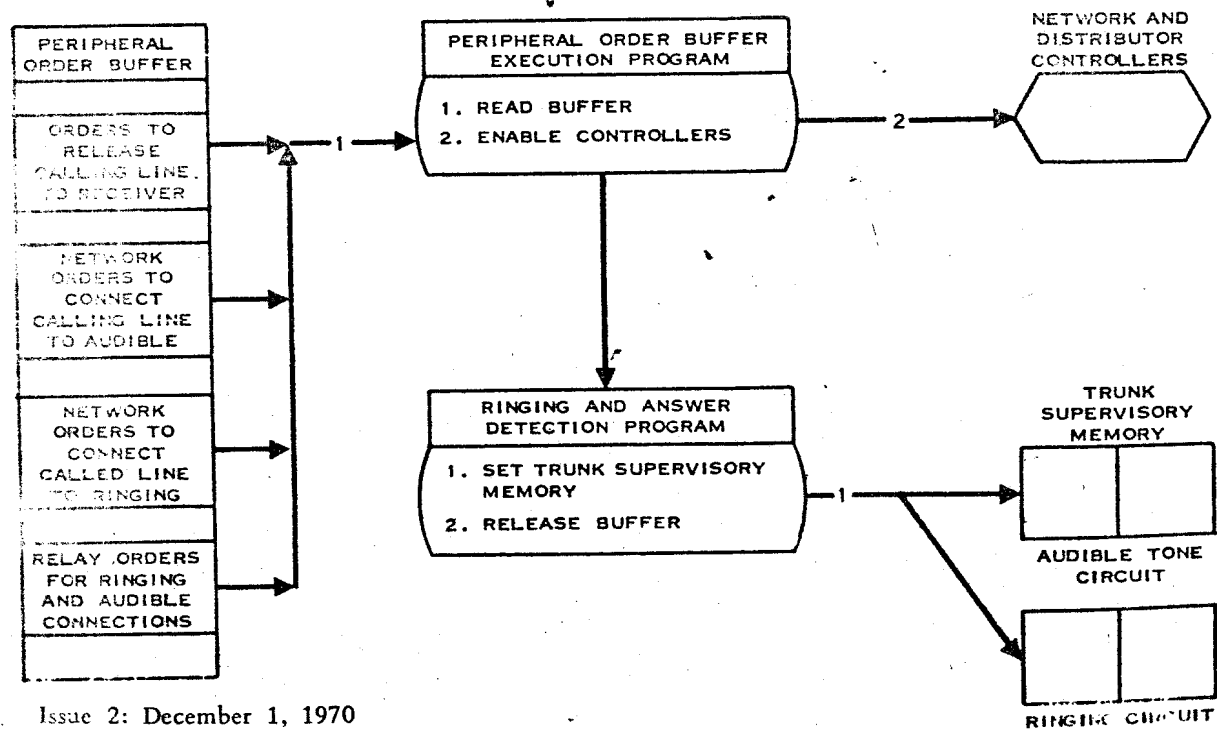
ANALYSIS OF THIRD DIGIT

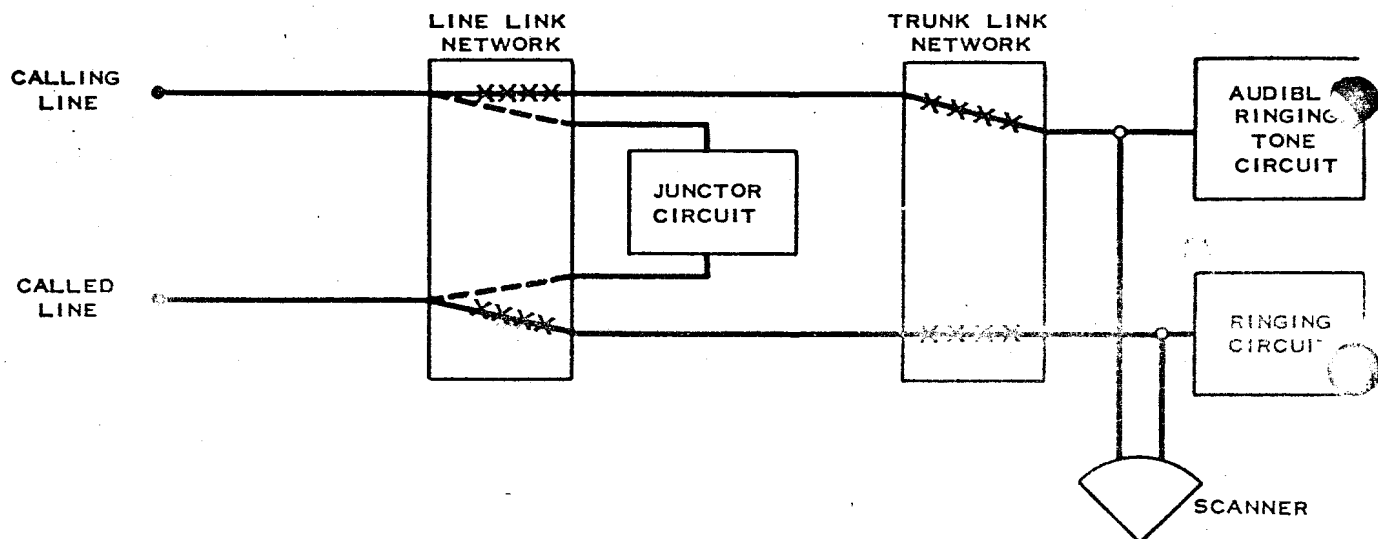


ANALYSIS AFTER END OF DIALING

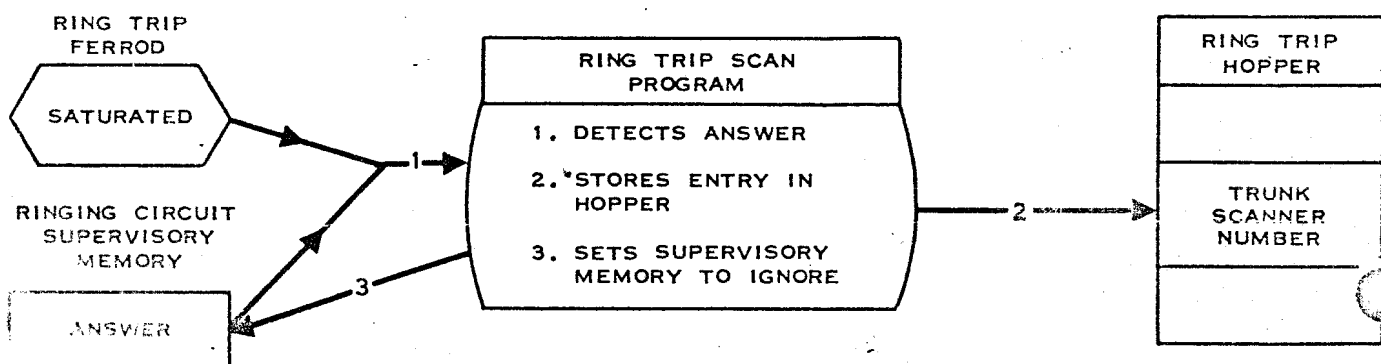


INITIAL ACTIONS FOR RINGING AND AUDIBLE CONNECTION

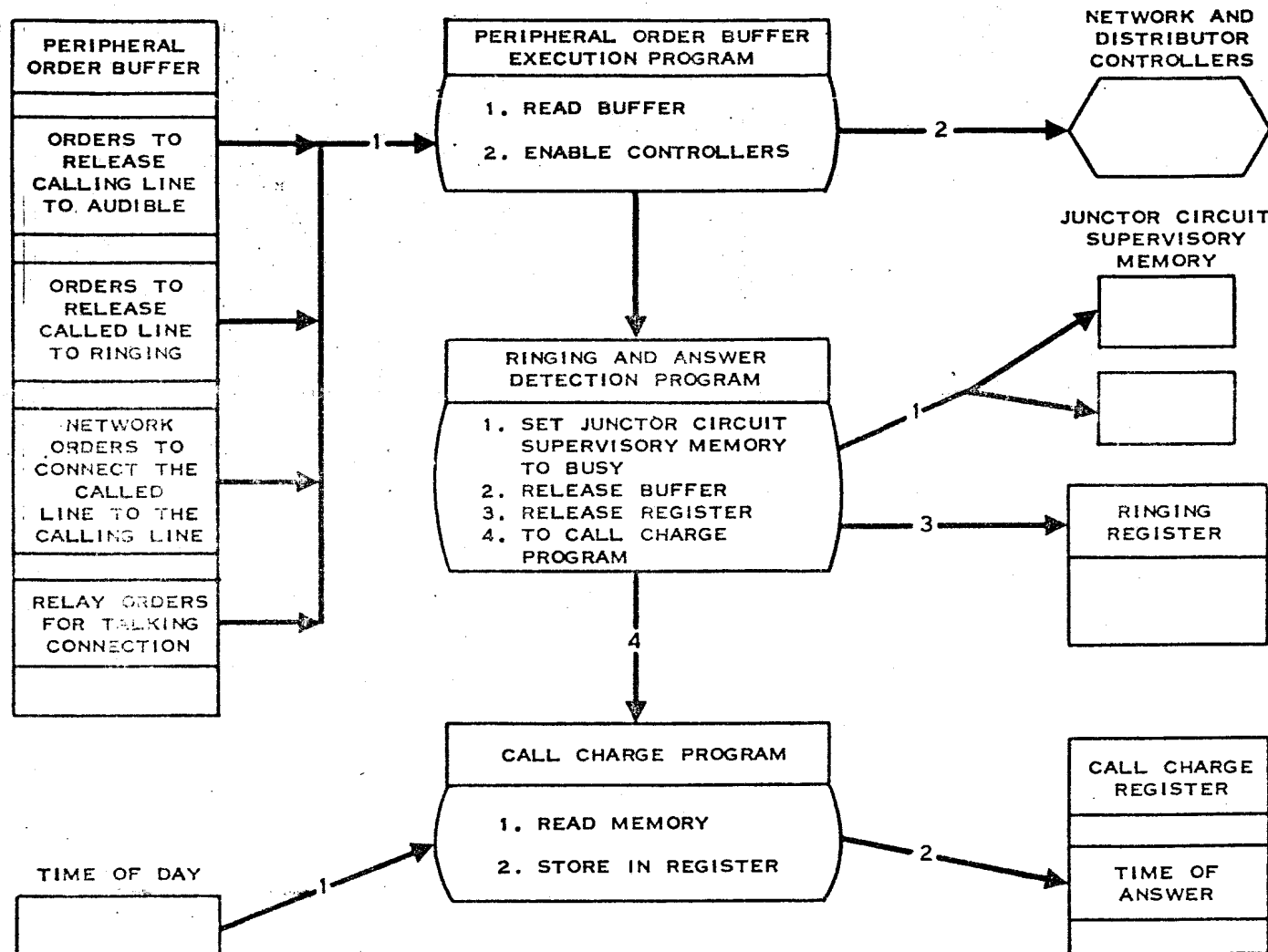




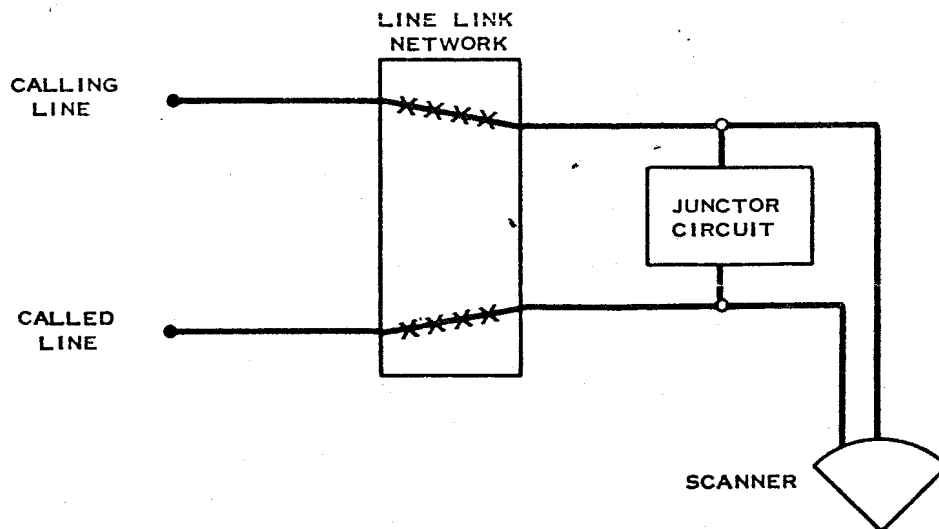
RINGING AND AUDIBLE CONNECTION



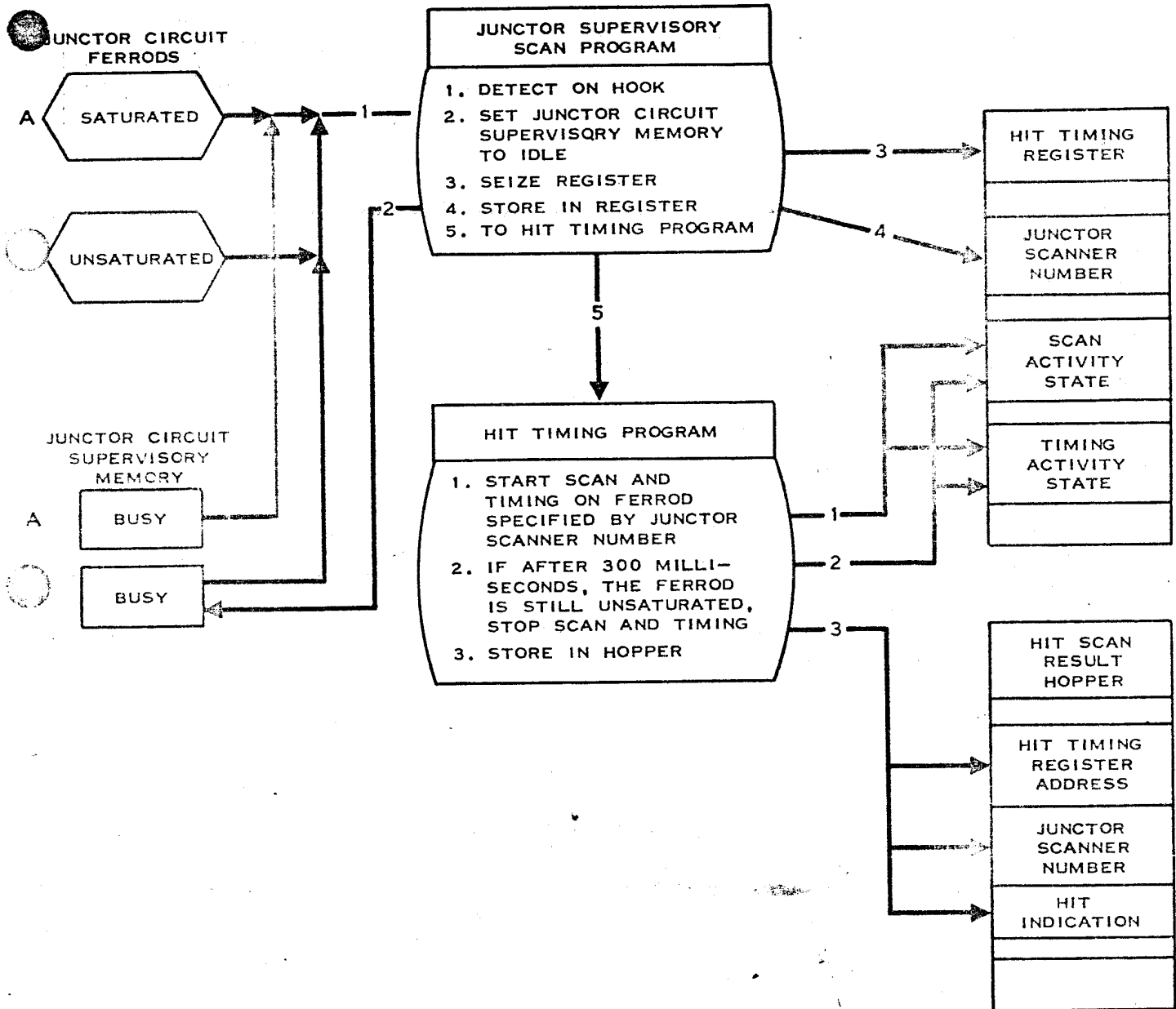
DETECTION OF ANSWER



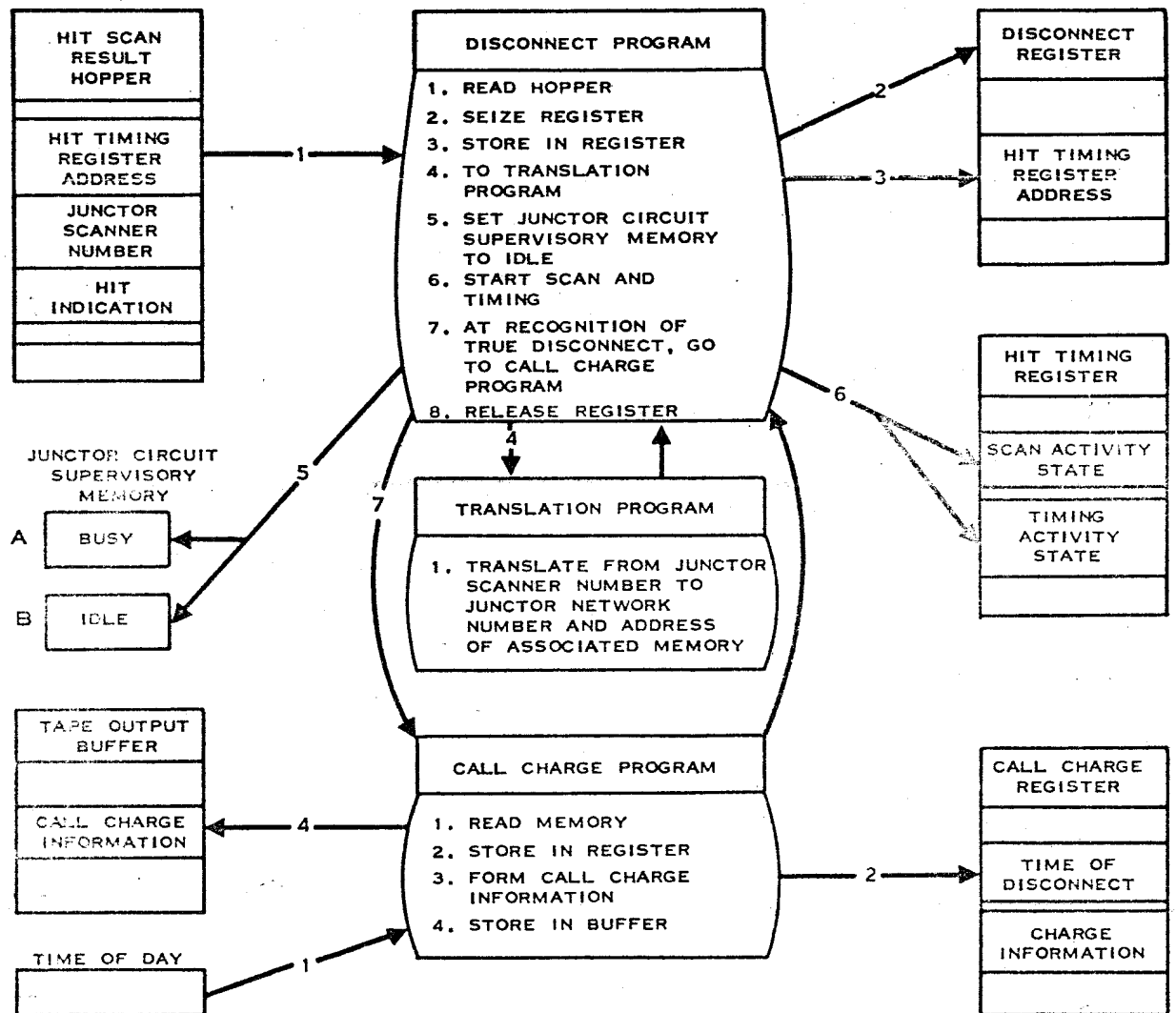
FINAL ACTIONS FOR TALKING CONNECTION



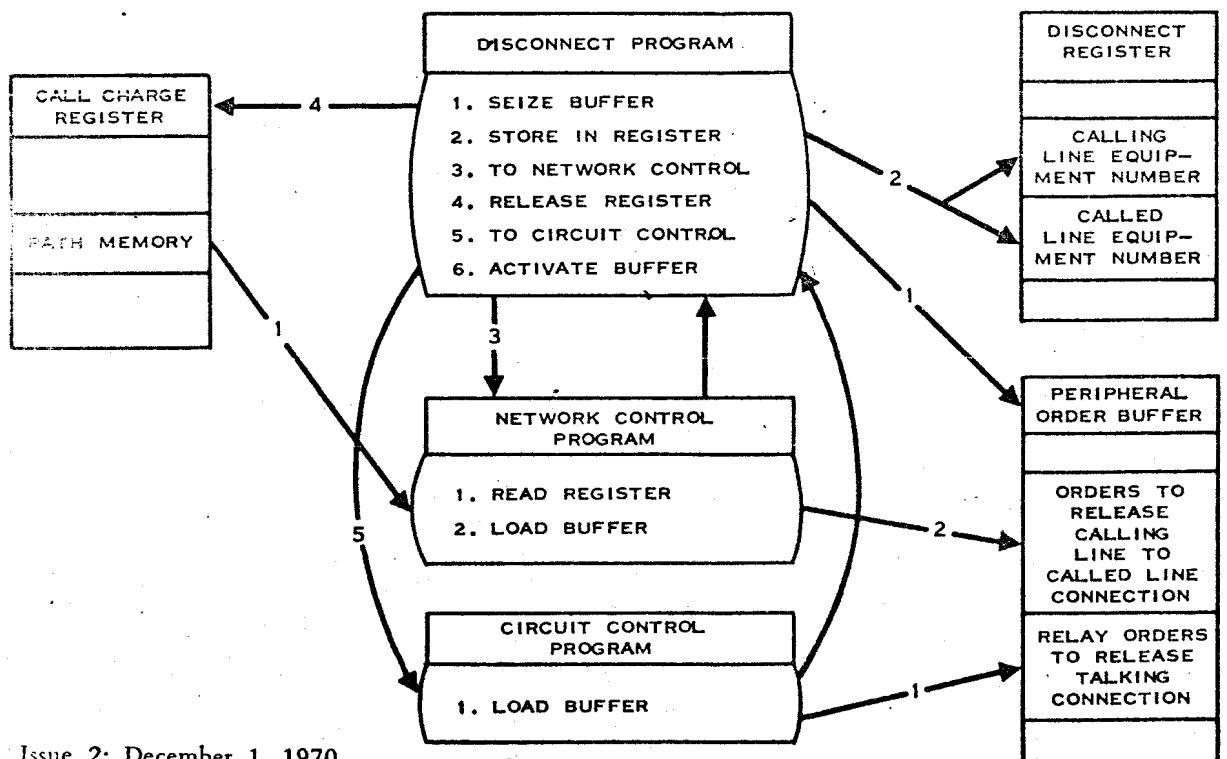
TALKING CONNECTION

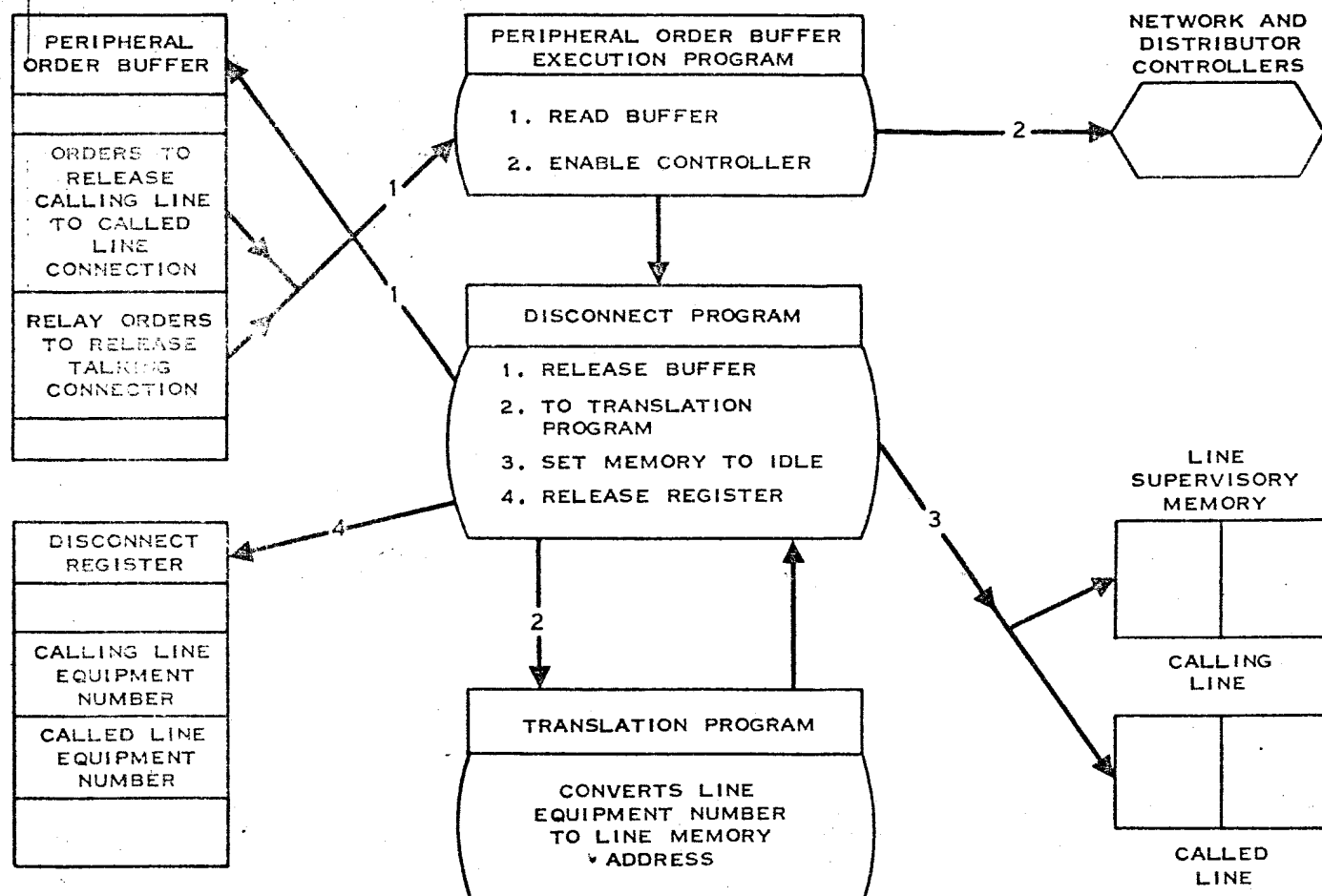


DETECTION OF ON-HOOK AND HIT TIMING



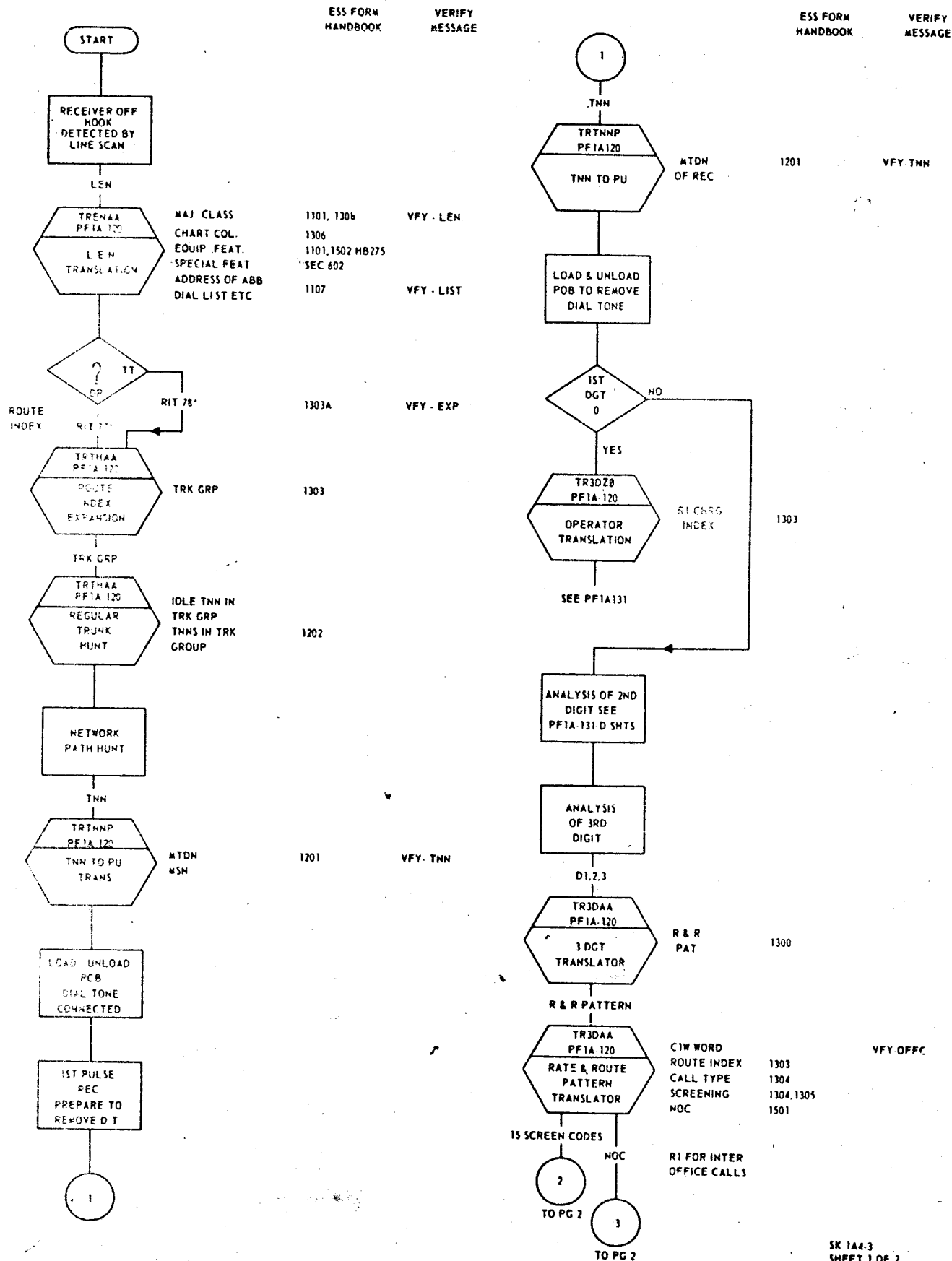
DETECTION OF DISCONNECT AND CHARGING ACTIONS



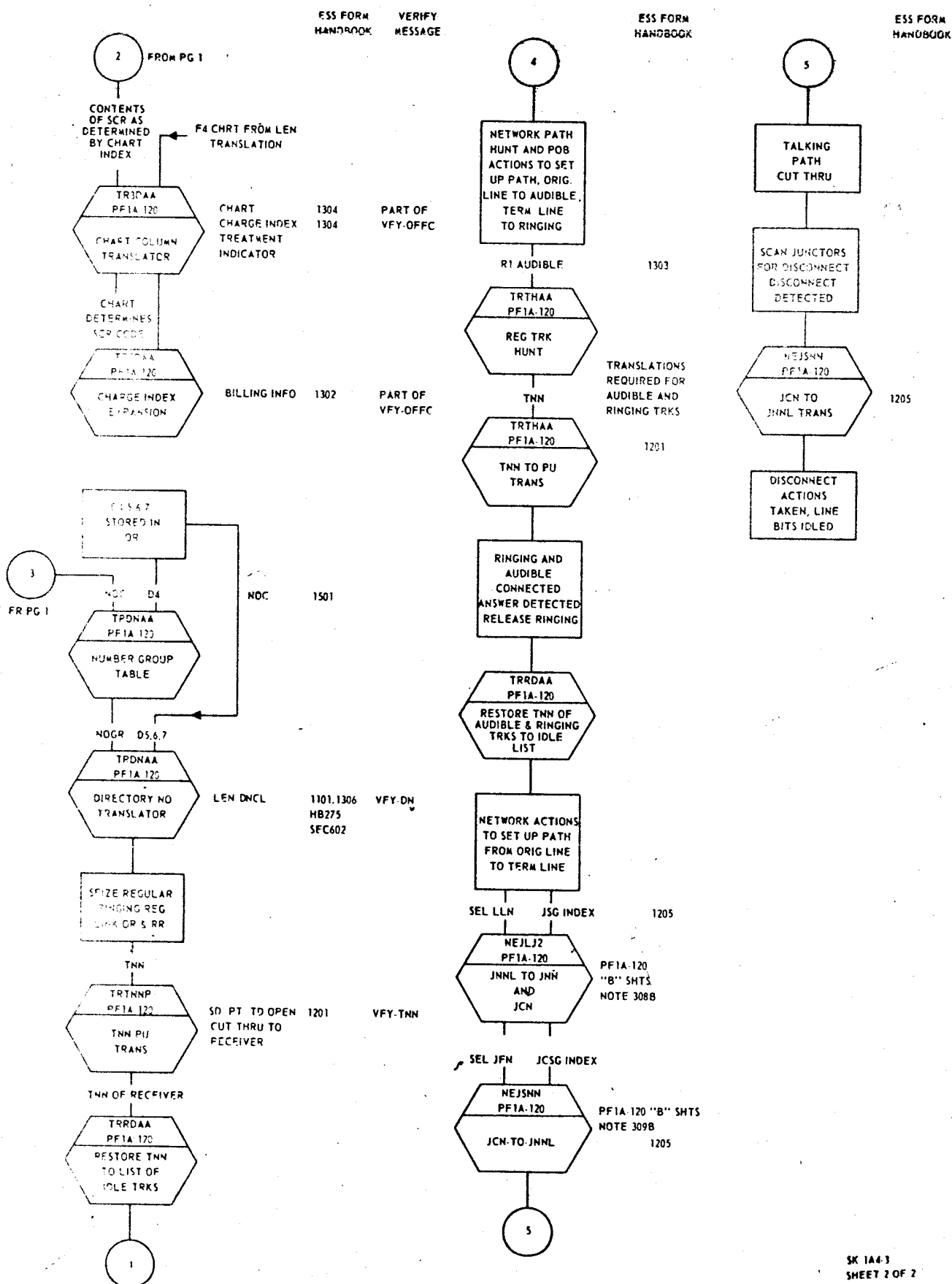


FINAL DISCONNECT ACTIONS

TRANSLATIONS FOR A TYPICAL INTRA OFFICE CALL



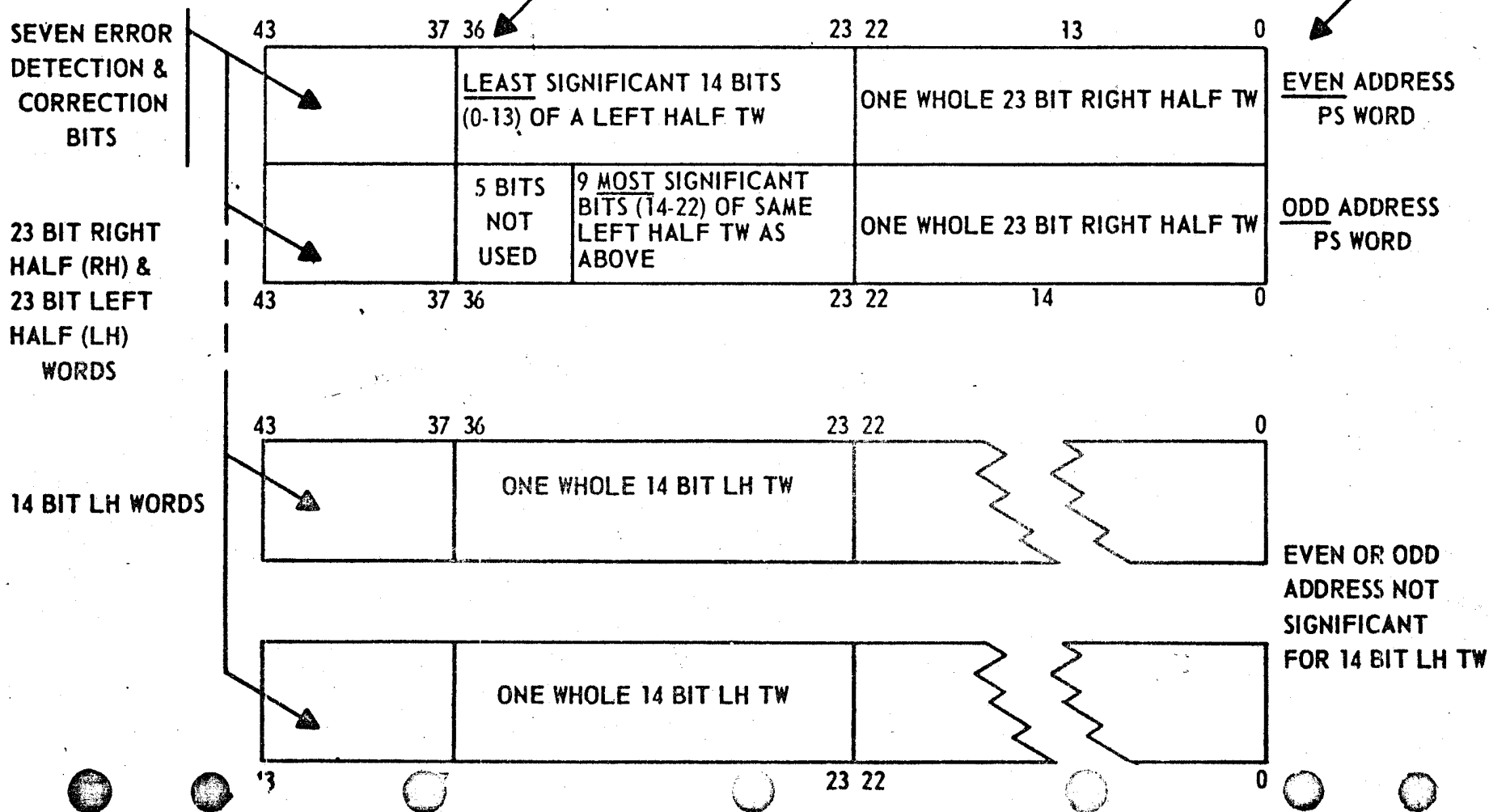
TRANSLATIONS FOR A TYPICAL INTRA OFFICE CALL



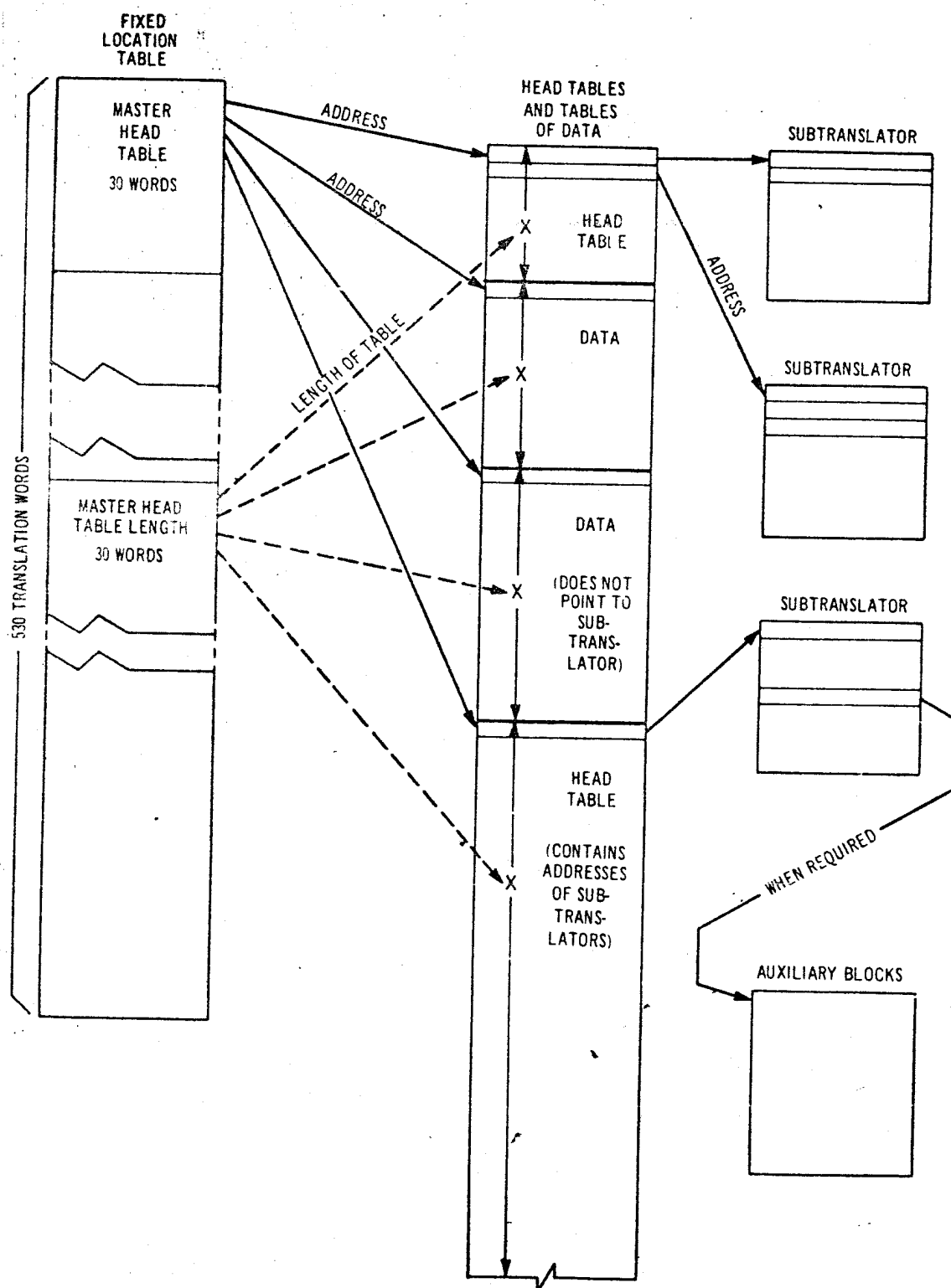
CALL STORE WORD STRUCTURE:



PROGRAM STORE WORD STRUCTURE:



NO. 1 ESS
TRANSLATION MEMORY ORGANIZATION



PERMANENT TABLE

+0	HEAD-HEAD TABLE OR MASTER HEADTABLE (30 WORDS)	+0.0
+30	UNIT TYPE TRANSLATOR (64 WORDS)	+0.36
+94	20 QUESTIONS AREA (20 WORDS) ESS BIT 22 = 1 IF ANSWER TO QUESTION IS YES	+0.136
+114	HEADTABLE LENGTHS (30 WORDS)	+0.162
+144	UNIT TYPE TABLE LENGTHS (64 WORDS)	+0.220
+208	RIGHT HALF LINK LIST (33 WORDS)	+0.320
+241	LEFT HALF LINK LIST (33 WORDS)	+0.361
+274	JNN → JNN (32 WORDS)	+0.422
+306	INITIALIZATION MAP ON LLN (16 WORDS)	+0.462
+322	JNN → JNN & INITIALIZATION MAP ON TLN (16 WORDS)	+0.502
+338	ABBREVIATED ORIGINATING CLASS WORDS (128 WORDS)	+0.522
+466	ABBREVIATED TERMINATING CLASS WORDS (64 WORDS)	+0.722

FIXED LOCATION TABLE

HEAD-HEAD TABLE FOR PROGRAM STORE (PS)

FIX ADDRESS OF
HEAD-HEAD TABLE
PLUS

+0	ADDRESS OF HEAD TABLE FOR DN** (HDN)
+1	ADDRESS OF HEAD TABLE FOR LEN (HLEN)
+2	ADDRESS OF HEAD TABLE FOR 3-DIGIT* (HNAC)
+3	ADDRESS OF HEAD TABLE FOR TNN — PERIPHERAL (HTNP)
+4	ADDRESS OF HEAD TABLE FOR TNN — TGN (HTNG)
+5	ADDRESS OF HEAD TABLE FOR UTSN — TNN (HTUS)
+6	ADDRESS OF LINE CONC. HEAD TABLE (4-WIRE)
+7	ADDRESS OF HEAD TABLE FOR MSN (HMSN)
+8	ADDRESS OF TGN PRIMARY TABLES (TGBS)
+9	ADDRESS OF TRK. CLASS EXPANSION TABLE (TCBP)
+10	ADDRESS OF NOC NO. GROUP NO. TABLE (NOCG)
+11	ADDRESS OF HEAD TABLE FOR PBX (HPBX)
+12	ADDRESS OF HEAD TABLE OF SCIW (HSIW)
+13	ADDRESS OF ROUTE INDEX EXP. TABLE (REXP)
+14	ADDRESS OF CHARGE INDEX EXP. TABLE (CEXP)
+15	ADDRESS OF TNN — TSN (4-WIRE)
+16	ADDRESS OF HIGH PRIORITY BROADCAST TBLE. (4-WIRE)
+17	ADDRESS OF CPDN TRANSLATOR
+18	ADDRESS OF USOC CODE TRANSLATOR (USOC)
+19	ADDRESS OF AUTOMATIC TRUNK TEST TABLE
+20	ADDRESS OF INCOMING TRK. CHART TABLE (INCH)
+21	ADDRESS OF ROUTE PATTERN EXT. (HRPX)
+22	ADDRESS OF TRAFFIC (TMTH)
+23	ADDRESS OF TRAFFIC (TMTC)
+24	ADDRESS OF TRAFFIC (CLTA)
+25	ADDRESS OF TRAFFIC (CLSA)
+26	UNASSIGNED *
+27	UNASSIGNED
+28	UNASSIGNED
+29	ADDRESS OF NOGR RATE CENTER

** HEAD TABLE HAS ADDRESSES OF SUBTRANSLATORS

* HEAD TABLE HAS ADDRESSES OF SUBTRANSLATORS — 211

ESS-1500A (7-68)

HEAD TABLE CAPACITY
AND OPTION RECORD

NO. 1 ESS

TEL. CO: _____

BASE _____ CONT. GR. _____

FORM CODE: 00

ESS UNIT: _____

ITEM	CAPACITY TO BE PROVIDED				IN UNITS OF	DESCRIPTION	REMARKS
	YES	NO					
3	2	1	0				
00	—	0	5	0	THOUSAND	DIRECTORY NUMBERS (UP TO 128,000)	
01	—	—	1	4	NETWORKS	LINE LINK NETWORKS (UP TO 16)	
02	—	—	3	2	TRANSLATORS	TOTAL OF 3 & 6 DIGIT TRANSLATORS (UP TO 32)	
03	—	—	1	6	NETWORKS	TRUNK LINK NETWORKS-EQUIP. TRNSL. (UP TO 16)	
04	—	—	1	6	NETWORKS	TRUNK LINK NETWORKS-TK. GRP. TRNSL. (UP TO 16)	
05	—		3	6	TRK. FRAMES	UNIVERSAL TRUNK FRAMES (UP TO 100)	
06						FUTURE	
07	—	—	2	0	MS FRAMES	MASTER SCANNER FRAMES (UP TO 64)	
08		7	0	0	TRK. GROUPS	TRUNK GROUPS (UP TO 1000)	
09	—	1	0	0	TRK. TYPES	TRUNK TYPES (UP TO 256)	
10	—	—	1	5	NOC. CODES	NORMALIZED OFFICE CODES (UP TO 32)	
11		5	0	0	NLH GROUPS	MULTI-LINE HUNTING GROUPS (UP TO 2048)	
12		0	5	0	CL. COLUMNS	CHART CLASS COLUMNS (UP TO 1024)	
13		2	0	0	RT. INDICES	ROUTE INDICES (UP TO 2048)	
14		1	0	0	CHG. INDICES	CHARGE INDICES (UP TO 1000)	
15					CENTREX GROUPS	CENTREX COMMON BLOCK (UP TO 2048)	
16						FUTURE	
17	—	—	—	8	CPD PAIRS	CENTRAL PULSE DISTRIBUTOR PAIRS (UP TO 8)	
18	0	1	0	0	LINE CLASS CODES	LINE CLASS CODES (UP TO 1024)	
19		1	5	0	TABLES	AUTOMATIC TRUNK TEST TABLE (UP TO 1000)	
20	—	—	0	5	SEL. TABLES	INC. TRK. OFFICE SELECTOR TABLE (UP TO 32)	
21	—	—	0	6	R & R PATTERN BLKS.	R & R PATTERN BLKS. (128 PATTERNS EACH) (UP TO 78)	
22	—	—	1	0	LIST NO. BLKS.	H SCHEDULE LIST NO. BLKS. (128 NO. EA.) (UP TO 50)	
23	—	—	1	6	LIST NO. BLKS.	C SCHEDULE LIST NO. BLKS. (128 NO. EA.) (UP TO 20)	
24	—	—	—	8	CONCENTRATORS	TRAFFIC COUNT ON LINES OF SELECTED CONC. (UP TO 8)	
25	—	1	2	0	LINES	TRAFFIC COUNT ON SELECTED LINES (UP TO 128)	
26	—				TANDEM TABLES	TANDEM TABLES (UP TO 128)	
27						FUTURE	
28						FUTURE	
29	—				THOUSAND (ASSG'D TO RATE CTR.)	DIRECTORY NOS. (UP TO 128,000) IF TWO OR MORE RATE CENTERS	
30	—		1	0	COIN OPTION	INITIAL DEPOSIT RETURN ON OPR. CALLS	
31	—		0	1	COIN OPTION	CHARGING ON LOCAL OVERTIME	
32	—				ACCESS CODE	PREFIX "0" ON T.S.P. CALLS	
33	—		1	0	AMA OPTION	RECORD COIN ZONE CALLS ON AMA	
34	—				ACCESS CODE	PREFIX "1" ON STATION TO STATION CALLS	
35	—						
36	—						
37	—		0	1	TTY OPTION	SERVICE ORDER TTY 1-WAY (YES OR NO)	
38	—						
			1	0			
44							
45	—						
46	—						
47	3	7	2	0		NUMBER OF PRIMARY RECENT CHANGE REGISTERS (MAX. 4095)	2 WDS/REG.
48	—	—	—	—		PROGRAM STORE ERROR PARAMETER # 1	
49	—	—	—	—		PROGRAM STORE ERROR PARAMETER # 2	

20 QUESTIONS TABLE

HH = 1560136

+
INDEX

1560136 = 20000000
00000000
20000000
00000000
00000000
00000000
00000000
00000000
00000000
00000000
20000000
00000000
00000000
00000000
00000000
00000000
00000000
01660060
00003720
00037741
00000004

SIZE OF HOLE
(FROM 0 TO 32 WORDS)

INDEX

LEFT HALF LINK LIST

241₁₀ OR 361₈

THE ADDRESS OF THIS TABLE IS THE
ADDRESS OF THE HEAD - HEAD TABLE PLUS 241

0	ALL ZEROS
	ADDRESS OF LEFT HALF WORD HOLE OF SIZE 1
	ADDRESS OF LEFT HALF WORD HOLE OF SIZE 2
	ADDRESS OF LEFT HALF WORD HOLE OF SIZE 3
	ADDRESS OF LEFT HALF WORD HOLE OF SIZE 4
	ADDRESS OF LEFT HALF WORD HOLE OF SIZE 5
	ADDRESS OF LEFT HALF WORD HOLE OF SIZE 6
	ADDRESS OF LEFT HALF WORD HOLE OF SIZE 7
	ADDRESS OF LEFT HALF WORD HOLE OF SIZE 8
	ADDRESS OF LEFT HALF WORD HOLE OF SIZE 9
	ADDRESS OF LEFT HALF WORD HOLE OF SIZE 10
	ADDRESS OF LEFT HALF WORD HOLE OF SIZE 11
	ADDRESS OF LEFT HALF WORD HOLE OF SIZE 12
	ADDRESS OF LEFT HALF WORD HOLE OF SIZE 13
	ADDRESS OF LEFT HALF WORD HOLE OF SIZE 14
	ADDRESS OF LEFT HALF WORD HOLE OF SIZE 15
	ADDRESS OF LEFT HALF WORD HOLE OF SIZE 16
	ADDRESS OF LEFT HALF WORD HOLE OF SIZE 17
	ADDRESS OF LEFT HALF WORD HOLE OF SIZE 18
	ADDRESS OF LEFT HALF WORD HOLE OF SIZE 19
	ADDRESS OF LEFT HALF WORD HOLE OF SIZE 20
	ADDRESS OF LEFT HALF WORD HOLE OF SIZE 21
	ADDRESS OF LEFT HALF WORD HOLE OF SIZE 22
	ADDRESS OF LEFT HALF WORD HOLE OF SIZE 23
	ADDRESS OF LEFT HALF WORD HOLE OF SIZE 24
	ADDRESS OF LEFT HALF WORD HOLE OF SIZE 25
	ADDRESS OF LEFT HALF WORD HOLE OF SIZE 26
	ADDRESS OF LEFT HALF WORD HOLE OF SIZE 27
	ADDRESS OF LEFT HALF WORD HOLE OF SIZE 28
	ADDRESS OF LEFT HALF WORD HOLE OF SIZE 29
	ADDRESS OF LEFT HALF WORD HOLE OF SIZE 30
	ADDRESS OF LEFT HALF WORD HOLE OF SIZE 31
+32	ADDRESS OF LEFT HALF WORD HOLE OF SIZE 32 OR GREATER

NOTE: The last word in the link list contains the address of a hole which is of the size of 32 or greater.

208₁₀ or 320₈

SIZE OF HOLE
(FROM 0 TO 32 WORDS)

RIGHT HALF LINK LIST

THE ADDRESS OF THIS TABLE IS THE
ADDRESS OF THE HEAD - HEAD TABLE PLUS 208

INDEX

+ 0

ALL ZEROS

ADDRESS OF RIGHT HALF WORD HOLE OF SIZE 1
ADDRESS OF RIGHT HALF WORD HOLE OF SIZE 2
ADDRESS OF RIGHT HALF WORD HOLE OF SIZE 3
ADDRESS OF RIGHT HALF WORD HOLE OF SIZE 4
ADDRESS OF RIGHT HALF WORD HOLE OF SIZE 5
ADDRESS OF RIGHT HALF WORD HOLE OF SIZE 6
ADDRESS OF RIGHT HALF WORD HOLE OF SIZE 7
ADDRESS OF RIGHT HALF WORD HOLE OF SIZE 8
ADDRESS OF RIGHT HALF WORD HOLE OF SIZE 9
ADDRESS OF RIGHT HALF WORD HOLE OF SIZE 10
ADDRESS OF RIGHT HALF WORD HOLE OF SIZE 11
ADDRESS OF RIGHT HALF WORD HOLE OF SIZE 12
ADDRESS OF RIGHT HALF WORD HOLE OF SIZE 13
ADDRESS OF RIGHT HALF WORD HOLE OF SIZE 14
ADDRESS OF RIGHT HALF WORD HOLE OF SIZE 15
ADDRESS OF RIGHT HALF WORD HOLE OF SIZE 16
ADDRESS OF RIGHT HALF WORD HOLE OF SIZE 17
ADDRESS OF RIGHT HALF WORD HOLE OF SIZE 18
ADDRESS OF RIGHT HALF WORD HOLE OF SIZE 19
ADDRESS OF RIGHT HALF WORD HOLE OF SIZE 20
ADDRESS OF RIGHT HALF WORD HOLE OF SIZE 21
ADDRESS OF RIGHT HALF WORD HOLE OF SIZE 22
ADDRESS OF RIGHT HALF WORD HOLE OF SIZE 23
ADDRESS OF RIGHT HALF WORD HOLE OF SIZE 24
ADDRESS OF RIGHT HALF WORD HOLE OF SIZE 25
ADDRESS OF RIGHT HALF WORD HOLE OF SIZE 26
ADDRESS OF RIGHT HALF WORD HOLE OF SIZE 27
ADDRESS OF RIGHT HALF WORD HOLE OF SIZE 28
ADDRESS OF RIGHT HALF WORD HOLE OF SIZE 29
ADDRESS OF RIGHT HALF WORD HOLE OF SIZE 30
ADDRESS OF RIGHT HALF WORD HOLE OF SIZE 31

+ 32

ADDRESS OF RIGHT HALF WORD HOLE OF
SIZE 32 OR GREATER

NOTE: The last word in the link list contains the address of a hole which is of size 32 or greater.

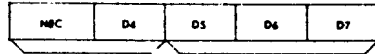
HEAD - HEAD TABLE FOR CALL STORE

0.	ADDRESS OF HEADCELLS OF TRUNKS	00132120
1.	ADDRESS OF HEADCELLS OF PBX ACTIVITY BLOCKS	00134710
2.	RC - HEADCELL: START OF PRIMARY AREA	00136664
3.	START OF SHIFTED PRIMARY AREA	00142524
4.	MASTER HUNT DISPLACEMENT	37777753
5.	START OF AUXILIARY AREA	00146525
6.	ADDRESS OF LINE CONC. HEADCELL (4-WIRE)	00000000
7.	ADDR. OF TRK. GRP. PRECEDENCE HEADCELL (4-WIRE)	00000000
8.	END OF PRIMARY AREA	00146524
9.	END OF RC AREA = START OF ACT. BLOCKS	00157575

DIRECTORY NUMBER TRANSLATION

A. IN TABLES: THE NUMBERS IN BRACKETS INDICATE THE NUMBER OF BITS COMPRISING EACH ITEM.

B. DIRECTORY NUMBER (RAW)

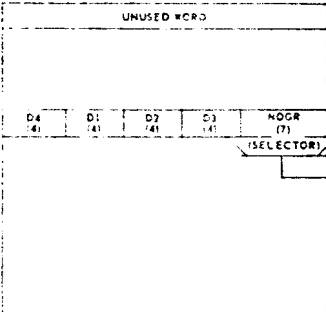


$10(NBC) + D4$

$100D5 + 10D6 + D7$
(INDEX)

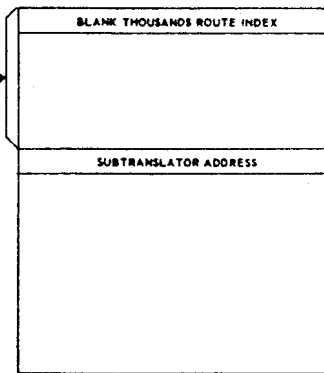
C. NOGR TABLE

(1) SEE ATTACHMENT 10 FOR DETAILED TABLE



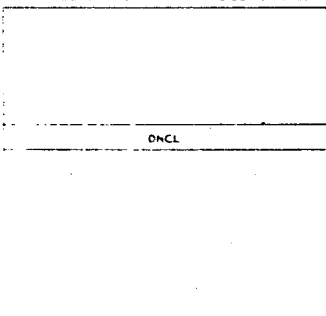
E. DN HEADTABLE

(1) MAXIMUM SIZE IS 128 WORDS



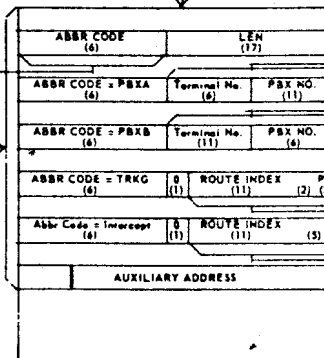
D. ABBREVIATED TERMINATING CLASS WORDS (PART OF PERMANENT TABLE)

(1) SEE ATTACHMENT 100 FOR A DETAILED ABBREVIATED TERMINATING CLASS WORD.



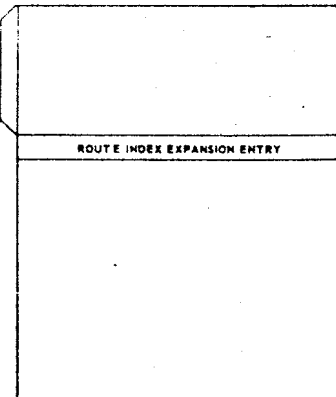
F. DN SUBTRANSLATOR

(1) SIZE IS 1000 WORDS

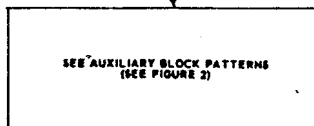


FOR PBX TRANSLATION

H. ROUTE INDEX EXPANSION TABLE



G. AUXILIARY BLOCK



STD ESS FORMAT - DN

SELECTOR	INDEX
NOGR	$100 D5 + 10 D6 + D7 - 111$

SEE CHART 14 FOR COMPUTED VALUE OF SELECTOR AND INDEX

AUXILIARY BLOCK PATTERNS

A. IN TABLES: THE NUMBERS IN BRACKETS () INDICATE THE NUMBER OF BITS COMPRISING EACH ITEM.

B. PATTERN 1

WRDN (5)	(1)	LEN (17)
DNCL (SEE FIGURE 3)		

C. PATTERN 2

PATTERN 1		
0 (1)	MSN (16)	DISPLACED MAJOR (6)
0 (1)	QTY (4)	MTDN (18)

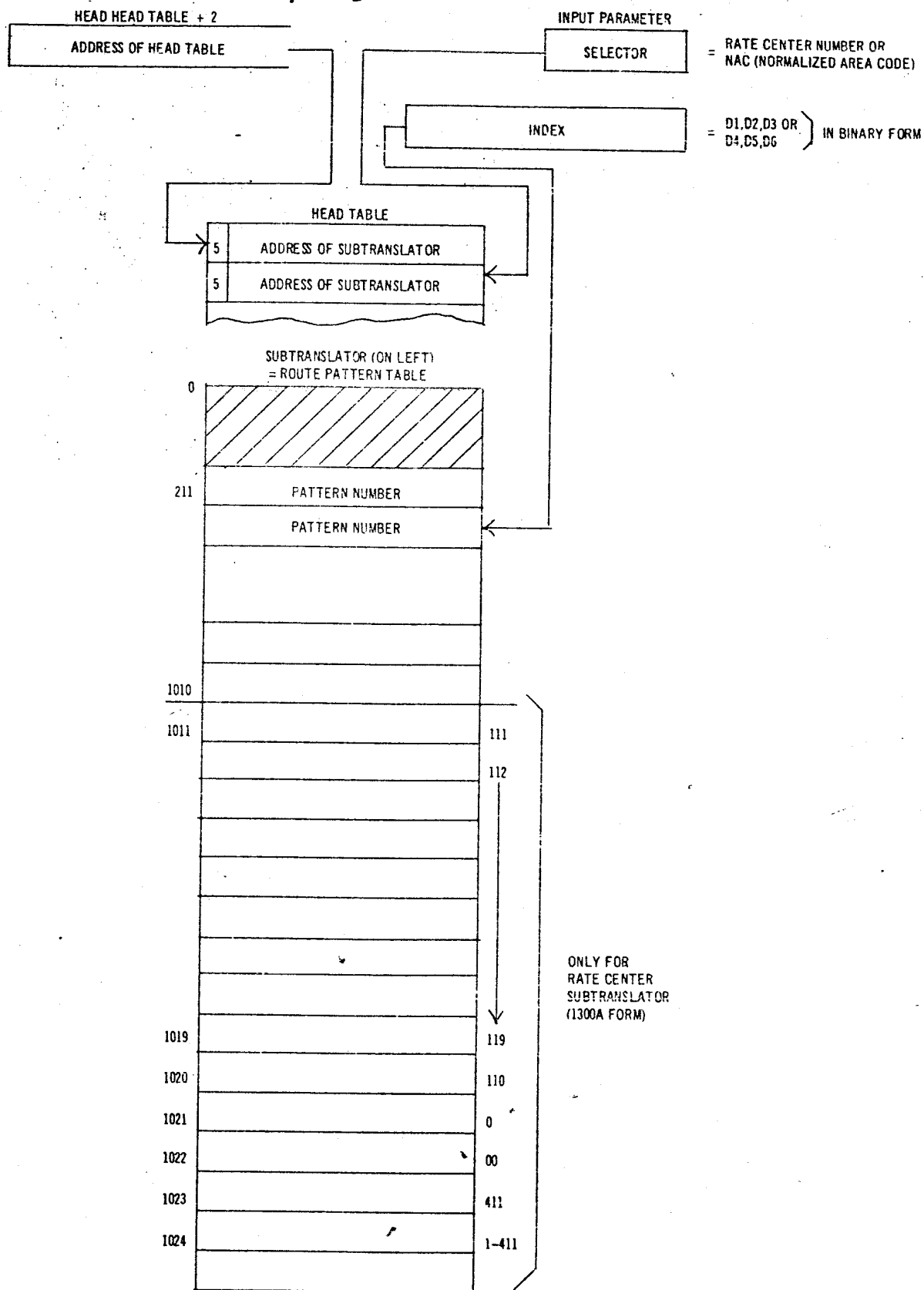
D. PATTERN 3

PATTERN 1		
SE DATA (SEE FIGURE 4)		
TRAFFIC COUNTER		

E. PATTERN 4

PATTERN 3		
0 (1)	MSN (16)	DISPLACED MAJOR (6)
0 (1)	QTY (4)	MTDN (18)

3/6 digit translator

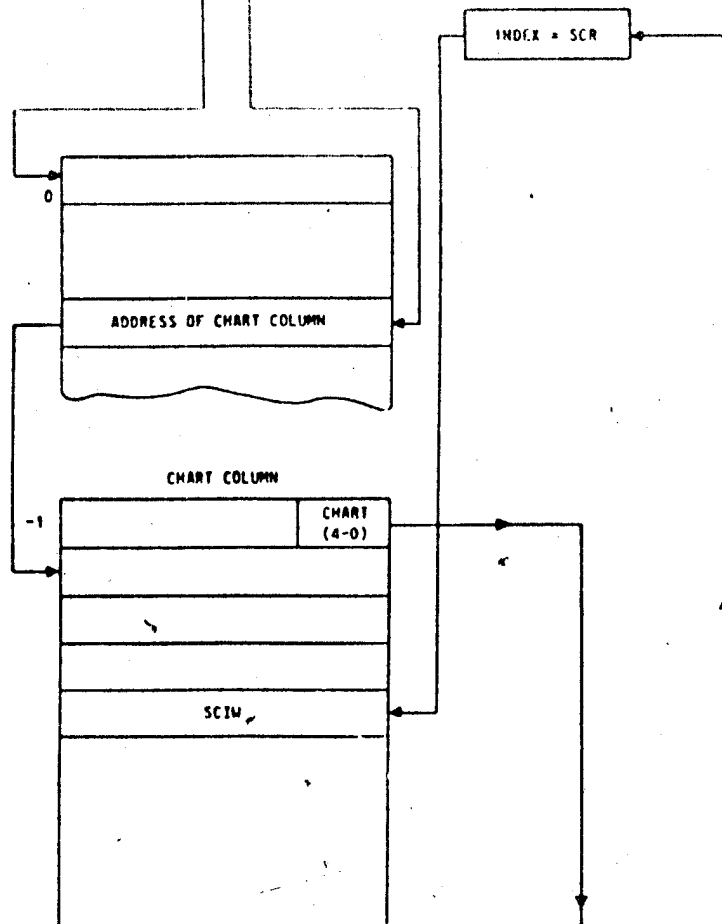


SELECTOR = Columns 19 and 20 on the 1300B or 1301 form.

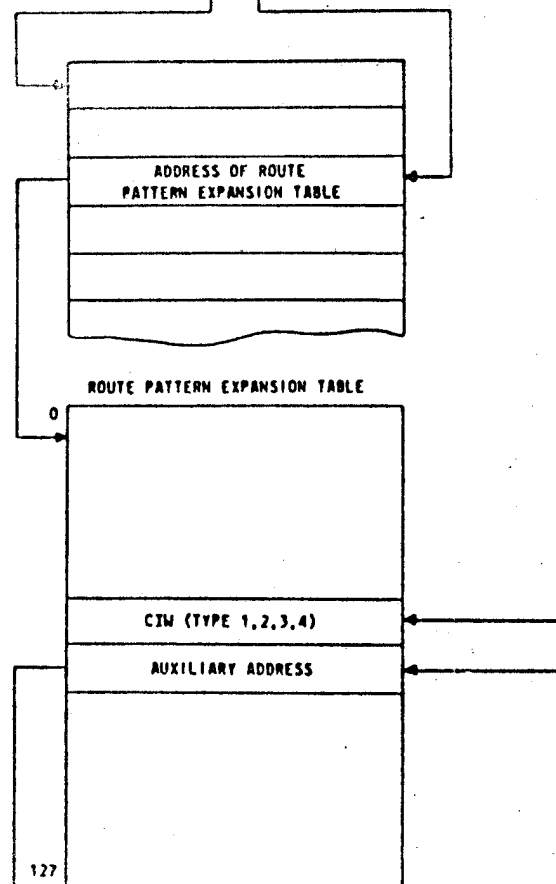
INDEX = 100 times column 21 plus 10 times column 22 plus column 23 on the corresponding 1300B or 1301 form plus 211 - and if any column is equal to zero add 10 to that column before multiplying and adding. (100 D1/D4 + 10 D2/D5 + D3/D6 + 211)

CHART COLUMN (CHRT)

TO ENTER



B. ROUTE PATTERN EXPANSION TABLE



AUXILIARY BLOCK

CIW (TYPE 5,6) -			
SCR3 (22-10)	SCR2 ¹ (17-11)	SCR1 (11-6)	(5-0)
SCR7	SCR6	SCR5	SCR4
SCR11	SCR10	SCR9	SCR8
SCR15	SCR14	SCR13	SCR12

C. TYPES OF CIW

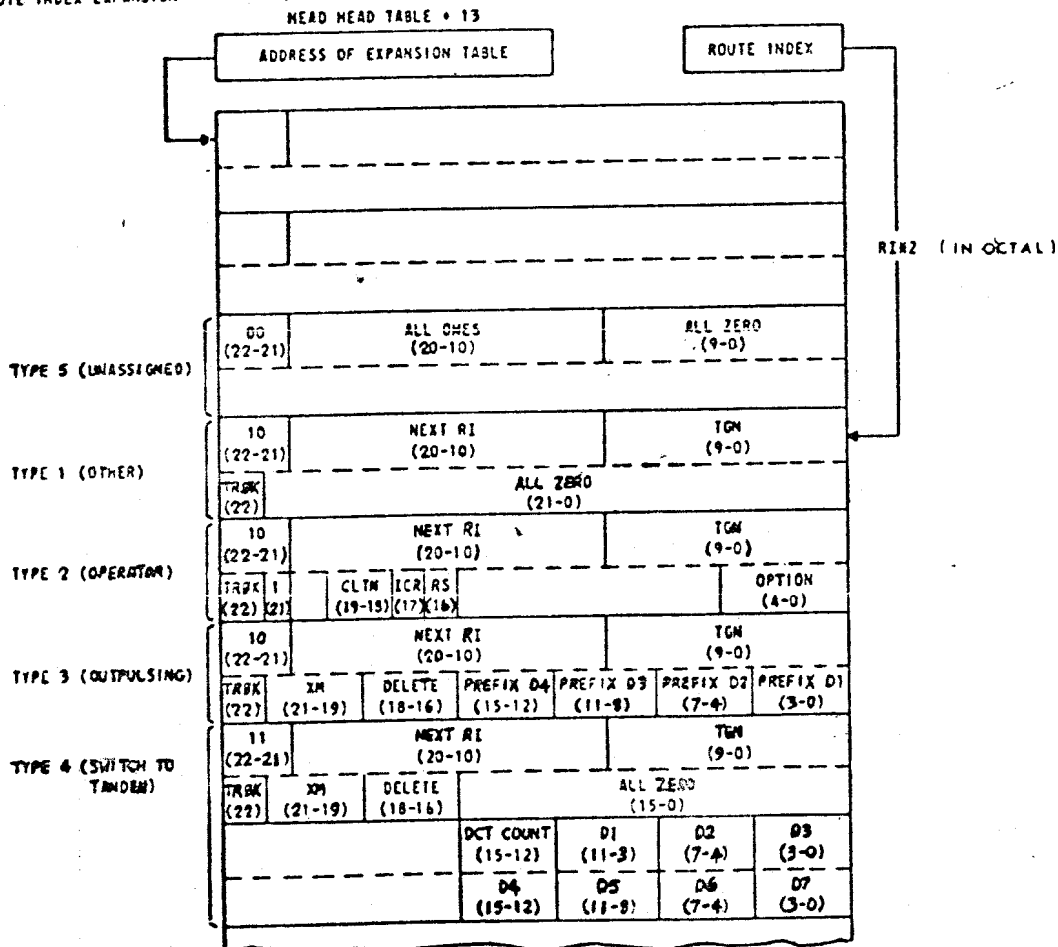
TYPE 1 (SPECIAL SERVICE)	1 (22)			CALL TYPE (4-0)
TYPE 2 (INV)	1 (22)	0 (16)	RI (15-5)	CALL TYPE
TYPE 3 (FAT)	1 (22)	NAC (16-12)		CALL TYPE
TYPE 4 (TEST)	1 (22)	NBC		CALL TYPE
TYPE 5 (INTRA)	NRDM (22-18)	NBC		CALL TYPE
TYPE 6 (INTER.COMP)	NRDM (22-18)	SLP (16)	RI (15-5)	CALL TYPE (4-0)

D. TYPES OF SCIW

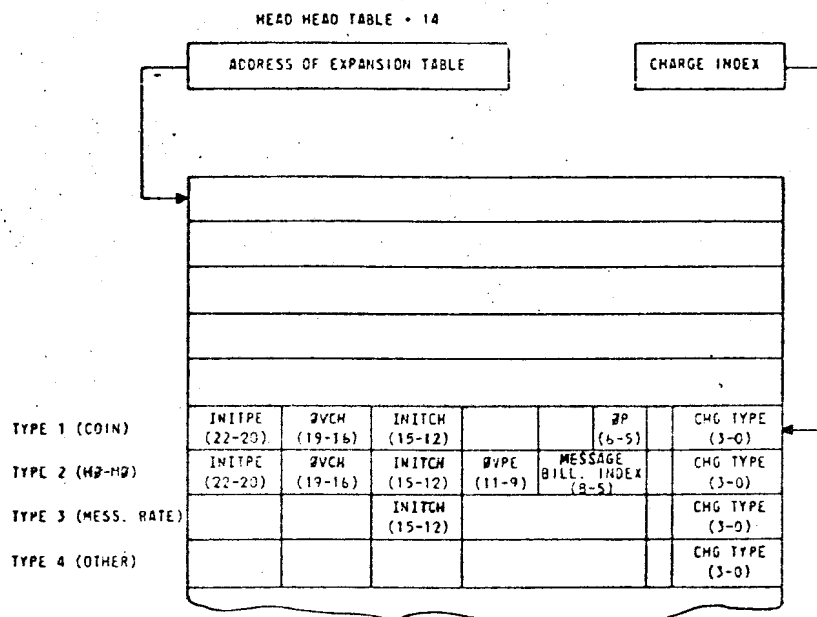
CONTROL-WORD	1 (22)		AMAL (11-7)	CHART (4-0)
TRI-TYPE STD (00)	TRI (22-21)	1 (20)	CHARGE INDEX (12-5)	A (4)
TRI-TYPE REV (01)	TRI (22-21)	1 (20)	CHARGE INDEX (12-5)	A (4)
TRI-FAT (10)	TRI (22-21)	1 (20)	NAC (16-12)	CALL TYPE FAT (4-0)
TRI-SPE (11)	TRI (22-21)		SPL RI (20-10)	CALL TYPE (9-5) CHG TYPE (3-0)

TRI - TREATMENT INDICATOR - 00 = STANDARD, 10 = FAT
01 = REVERSE, 11 = SPECIAL

E. ROUTE INDEX EXPANSION



F. CHARGE INDEX EXPANSION



G. CHARGE TYPES

NON-COIN {

- XXXX = FREE
- XX01 = DETAILED BILL
- XX11 = BULK BILLED, UNTIMED
- XX11 = BULK BILLED, TIMED

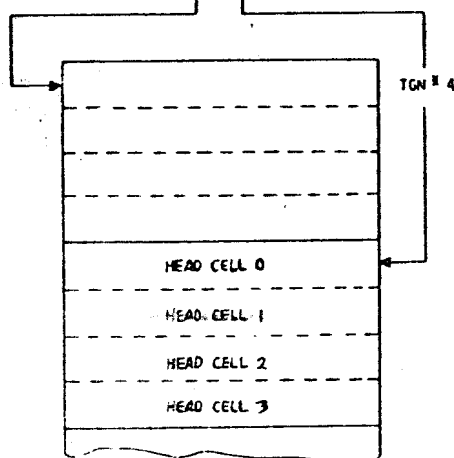
COIN {

- XX00 = FREE
- XX01 = LOCAL
- XX11 = COIN ZONE

CALL STORE HEAD TABLE * 0

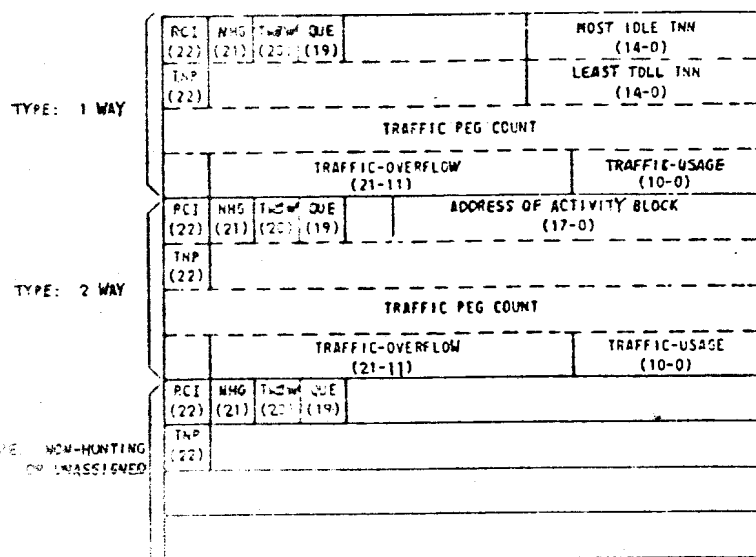
ADDRESS OF LINK LIST HEAD

INDEX = TON

[illegible]

0 = BUSY
1 = IDLE

D. HEAD CELL BLOCKS

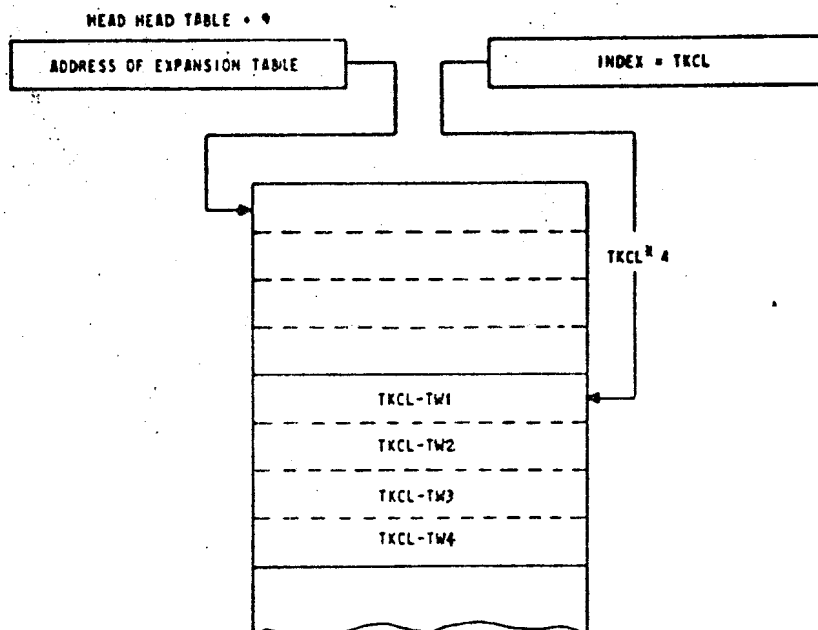


TYPE 2: OTHER

I1 (22)	M8 (21)	I2 (20)	NGT (19)		NEXT TMM OR END SYMBOL (14-0)
I1 (22)	M8 (21)	I2 (20)	NGT (19)		ALL ZERO (14-0)

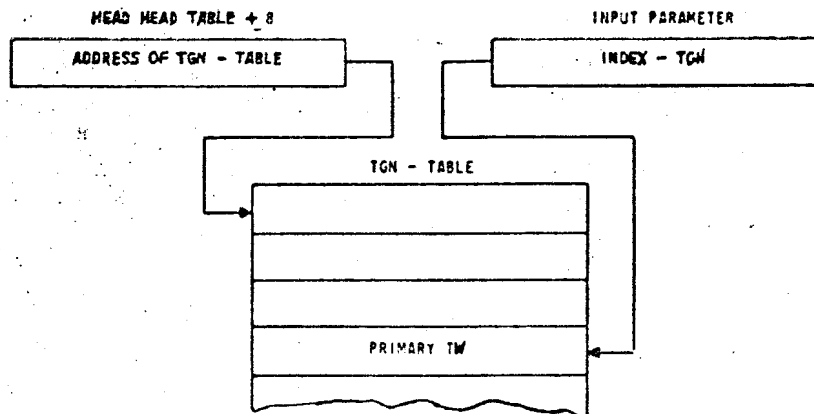
IDLE CODE = 24 IF GUARD TIMING
= 26 IF NO GUAPD TIMING
IF IDLE - I1, I2 = 11

G. TRUNK CLASS CODE (TKCL) EXPANSION



* FOR DETAILED LAYOUT OF TW1-TW4 SEE:
USER'S MANUAL FOR REQUESTING TRANSLATION
SUBROUTINES.

319. TRUNK GROUP NUMBER TRANSLATOR



A. TYPES OF PRIMARY TW

TYPE 1	TNP (22)	1 (21)	TABLE NO. (20-18)	TKCL (17-10)	NO. OF TRUNKS (9-0)
TYPE 2	000 (22-20)			AUXILIARY ADDRESS (19-0)	
TYPE 3	ALL ZERO (UNASSIGNED)				

B. AUXILIARY BLOCKS

PATTERN,
(2-WAY TRUNKS, TABLE NO. ≤6)

WRDN (22-18)			TKCL (17-10)	NO. OF TRUNKS (9-0)
TNP (22)	0 (21)	TABLE NO. (20-18)		TNN (14-0)
				TNN
				TNN
				TNN
				TNN

PATTERN
(1-WAY TRUNK, TABLE NO. >6)

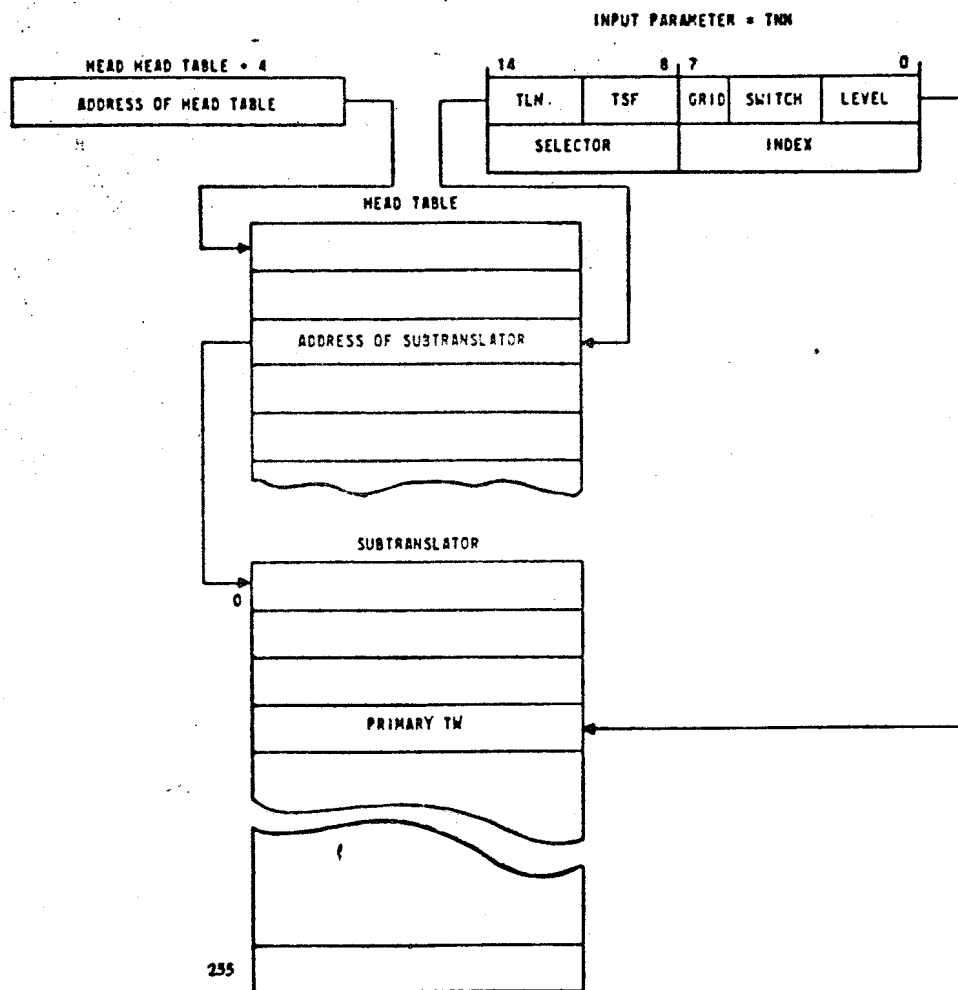
WRDN (22-18)			TKCL (17-10)	NO. OF TRUNKS (9-0)
TNP (22)	0 (21)	111 (20-18)		TABLE NO. (9-0)

PATTERN
(2-WAY TRUNKS, TABLE NO. >6)

WRDN (22-18)			TKCL (17-10)	NO. OF TRUNKS (9-0)
TNP (22)	0 (21)	111 (20-18)		TNN (14-0)
				TNN
				TNN
				TNN
				TNN
			TABLE NO (17-0)	

INFORMATION NOTES: (CONT)

318. TRUNK NETWORK NUMBER TO TRUNK GROUP NUMBER TRANSLATOR



A. TYPES OF PRIMARY TW

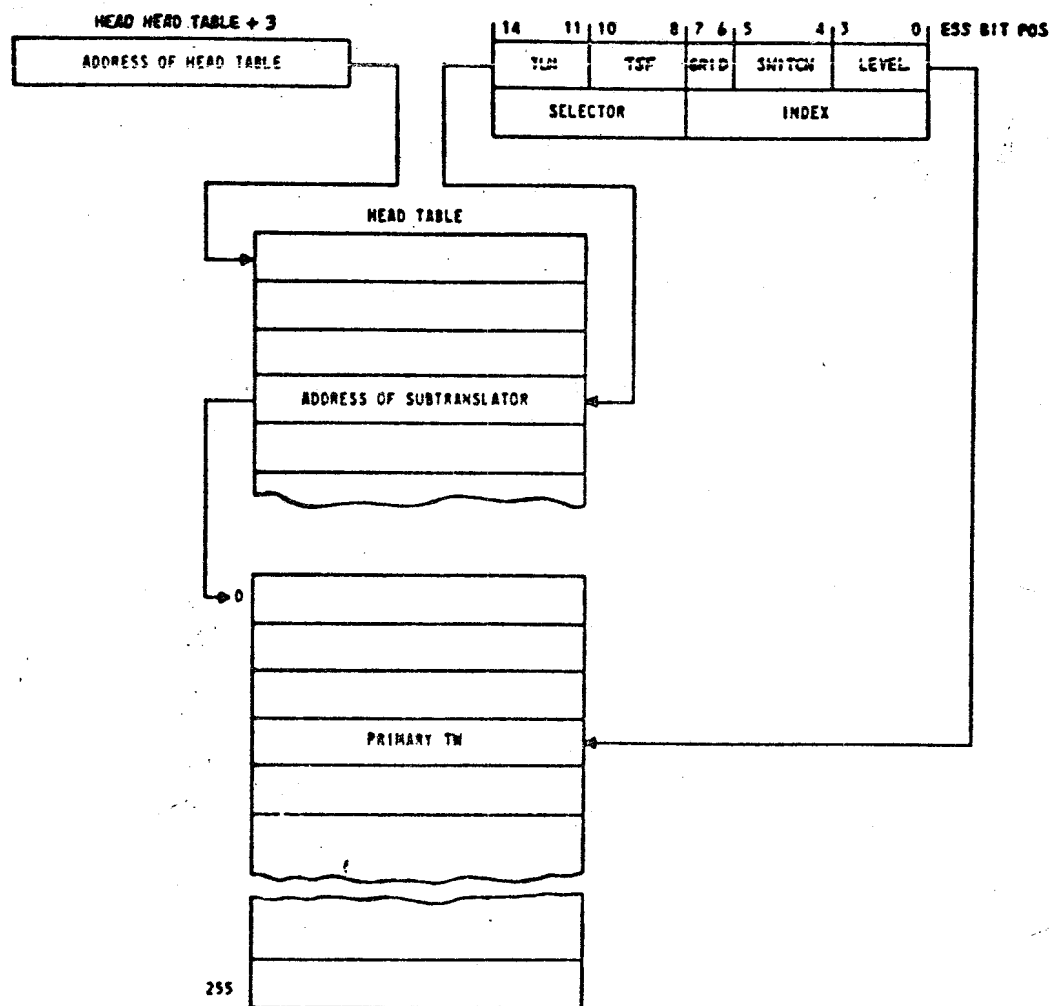
TYPE 1	ALL ZERO (UNASSIGNED)		
TYPE 2	1 (22)	TKCL (17-10)	TGN (9-0)
TYPE 3	000 (22-20)	AUXILIARY ADDRESS (19-0)	

AUXILIARY BLOCK
(FOR 2-WAY AND/OR RECORDED COMPLETING TRUNKS)

NRDN (22-18)	RECORDING COMPLETING NO. (17-9)	MEMBER NO. 1 (8-0)
	TKCL (17-10)	TGN (9-0)

■ 2-WAY TRUNK GROUPS CANNOT EXCEED 512 MEMBERS

317. TRUNK NETWORK NUMBER TO PERIPHERAL EQUIPMENT TRANSLATOR



A. TYPES OF PRIMARY TW'S

TYPE 1 (UNIV.)

TYPE 2 (MISC.)

TYPE 3 (UNASS.)

1 (22)	PTS (21)		MATE (16)	TSN (15-0)
000 (22-20)		AUXILIARY ADDRESS (19-0)		
ALL ZERO				

AUXILIARY BLOCK

WRDN (22-18)	QUANT (17-14)	CPDN (13-0)
QUANT (22-18)	MTDN (17-0)	
QUANT (22-18)	MSNS (17)	MSN-SUP OR MSN-DIR FOR T-T APPLIQUE (15-0)
QUANT (22-18)		MSN-DIR (16-0)
VARIABLE PART		

B. PATTERNS FOR VARIABLE PART

PORT - PORT INDICATOR - 0 = MAJOR PORT
1 = MINOR PORT

VPI - VARIABLE PART INDICATOR - 011 = CONFERENCE TRUNK
001 = 2 PORT TRUNK
000 = OTHER

FOR CONFERENCE TRUNKS (VPI = 3)

(22-20)		15	14	0 LESS BIT POS
VPI		PORT		OTHER TNN OF PAIR
		PORT		TNN ₀ OF OTHER PAIR
		PORT		TNN ₁ OF OTHER PAIR

FOR COIN ZONE AND
OVERTIME MONITORING TRUNKS (VPI = 1)

VPI (22-20)	PORT (15)	OTHER TNN (14-0)
QUANT (22-18)		COMMON MSN (15-0)
QUANT (22-18)		COMMON MTOW (17-0)
QUANT (22-18)		MTOW (1A) (17-0)

FOR STATION RINGER AND
ENVIRONMENTAL TEST TRUNKS (VPI = 1)

VPI (22-20)	PORT (15)	OTHER TNN (14-0)
QUANT (22-18)		COMMON MSN (15-0)
QUANT (22-18)		COMMON MTOW (17-0)

FOR LOCAL TEST DESK INCOMING (VPI = 1)

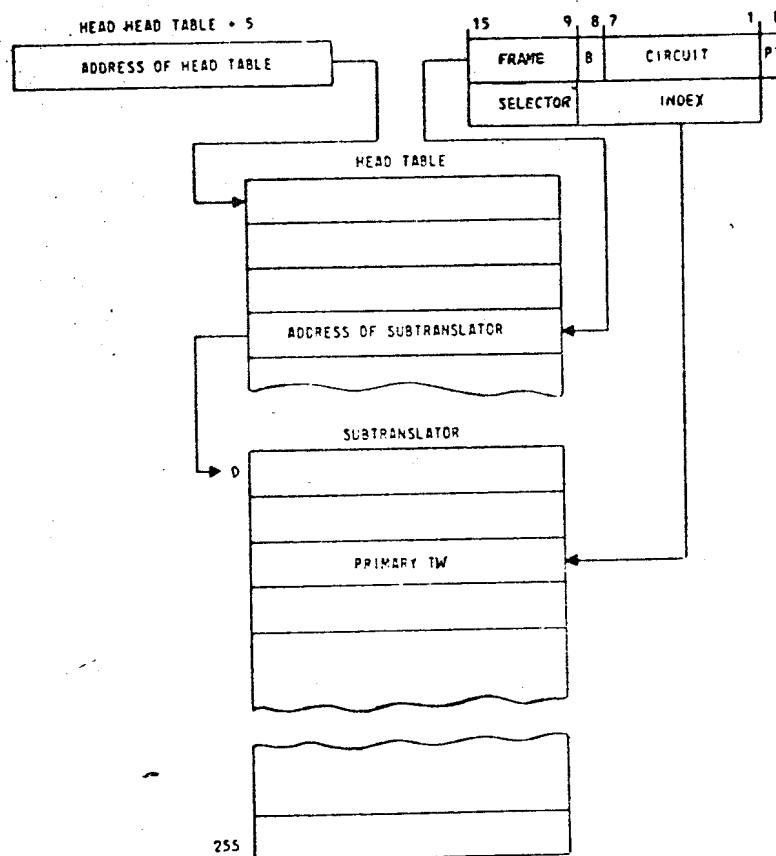
VPI (22-20)	PORT (15)	OTHER TNN (14-0)
ALL ZERO		
ALL ZERO		
QUANT (22-18)		MTOW (1A) (17-0)

FOR RECEIVERS, REVERTIVE
TRANSMITTERS, RINGING TRUNKS (VPI = 0)

ALL ZERO		
QUANT (22-18)		MSN (FAST) (16-0)

INFORMATION NOTES: (CONT)

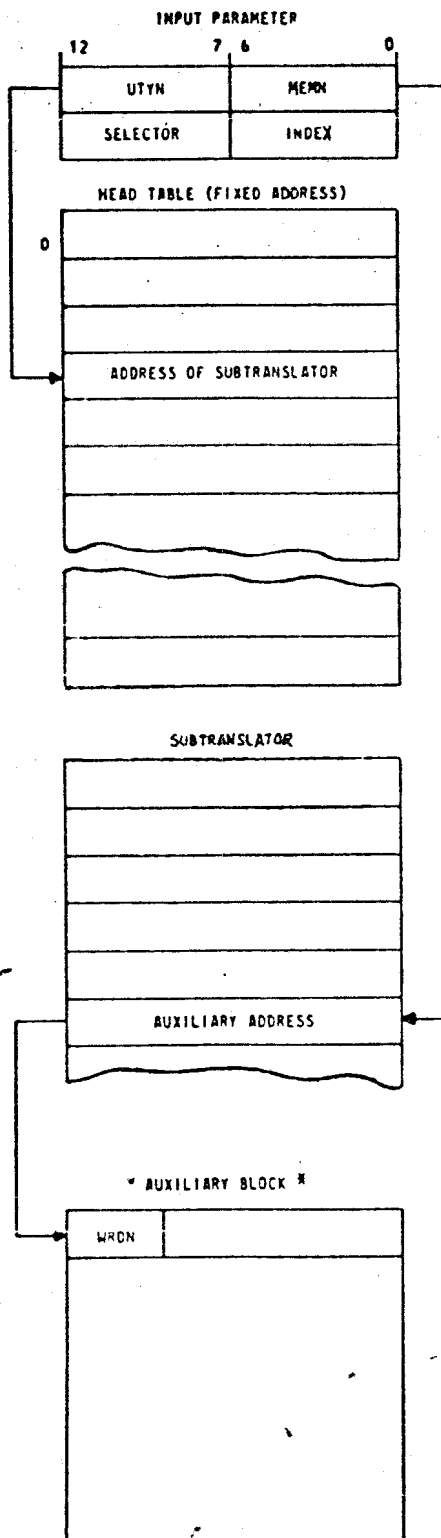
320. TRUNK CIRCUIT NUMBER-TRANSLATOR



A. TYPES OF PRIMARY TW

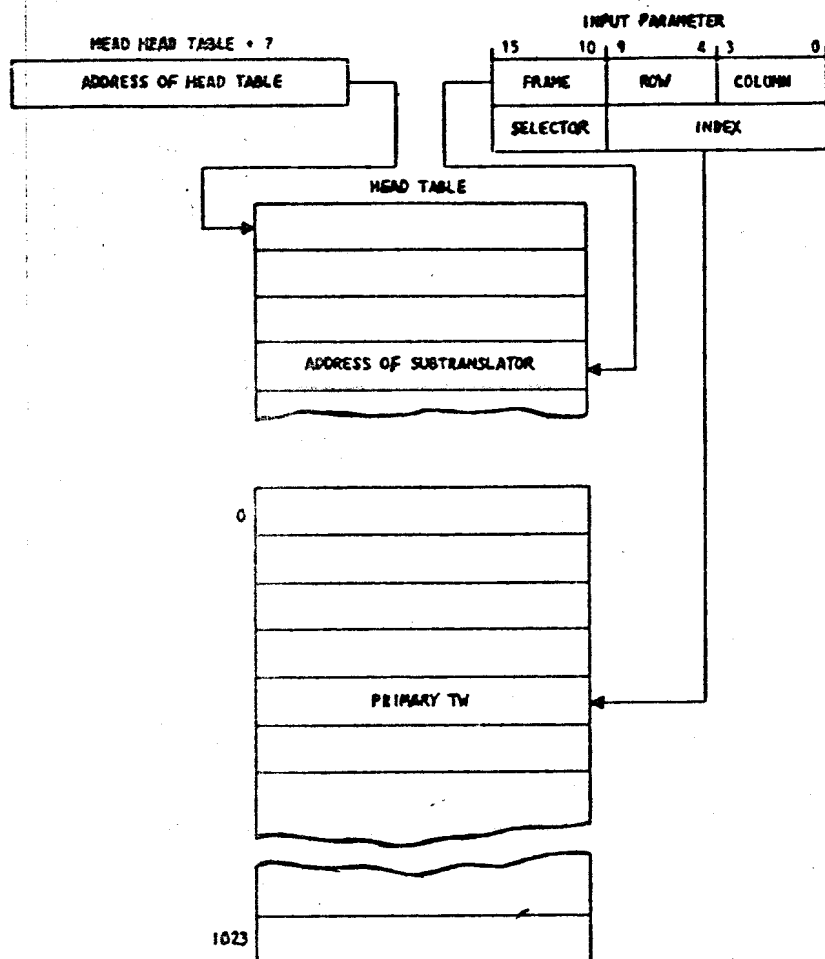
TYPE: UNASSIGNED	ALL ZERO = UNASSIGNED		
TYPE: ASSIGNED	TK (22)	SPI (21-15)	TNN (14-0)

322. UTYN-TRANSLATOR



* FOR DETAILED DESCRIPTION OF THE
AUXILIARY BLOCK SEE:
USER'S MANUAL FOR TRANSLATION
SUBROUTINES.

321. MASTER SCANNER NUMBER-TRANSLATOR



B. AUXILIARY BLOCK PATTERNS

PATTERN:
PBX-RANDOM MAKE BUSY KEY

WRDN (22-18)	000 (17-15)	RMBK (14-11)	PBXND (10-0)
01 (22-21)	NTPI (20-13)	UTYN (12-6)	ALL ZERO (5-0)

PATTERN:
PBX-STOP HUNT NUMBER (STOP)

WRDN (22-18)	STOPH (17-11)	PBAND (10-0)
01 (22-21)	NTPI (20-13)	UTYN (12-7)
		000 (6-4)
		STOPH- MID-5 (3-0)

A. TYPES OF PRIMARY TW

TYPE: UNASSIGNED

TYPE: TONE

TYPE: TONE-TWINK

ALL ZERO = UNASSIGNED				
TK (22)	TP1 (21-15)	TWN (14-0)		
TK (22)	1 (21)	NTPI (20-13)	UTYN (7-12)	MEMN (0-6)
000 (22-20)	AUXILIARY ADDRESS (19-0)			

GLOSSARY OF ABBREVIATIONS

A - Access Code Required	MSN - Master Scanner Number
ABB - Abbreviated Class Code	MIDN - Miscellaneous Trunk Distributor Number
ABD - Abbreviated Dialing	NAC - Normalized Area Code
AMAC - AMA-Type	NOC - Normalized Office Code
CHART - Box Number for Screening Code	NØGR - Number Group Number
CHRT - Chart Class Column	NTPI - Non-trunk Program Index
CIW - Call Identification Word	PBX - Multiline Hunt Group
CR - Cancel Rotation	PBXNØ - PBX Number
D1 - Digit Number 1	PI - Program Index
DN - Directory Number	PLG - Precedence Line Group
DPC - Destination Peg Count Register	PRP - Polygrid Route Pattern
GS - Ground Start	PS - Program Store
IND - Individual Line	PTW - Primary Translation Word
IP - Immediate Pre-emption	QUAN - Quantity
JSF - Junctor Switch Frame	RCD - Route Control Digit
JSG - Junctor Sub Group	RI - Route Index
JSN - Junctor Scanner Number	SCIW - Supplementary Call Identification Word
LERCL - Line Eqpt. Number Class	SCR - Screening Code
LSSB - Least Significant Bit	SG - Special Grade
LGN - Line Group Number	SH - Dual-Homed MLHG
MAJ - Major Class	SPI - Special Program Index
MEMN - Member Number	STHT - Start Hunt Number
MLHG - Multiline Hunt Group	TAG - P.S. Address of PTW
MSSB - Most Significant Bit	TCC - Trunk Class Code

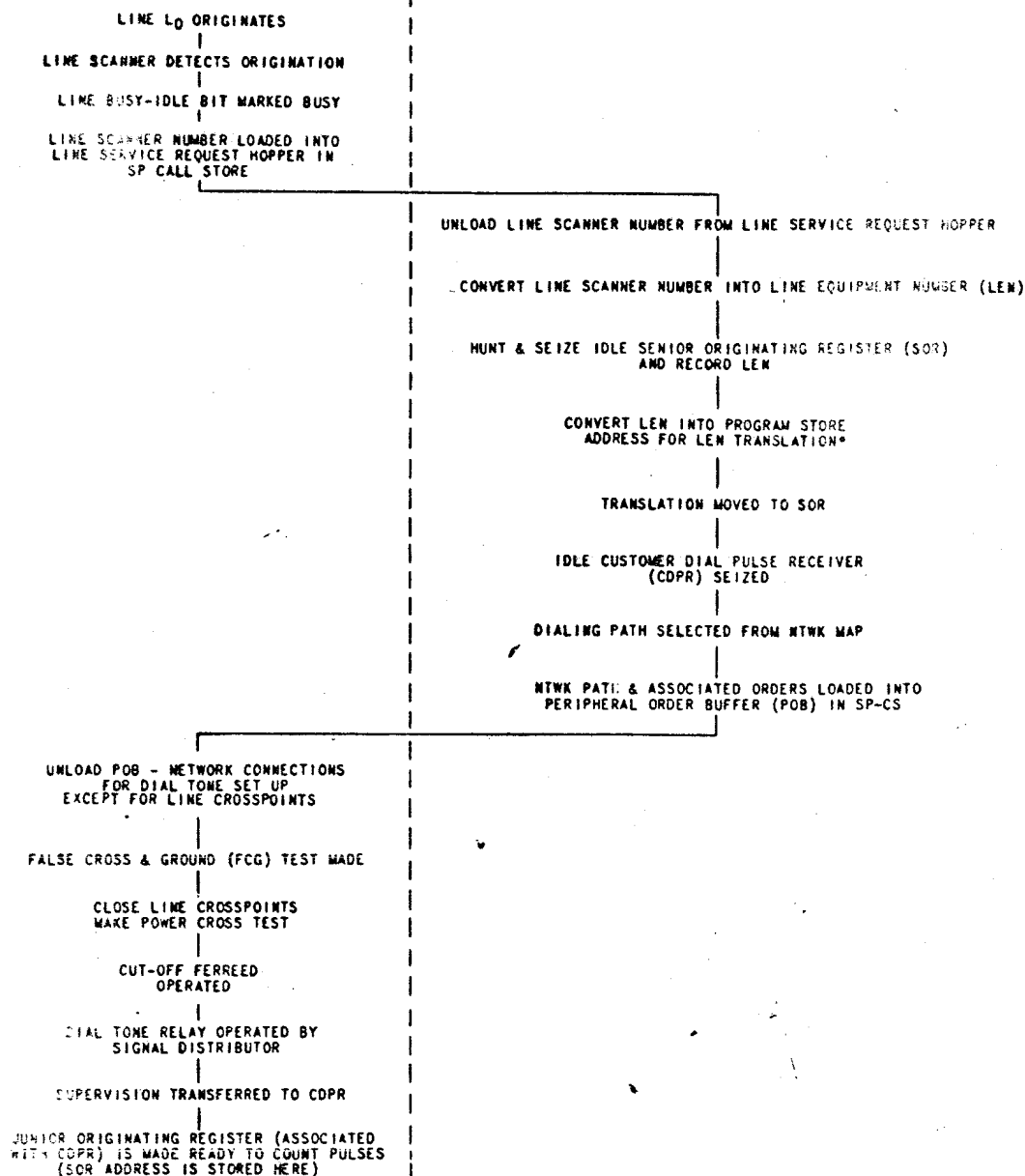
TGN - Trunk Group Number
TKCL - Trunk Class Code
TLN - Trunk Link Network
TNN - Trunk Network Number
TNP - Toll Network Protection
TPI - Trunk Program Index
TSF - Trunk Switch Frame
TSN - Universal Trunk Scanner Number
TW - Translation Word
UTYN - Unit Type
VG - Voice Grade
VS - Voice to Special Overflow
WRDN - Word Number

DIAL TONE CONNECTION*

SEE NOTE 1

SP

CC



*LINE EQUIPMENT NUMBER TRANSLATION CONTAINS:

LINE CLASS
DIRECTORY NUMBER
TYPE OF CDPR
SPECIAL ORIGINATING FEATURES

NOTES:

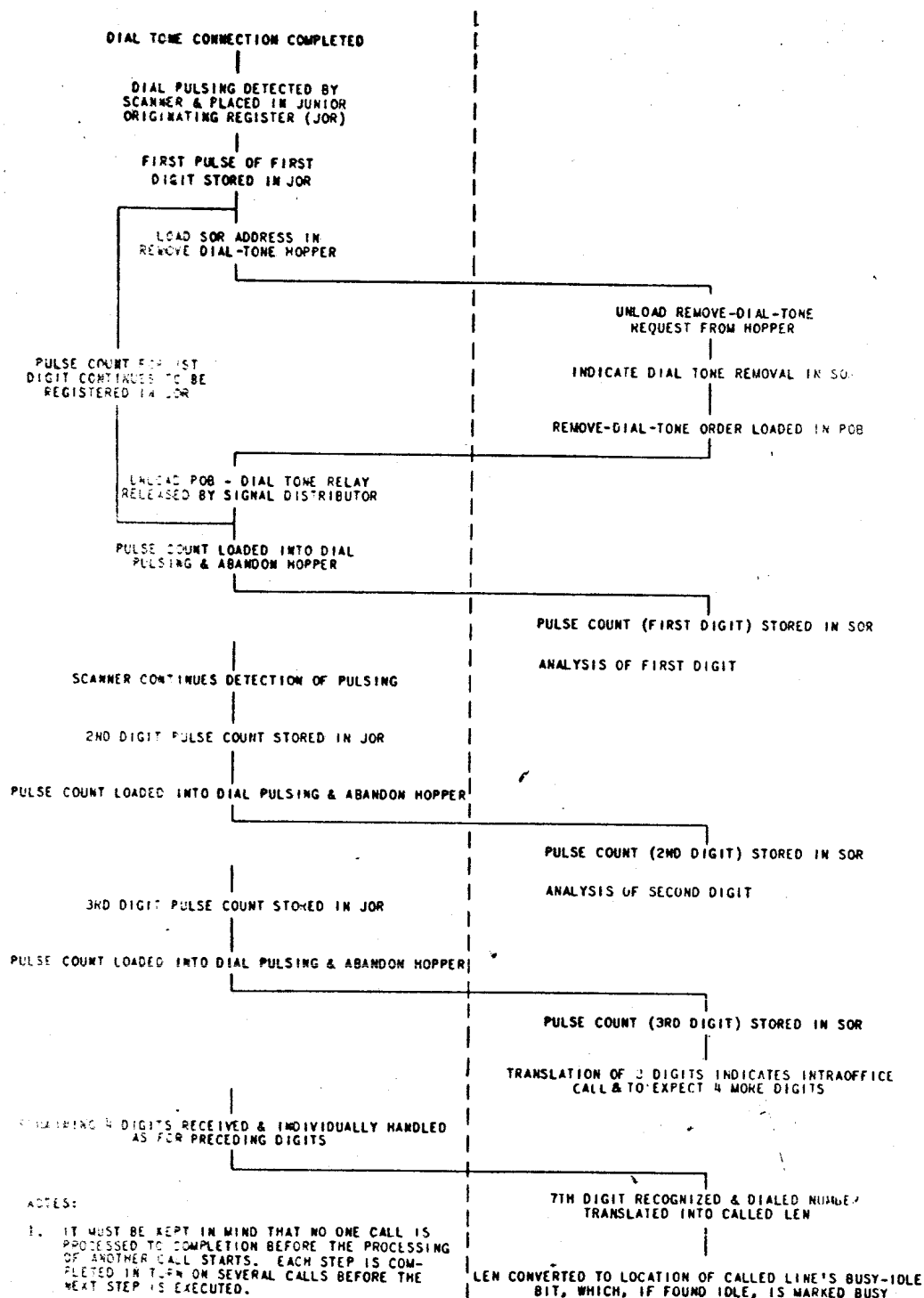
1. IT MUST BE KEPT IN MIND THAT NO ONE CALL IS PROCESSED TO COMPLETION BEFORE THE PROCESSING OF ANOTHER CALL STARTS. EACH STEP IS COMPLETED IN TURN ON SEVERAL CALLS BEFORE THE NEXT STEP IS EXECUTED.

INTRAOFFICE CALL

SEE NOTE 1

SP

CC



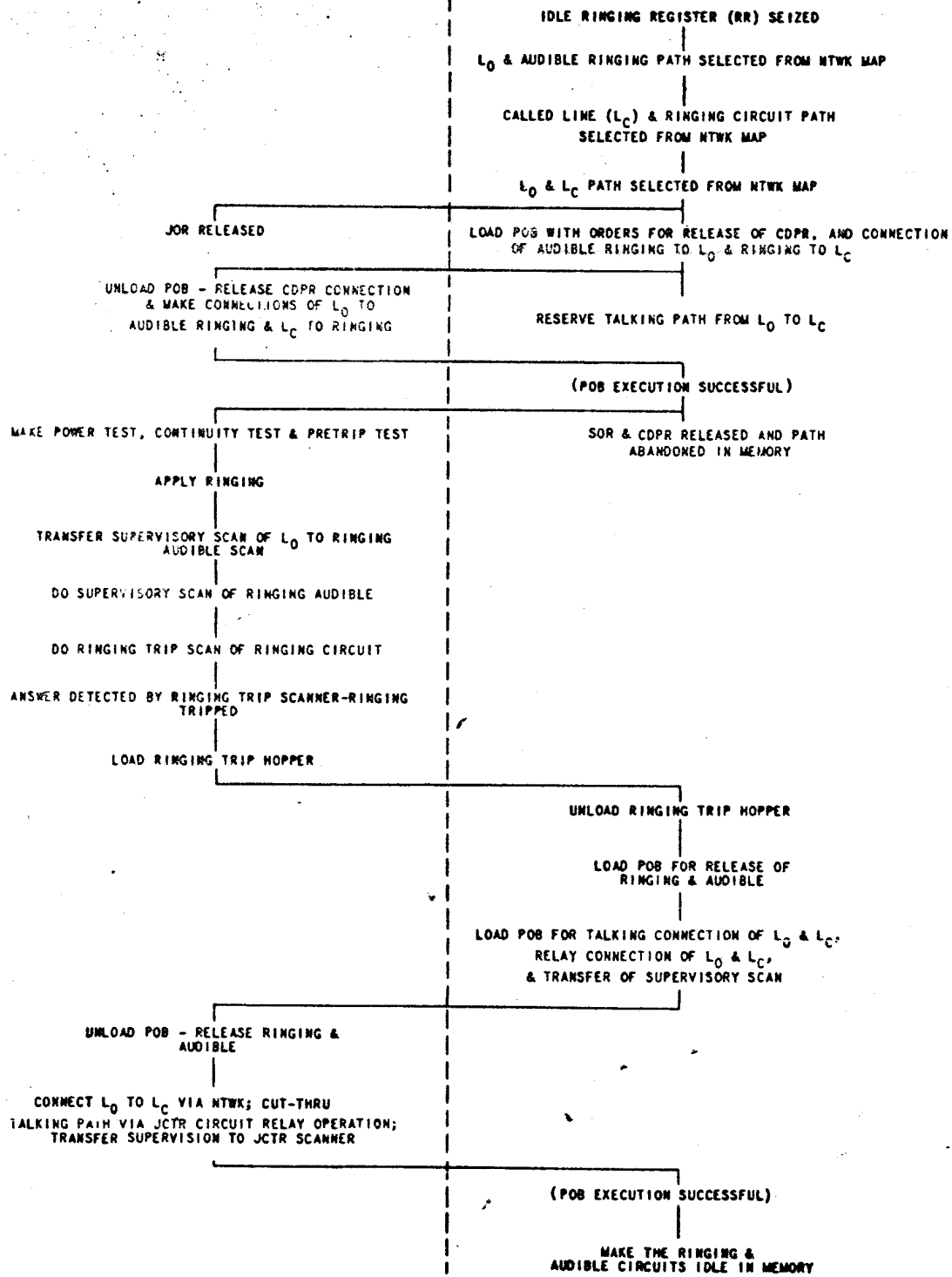
CONTINUED

INTRAOFFICE CALL

SP

(CONTINUED)

CC



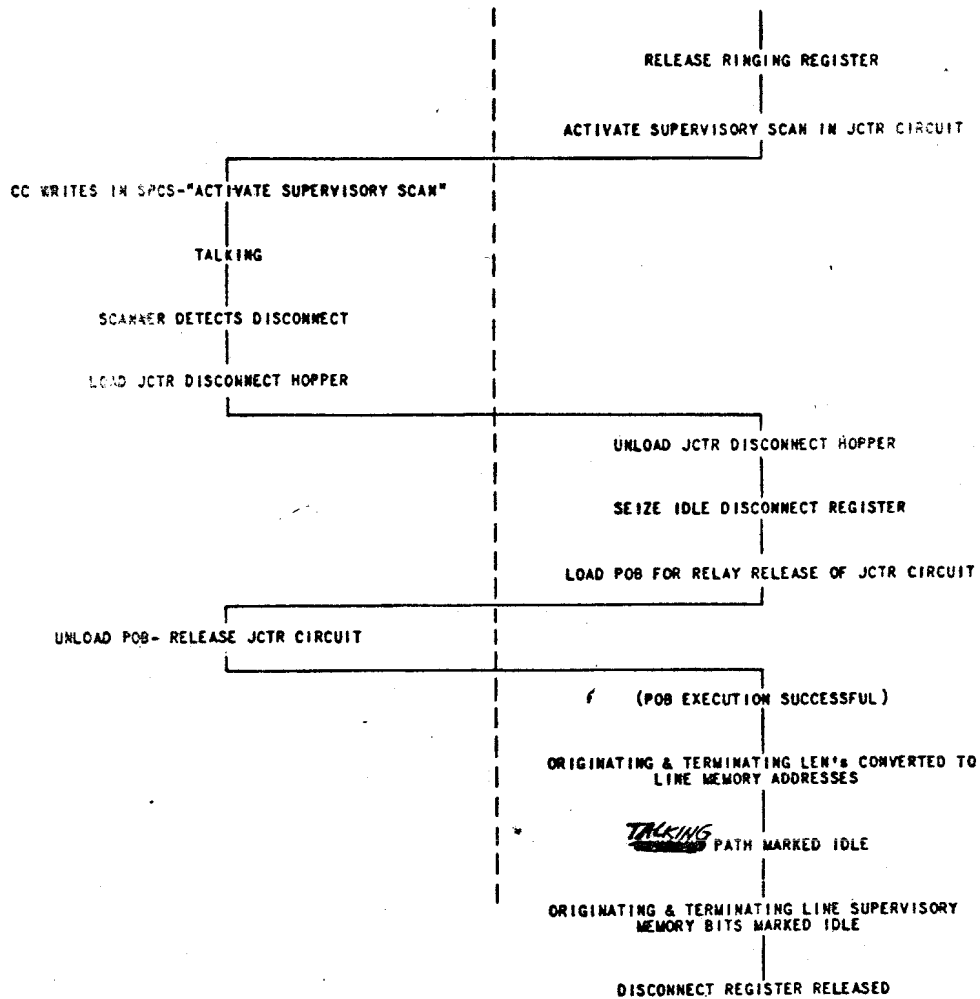
(CONTINUED)

INTRAOFFICE CALL

SP

(CONTINUED)

CC



LIST OF SP PROGRAM INSTRUCTIONS ARRANGED BY MACHINE ORDER

<u>MACH ORDER</u>	<u>PROG INSTR</u>	<u>231-100-102 FIG.</u>	
<u>MOVE</u>			
L	MVRR	4	Move reg. to reg.
	MVRKI	5	Move reg. through mask Q to K
	LOG	40	Move logic function (of reg. and L) to reg.
	LOGKI	41	Move logic function (of reg. and L through mask Q) to K
RAR	MVMR	7	Move contents of indexed memory location to reg.
	TR	21	Transfer to indexed memory location
MR	MVMR	6	Move contents of memory to reg.
LMR	MVMRP	8	Move contents of memory +1 or +2 of reg.
RAW	MVRM	10	Move contents of reg. to indexed memory location
RM	MVRM	9	Move contents of reg. to memory
RLM	MVRMP	11	Move contents of reg. to memory +1 or +2
CR	MVDR	12	Move 16 bits of data to reg.
BTC	MVFF	15	Move F/F (1-3) to F/F (1-5)
	MVFK	16	Move F/F (1-3) to K-bit (00-22)
	MVDF	19	Set or reset F/F (1-5)
	MVDKF	20	Set or reset K-bit (00-22)

LIST OF SP PROGRAM INSTRUCTIONS ARRANGED BY MACHINE ORDER (Cont.)

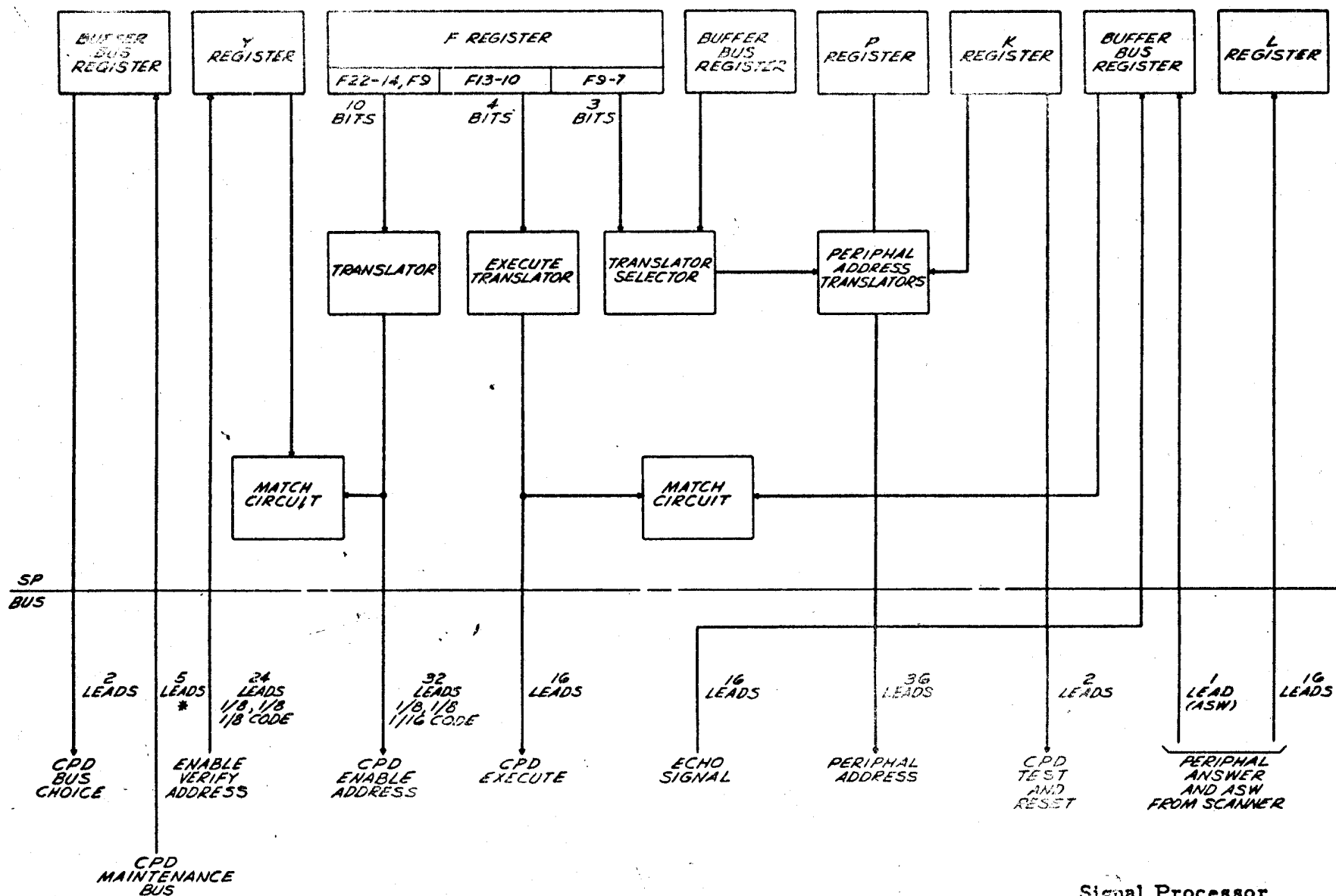
<u>MACH ORDER</u>	<u>PROG INSTR</u>	<u>FIG.</u>	
<u>MOVE</u>			
BTS	MVRF	17	Move reg. bit (00-22) to F/F (1-3)
	MVPRF	18	Move reg. bit (00-15 preset in P reg.) to F/F (1-3)
	RTSF	64	Reset F/F (1-3) if 16 bits of reg. are zero
	RTFT	65	Reset F/F (1-3) if 23 bits of reg. are zero
XWR	EODR	42	Move (16 bits of 0 reg.) into reg.
<u>TRANSFER</u>			
TSF	TM	22	Transfer to add. in var. field
	TSF	23	Transfer to add. in var. field and set F/F (1-3)
TCT	TA	24	Transfer to add. in var. field and increment counter
	IFCU	29	If count does not equal data transfer to add. in var. field
	CAT	62	If count does not equal 15 address CPD and transfer
TF	IFF	27	If F/F equals data transfer to add. in var. field
TT	IFLEC	28	If limit equals count transfer to add. in var. field
ST	IFFF	30	If F/F 5 is reset transfer to add. in var. field
PT	IFPT	31	If no timing bits time out transfer to add. in var. field

LIST OF SP PROGRAM INSTRUCTIONS ARRANGED BY MACHINE ORDER (Cont.)

<u>MACH ORDER</u>	<u>PROG INSTR</u>	<u>FIG.</u>	
<u>ARITHMETIC</u>			
INC	ADDKF	32	Add 0 to 15 to K reg. bits 0-4
	ADDKS	33	Add 0 to 15 to K reg. bits 0-15
	SUBKF	35	Subtract 0 to 15 from K reg. bits 0-4
	SUBKS	36	Subtract 0 to 15 from K reg. bits 0-15
	MVZKF	13	Zero bits 0-4 of K
	MVZKS	14	Zero bits 0-15 of K
INR	ADDR	34	Add 0, 1 or 2 to 15 bits of reg.
	SUBR	37	Subtract 0, 1 or 2 from 15 bits of reg.
Q	ROTRS	38	Rotate 16 bits of Q, 0 to 8 places right
	ROTRT	39	Rotate 23 bits of Q, 0 to 8 places right
<u>PERIPHERAL</u>			
DS	SCAN	43	Contents of memory location to scanner
RAP	SCAN	44	Contents of indexed memory location to scanner
	CPDM	47	Contents of indexed memory location to CPD
	CPDI	48	Contents of indexed memory location to CPD with bit 14
PO	CPDM	46	Contents of memory location to CPD
	CPDP	45	Contents of F reg. (preset) to CPD
	PU	49	Contents of memory location to PU
	PUS	50	Contents of memory location to PU, expect answer

LIST OF SP PROGRAM INSTRUCTIONS ARRANGED BY MACHINE ORDER (Cont.)

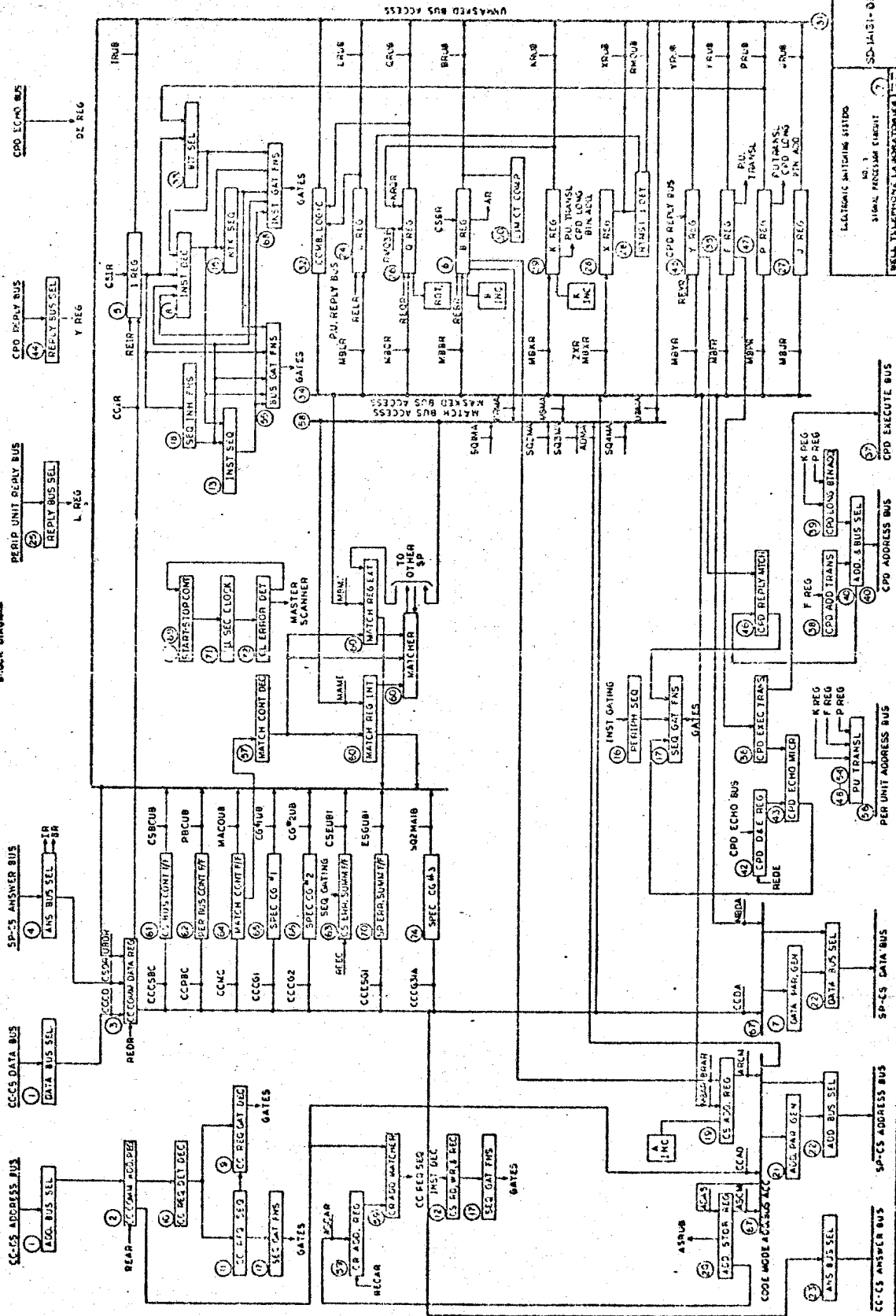
<u>MACH ORDER</u>	<u>PROG INSTR</u>	<u>FIG.</u>	
<u>PERIPHERAL</u>			
MM	SLT	51	Address scanner, store answer in L and transfer
	IFSM	61	Scan for dial pulses
ISD	IDS	52	Iterative directed scanning for timing hits, flashes and disconnects
IS1	ISA	54	Iterative supervisory scanning for lines and junctors
IS2	ISB	56	Iterative supervisory scanning for trunks
NTK	NTK	58	Unload POBS for network and SD orders
<u>MISCELLANEOUS</u>			
NOP	NOOP	63	No operation, wastes a cycle
HP	HOP	66	Store 1, 2 or 3 registers in a hopper
LLR	RLINK	70	Insert an idle memory block into a linked list
LLS	SLINK	69	Remove an idle memory block from a linked list
DGG	DGEN	73	Generate an address using a base add. and RMO detector
	TG	25	Generate an address and transfer to it
LMH	HUNT	74	Search a list of memory words for a specified word
INT	KINT	76	Perform a K level interrupt
CA	MISC	77	Perform a specified operation



* - 3 PARITY CHECKS
 - 1 MAINTENANCE
 - 1 ASW SIGNAL

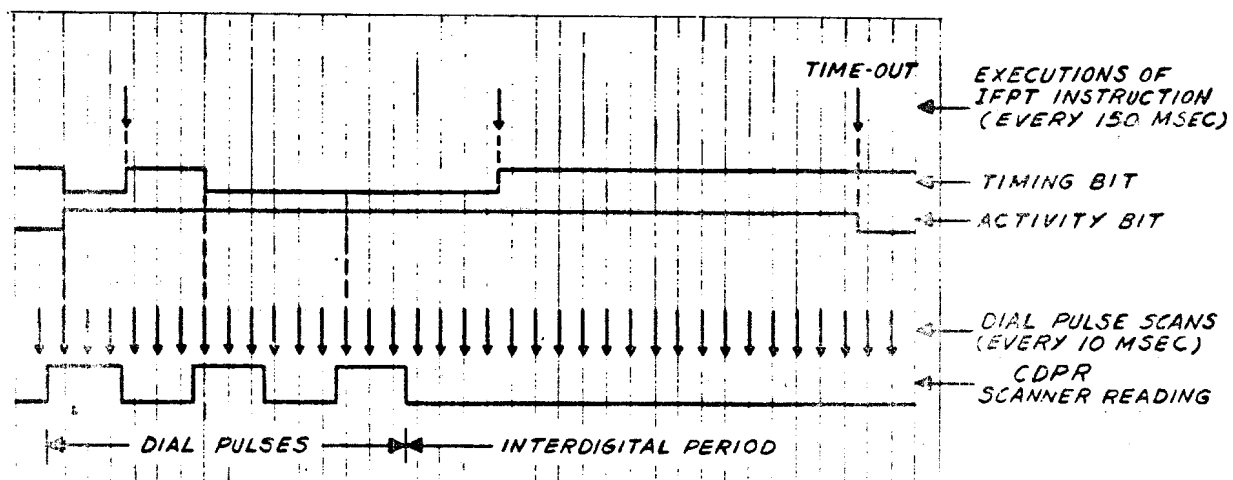
Signal Processor
 Communication With the
 Peripheral Units

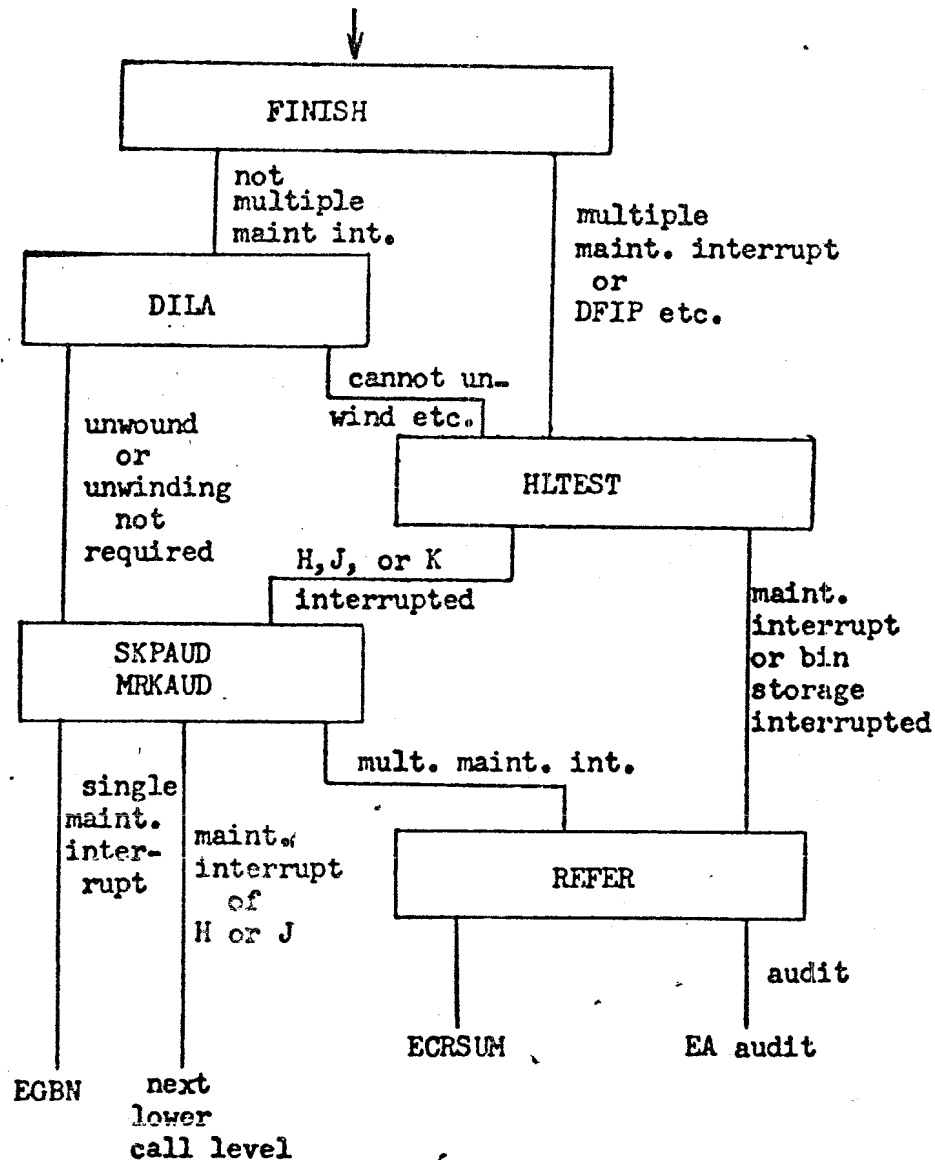
BD 1 BIO-MIN. PROCESSOR BLOCK DIAGRAM



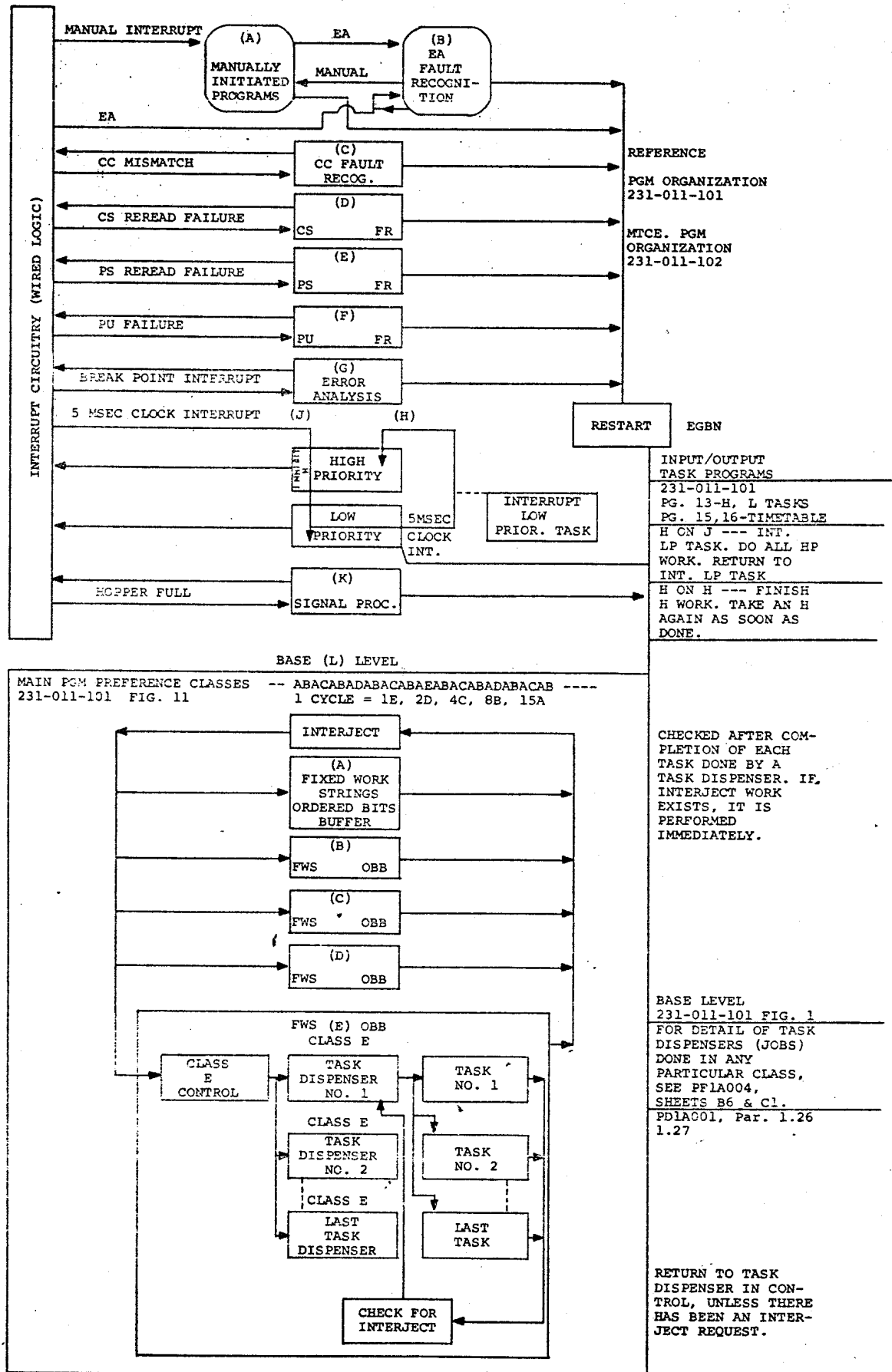
Issue 2: December 1, 1970

SD-1A131-01-H





PROGRAM ORGANIZATION



DECODING OF WORD 0 OF THE "SA02 CALL REG" MESSAGE (the State Word).

22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
D						N	T						P M F I			T						QI
P	R I					S	Ø	L									P T					
M						S	A	I														

- PT = PROGRAM TAG - Defines state register is in. If QI-1 register is on a queue (e.g., PØB queue) or a timing list (e.g., 100 msec timing), notes in appropriate PF should indicate the state associated with the PT value.
- TØ = TIMEOUT BIT - If a 1, indicates that register has been active for at least 5 minutes without being idled. If the register is a timeout type, this is the most likely reason that it was idled by the audit.
- PMFI = PATH MEMORY FORMAT INDEX - Defines the type of network connection associated with the register.
 Typical Values:
 0 - No Connection
 7 - Line to Trunk
 11 - Line to Line
- LI = LINKED INDEX - If a 1, indicates that several registers were associated with a call. Word 2 of the register (the link word) will have the starting address of the next register associated with a call. The linking is circular with the register having primary responsibility for the call (the master register) having bit 22 of word 2 - 1.
- TØA = TIMEOUT ACTIVITY BIT - If a 1, indicates that register may be in a transient state but that register is not lost. For more detailed explanation, see PD 1A012.
- NSS = NON-STEADY STATE BIT - If a 1, indicates that register is in a transient state which usually doesn't last more than 1 minute. For more detailed explanation, see PD 1A012.
- RI = REGISTER IDENTIFIER - Defines type of register. Note: the same physical block of call store space may be used as several types of register: e.g., the incoming, originating, and outpulsing registers all use the same engineered call store register space. The register identifiers are listed on next page.
- DPM = DISPLACED PATH MEMORY BIT - If a 1, indicates that the path memory information, normally stored starting at word 4 of the register, is stored in a path memory annex register located at the address stored in word 4 of the register

REGISTER IDENTIFIER TABLE

DECIMAL VALUE	OCTAL* VALUE	REGISTER TYPE	PD/PF #
0	000	Special-see note.	---
1	004	AMA	141
2	010	Hotel-Motel	162
3	014	Disconnect	134
4	020	Incoming	130, 132
5	024	Outpulsing	135
6	030	Operator	146, 147, 148
7	034	Originating	130, 131
8	040	Permanent-Signal	143
9	044	Regular Ringing	133
10	050	Special Ringing	133
11	054	Coin	140
12	060	Temporary Transfer	160
13	064	Conference	161
14	070	Intercept-Announcement	144
15	074	Trunk-Flashing	130
16	100	Local Test Desk	042
17	104	TLTP/STTP	040
18	110	Trunk Maintenance	045
19	114	DDD Service Observing	
20	120	S x S Incoming	
21	124	MCC - Permanent Signal	143
22	130	ALIT	041
23	134	Snap	073
24	140	Reverting Call	142
25	144	Incoming Trunk Test	045

NOTE: An RI-0 and a PT-7 identifies a register which an audit found to be in an invalid state and thus marked in trouble. In this case the register type is destroyed, and it is necessary to determine the type of register by its location in call store.

* OCTAL VALUE - Positioned as in register. (bits 21 - 17)

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ESS 1100, 7-68

TEL. CO.

BASE _____ CONT. GR. _____

FORM CODE : 14

DIRECTORY NUMBER RECORD CONVERSION

NO. 1 ESS

ESS UNIT SUCCASUNNA

OFFICE CODE 5 8 4
HUNDRED 4 3

DIRECTORY NUMBER	LINE EQUIPMENT NUMBER						RING COMB.	CLASS INFORMATION																SUPPL. INFO.	OLD DIRECTORY NO.	OLD CABLE PAIR	NEW CABLE																																																																																																																																																																																																																																																																																																																								
	NET	FRAME	BAY	CONC.	SWITCH	LEVEL		LINE CLASS CODE								EQPT.				FEAT.							PAGE	ITEM	CABLE	PAIR																																																																																																																																																																																																																																																																																																																					
								MULT.	CODE	P B X	I F B	I F R	I F R	I F R	I F R	I F R	I F R	OTHER	1	2	3	4	5								6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314

BASE _____ CONT. GR. _____
FORM CODE: 14

[illegible]

FORM CODE :

DIRECTORY NUMBER RECORD CONVERSION

12-3

NO. 1 ESS

OFFICE CODE
HUNDRED

ESS UNIT

[illegible]

OFFICE CODE 584
HUNDRED 53

ESS UNIT NO. 1 ESS
Succasunna

[illegible]

ESS 1102
(6-66)

LINE EQUIPMENT RECORD
4:1 TYPE CONCENTRATOR
NO. 1 ESS UNIT Succasunna-584

LINE LINK NET 00 12-5
L.S.F., BAY
& CONC. 002

L.S.F., BAY & CONC.

MDF. VERT. 02

SWITCH	LEVEL	DIRECTORY NUMBER		LINE CLASS CODE						SWITCH	LEVEL	DIRECTORY NUMBER		LINE CLASS CODE					
		PARTY 1	PARTY 2	PBX	I	F	F	I	P			PARTY 1	PARTY 2	PBX	I	F	F	I	P
0	00									1	00								
	01	6630			✓						01	7797			✓				
	02	9216				✓					02	5484				✓			
	03	4768				✓					03	5588				✓			
	04	6884				✓					04								
	05	8202				✓					05	4588				✓			
	06	7998	(4738)			✓					06	7718				✓			
	07	6436				✓					07	6265				✓			
	08	7125				✓					08	9813						✓	
	09	7098				✓					09	9193				✓			
	10										10	7951				✓			
	11										11	4221				✓			
	12	4692				✓					12	7481				✓			
	13	4586				✓					13	5716				✓			
	14	5159				✓					14								
	15										15	5282	8896				✓		

SW	LV	DIRECTORY NUMBER								SW	LV	DIRECTORY NUMBER							
		PARTY 1	PARTY 2									PARTY 1	PARTY 2						
2	00	8038	(6400)	✓						3	00								
	01	6666		✓							01								
	02	8017			✓						02	8971			✓				
	03	8544			✓						03	8233			✓				
	04										04	8811			✓				
	05	6171			✓						05	8550			✓				
	06	7357			✓						06	4117	(8390)		✓				
	07	7352			✓						07	6291			✓				
	08										08	9894						ISP	
	09	7709			✓						09	4557			✓				
	10	8129			✓						10	7418			✓				
	11	7955			✓						11	7865			✓				
	12	524			✓						12	8616			✓				
	13	7749			✓						13	8942			✓				
	14	4778			✓						14	7055			✓				
	15										15	6456	4564		✓				

ESS 1102
(6-66)

12-6

LINE EQUIPMENT RECORD
4:1 TYPE CONCENTRATOR
NO. 1 ESS UNIT Succasunna-584

LINE LINK NET 00
L.S.F., BAY
& CONC. 320

L.S.F., BAY & CONC.

MDF. VERT. 02

SWITCH	LEVEL	DIRECTORY NUMBER		LINE CLASS CODE						SWITCH	LEVEL	DIRECTORY NUMBER		LINE CLASS CODE					
		PARTY 1	PARTY 2	P B X	I F B	I F R			OTHER			PARTY 1	PARTY 2	P B X	I F B	I F R			OTHER
0	00									1	00								
	01	6162				✓					01								
	02										02	1140				✓			
	03										03								
	04										04								
	05										05								
	06										06								
	07										07								
	08										08								
	09										09	6118				✓			
	10										10								
	11	4394				✓					11	4845				✓			
	12										12								
	13										13	4045				✓			
	14										14								
	15										15	2112				✓			

SW	LV	DIRECTORY NUMBER								SW	LV	DIRECTORY NUMBER							
		PARTY 1	PARTY 2									PARTY 1	PARTY 2						
2	00									3	00								
	01										01								
	02										02								
	03	1774				✓					03								
	04										04								
	05										05								
	06	2112				✓					06								
	07										07								
	08										08	6169				✓			
	09										09								
	10										10								
	11	6211				✓					11	2117				✓			
	12	4111				✓					12								
	13										13								
	14	1787				✓					14								
	15										15								

ESS 1105, 9-67

MULTI-LINE HUNTING GROUP RECORD No. 1 ESS

TEL CO 5 4 5W.E. ORDER NO: 6 7 8 9 10 11 12FORM CODE: 1 5
14 15

ESS UNIT _____

PAGE _____ OF _____
19 20 21

LINE	GROUP NUMBER	GROUP TERMINAL NUMBER	LINE EQPT. NO HUNTING ORDER						DIRECTORY NUMBER	NON-HUNTING DIRECTORY NUMBER	MAKE BUSY		CLASS INFO			CHART CLASS		SUPPL INFO REF																	
			NET	FRAME	BAY	CONC	SWITCH	LEVEL			TYPE	KEY NO.	LINE CLASS CODE	EQPT.	FEAT.	CHART	COLUMN	PAGE	ITEM																
22	23	25	26	29	32	33	34	35	36	37	38	39	40	41	47	48	54	55	56	57	58	60	61	64	65	68	69	70	71	72	75	76	78	79	80
00																																			
01																																			
02																																			
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MULTI-LINE HUNTING GROUP RECORD

ESS 1105, 9-67

No. 1 ESS

TEL. CO: _____

W.E. ORDER NO: _____

PAGE 12 OF 21

ESS UNIT _____

FORM CODE: 1 6
14 13

[illegible]

SUPPLEMENTARY INFORMATION RECORD

ESS 1107A, 7-58

NO. 1 ESS

ESS UNIT Succasunna

TEL. CO:

BASE

CONT. GR.

FORM CODE:

PAGE 0060 OF

[illegible]

ESS 1200-B 7-68

UNIVERSAL TRUNK FRAME RECORD

TEL. CO. 3 4 5

NO. 1 ESS

BASE 6 7 8 9 CONT. GR. 10 11

ESS UNIT _____

FORM CODE: 26FRAME NO. 17 18 BAY 19 HOME OR MATE FRAME 20

UNIVERSAL CIRCUIT NO.	EQUIP. LOC.			TRUNK NETWORK NO.				TRUNK GROUP			TRUNK CLASS CODE	CKT. PER UNIT	TRUNK ORDER CODE	REMARKS
	HORIZONTAL MTG. PLT.	VERTICAL FILE	CIRCUIT	TRUNK LINK NET	TRK. SW. FR.	GRID	SWITCH	LEVEL	NAME	GROUP	TRUNK			
032	05	0	0											
033	05	0	1											
034	05	1	0											
035	05	1	1											
036	05	2	0											
037	05	2	1											
038	05	3	0											
039	05	3	1											
040	06	0	0											
041	06	0	1											
042	06	1	0											
043	06	1	1											
044	06	2	0											
045	06	2	1											
046	06	3	0											
047	06	3	1											
048	07	0	0											
049	07	0	1											
050	07	1	0											
051	07	1	1											
052	07	2	0											
053	07	2	1											
054	07	3	0											
055	07	3	1											
056	08	0	0											
057	08	0	1											
058	08	1	0											
059	08	1	1											
060	08	2	0											
061	08	2	1											
062	08	3	0											
063	08	3	1											

*DISTRIBUTOR POINTS ARE DETERMINED BY SUFFIXING THE EQUIPMENT LOCATION BY L OR R (SEE 3D-1A116-01).
 *DISTRIBUTOR POINTS ARE DETERMINED BY SUFFIXING THE EQUIPMENT LOCATION BY 0, 1, 2 OR 4, 5, 6
 (SEE 3D-1A127-01).

UNIVERSAL TRUNK FRAME RECORD

ESS 1200-B 7-68

NO. 1 ESS

TEL. CO: 401ESS UNIT SusunaeBASE 4022 CONT. GR. 3FRAME NO 00 BAY 0 HOME OR MATE FRAME HFORM CODE: 26

UNIVERSAL CIRCUIT NO.	EQUIP. LOC.			TRUNK NETWORK NO.				TRUNK GROUP			TRUNK CLASS CODE	CKT. PER UNIT	TRUNK ORDER CODE	REMARKS
	HORIZONTAL MTG. PLT.	VERTICAL FILE	CIRCUIT	TRUNK LINK NET	TRK. SW. FR.	GRID	SWITCH	LEVEL	NAME	GROUP	TRUNK			
064	09	0	0	00	0	0	5	3	SUSUNAE DODVLTOLL	037	001	023	2	(08)SD1A192-01
065	09	0	1		1		7				002			
066	09	1	0		1		0	4			016			
067	09	1	1		4		1				017			
068	09	2	0		0	1	2				015			
069	09	2	1		1		3	3			014			
070	09	3	0		4		2				013			
071	09	3	1		1	6					012			
072	10	0	0		0	0	4		SUSUNAE - DODVLTOLL	038	001	023		
073	10	0	1		1		1				002			
074	10	1	0		4		2				011			
075	10	1	1		0	1	3				010			
076	10	2	0		1	0	2	4	SUSUNAE - DODVLTOLL	039	001	023		
077	10	2	1		4	2	3				002			
078	10	3	0		0	0	1	4	DODVLTOLL - SUSUNAE	040	004	028		CHRG THE NO. 024
079	10	3	1		4		0				001			007
080	11	0	0											
081	11	0	1											
082	11	1	0											
083	11	1	1											
084	11	2	0											
085	11	2	1											
086	11	2	2											
087	11	2	3											
088	11	2	4											
089	11	2	5											
090	11	2	6											
091	12	1	1											
092	12	2	0											
093	12	2	1											
094	12	3	0											
095	12	3	1											

* THE SWITCHING ARE DETERMINED BY SUFFIXING THE EQUIPMENT LOCATION BY L OR (SEE SD-1A116-01) THE
 DISTRIBUTION ARE DETERMINED BY SUFFIXING THE EQUIPMENT LOCATION BY 0, 1, 2 OR 4, 5, 6
 (SEE SD-1A127-01).

ESS 1200-B 7-68

UNIVERSAL TRUNK FRAME RECORD

TEL. CO. 401

NO. 1 ESS

BASE 4022 CONT. GR. 3ESS UNIT SusunaeFORM CODE: 26FRAME NO. 00 BAY 0 HOME OR MATE FRAME H

UNIVERSAL CIRCUIT NO.	EQUIP. LOC.			TRUNK NETWORK NO.				TRUNK GROUP			TRUNK CLASS CODE	CKT. PER UNIT	TRUNK ORDER CODE	REMARKS
	HORIZONTAL MTG. PLT.	VERTICAL FILE	CIRCUIT	TRUNK LINK NET	TRK. SW. FR.	GRID	SWITCH	LEVEL	NAME	GROUP	TRUNK			
032	05	0	0											
033	05	0	1											
034	05	1	0											
035	05	1	1											
036	05	2	0											
037	05	2	1											
038	05	3	0											
039	05	3	1											
040	06	0	0											
041	06	0	1											
042	06	1	0											
043	06	1	1											
044	06	2	0											
045	06	2	1											
046	06	3	0											
047	06	3	1											
048	07	0	0											
049	07	0	1											
050	07	1	0											
051	07	1	1											
052	07	2	0											
053	07	2	1											
054	07	3	0											
055	07	3	1											
056	08	0	0						0006 SUSUNAE - DODOV 0123	001	001	007		(BB)SDIA165-01
057	08	0	1					10					002	
058	08	1	0					2					044	
059	08	1	1					3					045	
060	08	2	0					4					005	
061	08	2	1					5					006	
062	08	3	0					6					007	
063	08	3	1					7					008	

*THE DISTRIBUTOR POINTS ARE DETERMINED BY SUFFIXING THE EQUIPMENT LOCATION BY L OR R (SEE SD-1A116-01).
 THE DISTRIBUTOR POINTS ARE DETERMINED BY SUFFIXING THE EQUIPMENT LOCATION BY 0, 1, 2 OR 4, 5, 6
 (SEE SD-1A127-01).

UNIVERSAL TRUNK FRAME RECORD

ESS 1200-B 7-68

NO. 1 ESS

TEL. CO: 3 4 5

ESS UNIT _____

BASE 6 7 8 9

CONT. GR. 10 11

FRAME NO. 17 18 BAY 19 HOME OR MATE FRAME 20

FORM CODE: 26 12 13

UNIVERSAL CIRCUIT NO.	EQUIP. LOC. :			TRUNK NETWORK NO.			TRUNK GROUP			TRUNK CLASS CODE	CKT. PER UNIT	TRUNK ORDER CODE	REMARKS								
	HORIZONTAL MTG. PLT.	VERTICAL FILE	CIRCUIT	TRUNK LINK NPT	TRK. SW. FR.	GRID	SWITCH	LEVEL	NAME					GROUP	TRUNK						
21	23	25	26	27	28	29	30	31	32	33	34	35	37	38	40	41	43	44	45	46	50
064	09	0	0																		
065	09	0	1																		
066	09	1	0																		
067	09	1	1																		
068	09	2	0																		
069	09	2	1																		
070	09	3	0																		
071	09	3	1																		
072	10	0	0																		
073	10	0	1																		
074	10	1	0																		
075	10	1	1																		
076	10	2	0																		
077	10	2	1																		
078	10	3	0																		
079	10	3	1																		
080	11	0	0																		
081	11	0	1																		
082	11	1	0																		
083	11	1	1																		
084	11	2	0																		
085	11	2	1																		
086	11	3	0																		
087	11	3	1																		
088	12	0	0																		
089	12	0	1																		
090	12	1	0																		
091	12	1	1																		
092	12	2	0																		
093	12	2	1																		
094	12	3	0																		
095	12	3	1																		

*THE SCANS ARE DETERMINED BY SUFFIXING THE EQUIPMENT LOCATION BY L OR (SEE SD-1A116-01) THE DISTRIBUTION POINTS ARE DETERMINED BY SUFFIXING THE EQUIPMENT LOCATION BY 0, 1, 2 OR 4, 5, 6 (SEE SD-1A117-01).

ESS 1200-B 7-68

UNIVERSAL TRUNK FRAME RECORD

TEL. CO. 401

NO. 1 ESS

BASE 6 7 8 9 CONT. GR. 10 11ESS UNIT SUSUNAEFORM CODE: 26FRAME NO. 00 BAY 2 HOME OR MATE FRAME H

UNIVERSAL CIRCUIT NO.	EQUIP. LOC.			TRUNK NETWORK NO.				TRUNK GROUP			TRUNK CLASS CODE	CKT. PER UNIT	TRUNK ORDER CODE	REMARKS
	HORIZONTAL MTG. PLT.	VERTICAL FILE	CIRCUIT	TRUNK LINK NET	TRK. SW. FR.	GRID	SWITCH	LEVEL	NAME	GROUP	TRUNK			
032	05	0	0											
033	05	0	1											
034	05	1	0											
035	05	1	1											
036	05	2	0											
037	05	2	1											
038	05	3	0											
039	05	3	1											
040	05	0	0			4	0	4	2					SPARE
041	05	1	1			1	1	3	NNWK 2T34-SUSUNAE 1	018	001	009		320
042	05	1	0			0	1	6	MRMRTNO-SUSUNAE 1	019	004	009		71
043	05	1	1			1	↓	4	↓	↓	007	↓		121
044	05	2	0			1	1	0	MRMRTNT-SUSUNAE 1	020	005	009		24
045	05	2	1			0	2	4	↓	↓	006	↓		31
046	05	3	0			1	1	5	DODVT-SUSUNAE 1	015	024	009		1121
047	05	3	1			↓	7		MRMRTNT-SUSUNAE 1	020	010			33
048	07	0	0											
049	07	0	1											
050	07	1	0											
051	07	1	1											
052	07	2	0											
053	07	2	1											
054	07	3	0											
055	07	3	1											
056	07	0	0			0	0	3	SUSUNAE-DODVT FIN	007	001	040		(BB)SDIA165-01
057	08	0	1			1	↓	4	↓	↓	002	↓		
058	08	1	0			0	1	2	↓	↓	003	↓		
059	08	1	1			1	1	↓	↓	↓	004	↓		
060	08	2	0			1	0	0	SUSUNAE-DODVT 1WT	008	004	007		
061	08	2	1			4	1	↓	↓	↓	005	↓		
062	08	3	0			0	2	2	↓	↓	001	↓		
063	08	3	1			4	0	2	SUSUNAE-DODVT 0123	001	052	007		

*THE CIRCUIT POINTS ARE DETERMINED BY SUFFIXING THE EQUIPMENT LOCATION BY L OR R (SEE SD-1A116-01).
 THE TRUNK DISTRIBUTOR POINTS ARE DETERMINED BY SUFFIXING THE EQUIPMENT LOCATION BY 0, 1, 2 OR 4, 5, 6
 (SEE SD-1A127-01).

UNIVERSAL TRUNK FRAME RECORD

ESS 1200-B 7-68

NO. 1 ESS

ESS UNIT _____

TEL. CO: _____

CONT. GR. _____

FORM CODE: 26

FRAME NO. _____ BAY _____ HOME OR MATE FRAME _____

UNIVERSAL CIRCUIT NO.	EQUIP. LOC.			TRUNK NETWORK NO.				TRUNK GROUP			TRUNK CLASS CODE	CKT. PER UNIT	TRUNK ORDER CODE	REMARKS							
	HORIZONTAL MTG. PLT.	VERTICAL FILE	CIRCUIT	TRUNK LINK NET	TRK. SW. FR.	GRID	SWITCH	LEVEL	NAME	GROUP					TRUNK						
21	23	25	26	27	28	29	30	31	32	33	34	35	37	38	40	41	43	44	45	46	50
064	09	0	0																		
065	09	0	1																		
066	09	1	0																		
067	09	1	1																		
068	09	2	0																		
069	09	2	1																		
070	09	3	0																		
071	09	3	1																		
072	10	0	0																		
073	10	0	1																		
074	10	1	0																		
075	10	1	1																		
076	10	2	0																		
077	10	2	1																		
078	10	3	0																		
079	10	3	1																		
080	11	0	0																		
081	11	0	1																		
082	11	1	0																		
083	11	1	1																		
084	11	2	0																		
085	11	2	1																		
086	11	3	0																		
087	11	3	1																		
088	12	0	0																		
089	12	0	1																		
090	12	1	0																		
091	12	1	1																		
092	12	2	0																		
093	12	2	1																		
094	12	3	0																		
095	12	3	1																		

*THE DCA POINTS ARE DETERMINED BY SUFFIXING THE EQUIPMENT LOCATION BY L OR (SEE SD-1A116-01) THE DISTRIBUTOR POINTS ARE DETERMINED BY SUFFIXING THE EQUIPMENT LOCATION BY 0, 1, 2 OR 4, 5, 6 (SEE SD-1A127-01).

ESS 1200-A 7-68

UNIVERSAL TRUNK FRAME RECORD

TEL. CO. _____

NO. 1 ESS

BASE _____

CONT. GR. _____

ESS UNIT _____

FORM CODE: 26

FRAME NO. _____ BY _____ HOME OR MATE FRAME _____

UNIVERSAL CIRCUIT NO.	EQUIP. LOC.			TRUNK NETWORK NO.				TRUNK GROUP			TRUNK CLASS CODE	CKT. PER UNIT	TRUNK ORDER CODE	REMARKS							
	HORIZONTAL MTG. PLT.	VERTICAL FILE	CIRCUIT	TRUNK LINK NET	TRK. SW. FR.	GRID	SWITCH	LEVEL	NAME	GROUP					TRUNK						
21	23	25	26	27	28	29	30	31	32	33	34	35	37	38	40	41	43	44	45	46	50
096	13	0	0																		
097	13	0	1																		
098	13	1	0																		
099	13	1	1																		
100	13	2	0																		
101	13	2	1																		
102	13	3	0																		
103	13	3	1																		
104	14	0	0																		
105	14	0	1																		
106	14	1	0																		
107	14	1	1																		
108	14	2	0																		
109	14	2	1																		
110	14	3	0																		
111	14	3	1																		
112	15	0	0																		
113	15	0	1																		
114	15	1	0																		
115	15	1	1																		
116	15	2	0																		
117	15	2	1																		
118	15	3	0																		
119	15	3	1																		
120	15	0	0																		
121	15	0	1																		
122	15	1	0																		
123	15	1	1																		
124	15	2	0																		
125	15	2	1																		
126	15	3	0																		
127	15	3	1																		

*THE POINTS ARE DETERMINED BY SUFFIXING THE EQUIPMENT LOCATION BY L OR R (SEE SD-1A116-01).
 THE TRUNK DISTRIBUTOR POINTS ARE DETERMINED BY SUFFIXING THE EQUIPMENT LOCATION BY 0, 1, 2 OR 4, 5, 6
 (SEE SD-1A127-01).

UNIVERSAL TRUNK FRAME RECORD

ESS 1200-A 7-68

NO. 1 ESS

TEL. CO. 401ESS UNIT SusunaeBASE 4022 CONT. GR. 3FRAME NO. 01 BAY 0 HOME OR MATE FRAME HFORM CODE: 26

UNIVERSAL CIRCUIT NO.	EQUIP. LOC.			TRUNK NETWORK NO.				TRUNK GROUP			TRUNK CLASS CODE	CKT. PER UNIT	TRUNK ORDER CODE	REMARKS
	HORIZONTAL MTG. PLT.	VERTICAL FILE	CIRCUIT	TRUNK LINK NET	TRK. SW. FR.	GRID	SWITCH	LEVEL	NAME	GROUP	TRUNK			
000	01	0	0											
001	01	0	1											
002	01	1	0											
003	01	1	1											
004	01	2	0											
005	01	2	1											
006	01	3	0											
007	01	3	1											
008	02	3	0											
009	02	0	1											
010	02	1	0											
011	02		1											
012	02	2	0											
013	02	2	1											
014	02	3	0											
015	02	3	1											
016	03	0	0			4	✓	1			008			003
017	03	0	1			0	3	5			002			007
018	03	1	0			1	✓	1	✓	✓	005	✓		005
019	03	1	1			0	2	0	4	SUSUNAE-DODDVL	042	003	038	
020	03	2	0			1	✓	2			004			
021	03	2	1			1	3	5			005			
022	03	3	0			4	✓	4	✓	✓	006	✓		
023	03	3	1			4	3	3	4	SUSUNAE-DODDVL	043	003	023	
024	04	0	1											
025	04	1	0											
026	04	1	1											
027	04	2	0											
028	04	2	1											
029	04	3	0											
030	04	3	1											
031	04	4	0											

*THE SIGNAL POINTS ARE DETERMINED BY SUFFIXING THE EQUIPMENT LOCATION BY L OR R (SEE SD-1A116-01).
 THE SIGNAL DISTRIBUTOR POINTS ARE DETERMINED BY SUFFIXING THE EQUIPMENT LOCATION BY 0, 1, 2, OR 4, 5, 6
 (SEE SD-1A127-01).

MISCELLANEOUS TRUNK FRAME RECORD

ESS 1201A 7-68

NO. 1 ESS

ESS UNIT SUSUNAETEL. CO. 401CONT. GR. 3 4 5BASE 0 7 8 9FORM CODE 24TRUNK FRAME 00

ITEM	K.P. CARD NO.	EQUIP. LOC.		TRUNK NETWORK NO.					TRUNK GROUP				REMARKS	CPD POINTS					PORT ID		
		MTG. PLT.	CKT. NO.	TRUNK	LINK NET	TRK. SW FR	GRID	SWITCH	LEVEL	NAME	GROUP	TRUNK		TRUNK CLASS CODE	CPD PAIR	QUANT.	FIRST				
																	HALF	GROUP		ROW	COL.
00	1	02:00	00	0	0	1	5			SUSUNAE-SUSUNAE 1 RING REG.	065	004	010	(DB1)SD1A168-01							
01	1	03:00			1	2				↓	084	001									
02	1	04:00			1	3				↓	↓	005	↓								
03	1	05:00			4	1	4			SUSUNAE-SUSUNAE 1 REC PP	063	011	011	(DC1)SD1A172-01							
04	1	05:01			4	1	4			↓	↓	012	↓								
05	1	08:00			0	0	5			SUSUNAE-SUSUNAE 1 CUST REC TT	064	003	012								
06	1	08:01			0	0	5			↓	↓	005									
07	1	11:00								TT CALLING DET				ASSOC. (DD1)SD1A177-01							
08	1	11:01								↓				WITH TWO ADAMS							
09	1	13:00	00	1	1	6				SUSUNAE-D. DRY TOLL CN OUT	072	001	025	(2 B. TS) (DD1)SD1A177-01							
10	1																				
11	1																				
12	1																				
13	1																				
14	1																				
15	1																				
16	1																				
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47	1																				
48	1																				
49	1																				
50	1																				
51	1																				
52	1																				

TEL. CO. 401

NO. 1 ESS

BASE 1 CONT. GR. 11ESS UNIT SUSUNAEFORM CODE 24
14 15TRUNK FRAME NO. 00
18 19 20

ITEM	K.P. CARD NO.	SIGNAL DIST. POINT				SUP SCAN POINTS				DIRECTED SCAN POINTS				FAST SCAN POINTS				COMMON SCAN POINTS				COMMON DIST POINTS				INTERRUPTER POINTS			
		FR TYPE	FR NO.	QUANT.	FIRST POINT	M. SCAN	QUANT.	FIRST		M. SCAN	QUANT.	FIRST		M. SCAN	QUANT.	FIRST		M. SCAN	QUANT.	FIRST		FR TYPE	FR NO.	QUANT.	FIRST POINT	FR TYPE	FR NO.	QUANT.	FIRST POINT
								ROW	POINT			ROW	POINT			ROW	POINT			ROW	POINT								
00	2	M	00	04	000					02	02	02	00	02	01	00	00												
01	2		00	04	004					02	02	02	02	02	01	00	01												
02	2		00	04	003					02	02	02	04	02	01	00	02												
03	2		00	05	002					02	01	04	00	00	01	36	00												
04	2		00	05	017					02	01	04	01	00	01	36	02												
05	2		00	05	002	02	08	08	00	02	01	06	00	00	02	38	04												
06	2		00	05	007	02	08	08	08	02	01	06	01	00	02	38	06												
07	2																												
08	2																												
09	2	M	00	02	032	02	01	28	02									02	04	02	00	00	05	032	M	00	01	584	
10	2																												
11	2																												
12	2																												
13	2																												
14	2																												
15	2																												
16	2																												
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45	2																												
46	2																												
47	2																												
48	2																												
49	2																												

MISCELLANEOUS TRUNK FRAME RECORD

ESS 1201A 7-68

MO. 1 ESS

ESS UNIT _____

BASE _____

TEL. CO. _____
CONT. GR. _____
FORM CODE 24

TRUNK FRAME _____

ITEM	K.P. CARD NO.	EQUIP. LOC.	TRUNK NETWORK NO.						TRUNK GROUP			TRUNK CLASS CODE	REMARKS	CPD POINTS				PORT ID		
			MTG. PLT.	CKT. NO.	TRUNK LINK NET	TRK. SW FR	GRID	SWITCH	LEVEL	NAME	GROUP			TRUNK	CPD PAIR	QUANT.	HALF GROUP		ROW	COL.
00	1																			
01	1																			
02	1																			
03	1																			
04	1																			
05	1																			
06	1																			
07	1																			
08	1																			
09	1																			
10	1																			
11	1																			
12	1																			
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16	1																			
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19	1																			
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42	1																			
43	1																			
44	1																			
45	1																			
46	1																			
47	1																			
48	1																			
49	1																			
50	1																			

TEL CO 3 4 5
 BASE 6 7 8 9 CONT GR 10 11
 FORM CODE 18

TRUNK GROUP RECORD

ESS 1202

NO. 1 ESS

7-68

ESS UNIT SUSUNAEPAGE 001 OF 027

ITEM	TRUNK GROUP			TRUNK CLASS CODE	TRUNK NETWORK NO.					EQUIPMENT LOCATION					REC. COMP. TRUNK NO.	PORT ID.	TRUNK ORDER CODE	REMARKS
	NAME	GROUP	TRUNK		TRUNK LINK NET	TRK SW FR	GRID	SWITCH	LEVEL	FR TYPE	FR NO	BAY	HORIZONTAL MTG. PLT.	VERT FILE CKT NO. H.M.I.U.T.				
00	SUSUNAE-DODOV 0123	001	001	007	00	0	0	0	6	U	00	0	08	0	0			12-1-63 FORM 04-N/55-SPX/65-01
01	(52)		002			↓	↓	1	0		↓	↓	↓	↓	1			
02			003			1	3	1			01	2	08	0	0			T.D 20036-N
03			004			↓	↓	0			↓	↓	07	3	1			
04			005			1	0	4			00	0	08	2	0			
05			006			↓	↓	5			↓	↓	↓	↓	1			RTE INDEX 0171
06			007			↓	↓	6			↓	↓	↓	3	0			
07			008			↓	↓	7			↓	↓	↓	↓	1			
08			009			4	↓	0			01	2	11	1	0			
09			010			1	3	2			01	2	08	0	1			
10			011			4	↓	3			↓	↓	↓	1	0			
11			012			↓	↓	4			↓	↓	↓	↓	1			
12			013			↓	0	4			00	2	09	0	1			
13			014			0	3	3			01	2	07	1	0			
14			015			↓	↓	4			↓	↓	↓	↓	1			
15			016			↓	↓	7			00	2	09	2	0			
16			017			↓	↓	0			↓	↓	↓	↓	1			
17			018			↓	↓	1			↓	↓	↓	3	0			
18			019			↓	↓	2			↓	↓	↓	↓	1			
19			020			↓	↓	3			↓	↓	10	0	0			
20			021			↓	↓	4			↓	↓	↓	↓	1			
21			022			↓	↓	5			↓	↓	↓	↓	1			
22			023			↓	↓	6			↓	↓	↓	↓	1			
23			024			4	↓	7			↓	↓	↓	2	0			
24			025			↓	↓	0			↓	↓	↓	↓	1			
25			026			↓	↓	1			↓	↓	↓	3	0			
26			027			↓	↓	2			↓	↓	↓	↓	1			
27			028			0	3	5			01	2	07	2	0			
28			029			↓	↓	6			↓	↓	↓	↓	1			
29			030			↓	↓	7			↓	↓	↓	3	0			
30			031			0	2	6			01	0	11	2	1			
31			032			↓	↓	7			↓	↓	↓	3	0			
32			033			↓	↓	0			↓	↓	11	0	0			
33			034			↓	↓	1			↓	↓	↓	↓	1			
34			035			↓	↓	2			↓	↓	↓	↓	1			
35			036			↓	↓	3			01	0	10	0	0			
36			037			4	↓	4			↓	↓	↓	↓	1			
37			038			↓	↓	5			↓	↓	↓	↓	1			
38			039			↓	↓	6			↓	↓	↓	↓	1			
39			040			↓	↓	7			↓	↓	↓	2	0			
40			041			↓	↓	0			↓	↓	↓	↓	1			
41			042			0	3	1			↓	↓	↓	3	0			
42			043			↓	↓	2			↓	↓	↓	↓	1			
43			044			0	2				00	0	08	1	0			
44			045			↓	↓	3			↓	↓	↓	↓	1			
45			046			↓	↓	5			00	2	09	1	0			
46			047			↓	↓	6			↓	↓	↓	↓	1			
47			048			2	↓	3			↓	↓	11	0	0			
48			049			↓	↓	4			↓	↓	↓	↓	1			
49			050			↓	↓	5			↓	↓	↓	↓	1			

ESS 1202

7-68

PAGE 002 OF 027

TRUNK GROUP RECORD

NO. 1 ESS

ESS UNIT SUSUNAE

TEL. CO 1 4 5

BASE 0 7 0 9 CONT. GR. 10 11

FORM CODE 18

ITEM	TRUNK GROUP			TRUNK CLASS CODE	TRUNK NETWORK NO					EQUIPMENT LOCATION					REC. COMP. TRUNK NO	PORT ID	TRUNK ORDER CODE	REMARKS
	NAME	GROUP	TRUNK		TRUNK LINK NET	TRK SW FR	GRID	SWITCH	LEVEL	FR TYPE	FR NO	BAY	HORIZONTAL MTG. PLT.	VERT. FILE CKT. NO. H M (UT)				
00	SUSUNAE-DODV 0123	001	051	007	00	4	0	1	0	U	01	2	11	1				
01	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓				
02			052	↓	↓	↓	↓	↓	↓	↓	00	2	08	3				
03																		
04																		
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49																		

TEL. CO. _____

TRUNK GROUP RECORD

ESS 1202

BASE _____ CONT. GR. _____

NO. 1 ESS

7-68

FORM CODE 18ESS UNIT SUSUNAEPAGE 006 OF 007

ITEM	TRUNK GROUP			TRUNK CLASS CODE	TRUNK NETWORK NO.					EQUIPMENT LOCATION					REC.-COMP. TRUNK NO.	PORT I.D.	TRUNK ORDER CODE	REMARKS
	NAME	GROUP	TRUNK		TRUNK LINK NET	TRK SW FR	GRID	SWITCH	LEVEL	FR TYPE	FR NO.	BAY	HORIZONTAL MTG. PLT.	VERT. FILE CKT. NO. H/M (UT)				
00	SUSUNAE-DOOYT FIN	007	001	040	00	0	0	3	1	U	00	2	08	0				(99)SD/4165-01
01	(7)		002			1	↓	4						↓				
02			003			0	1	2						1				
03			004			1	↓	1						↓				RT INDEX 0155
04			005			1	2	5			01	2	09	3				0159
05			006			0	3	0					10	0				0161
06	↓	↓	007	↓	↓	4	↓	7		↓	↓	↓	↓	↓				0167
07																		0182
08																		0184
09																		0186
10																		0188
11																		0190
12																		0191
13																		0194
14																		0196
15																		0199
16																		0201
17																		
18																		
19																		
20																		
21																		
22																		
23																		
24																		
25																		
26																		
27																		
28																		
29					(00201)													
30	SUSUNAE-DOOYT INT	008	001	007	00	0	2	2	1	U	00	2	08	3				(99)SD/4165-01
31	(6)		002			1	↓	6			01	2	10	1				RT INDEX 0160
32			003			1	3	5			↓	↓	↓	↓				0164
33			004			1	0	0			00	2	08	2				0205
34			005			4	1	4	↓		↓	↓	↓	↓				
35	↓	↓	006	↓	↓	4	0	2	6	↓	00	0	09	0				↓
36																		
37																		
38																		
39																		
40																		
41																		
42																		
43																		
44																		
45																		
46																		
47																		
48																		
49																		

ESS 1202

7-68

PAGE 026 OF 027

TRUNK GROUP RECORD

NO. 1 ESS
ESS UNIT SUSUNAE

TEL. CO.: _____

BASE _____ CONT. GR. _____
6 7 8 9 10 11
FORM CODE 18
14

ITEM	TRUNK GROUP			TRUNK CLASS CODE	TRUNK NETWORK NO.				EQUIPMENT LOCATION				REC. COMP.	TRUNK NO.	PORT I.D.	TRUNK ORDER CODE	REMARKS
	NAME	GROUP	TRUNK		TRUNK LINK NET	TRK SW FR	GRID	SWITCH	LEVEL	FR TYPE	FR NO	BAY					
00	SPARE EQUIPMENT	ASSIGNED TO	TRUNK GROUP	000	000	000	000	000	000	000	000	000	000	000	000	000	
01																	
02		000		000		4	1	6	0	U	01	0	11	1	1		SD-1A 165
03		↓		↓		4	0	3	0		00	2	09	0	0		
04		↓		↓		4	3	5	0		01	2	08	2	0		
05		↓		↓		4	3	6	0	↓	01	2	08	2	1		
06																	
07																	
08																	
09																	
10		000	000	009	00	1	0	6	2	U	00	0	07	0	1		(A) SDIA 166-01
11		↓	001	↓	↓	4	0	4	2	↓	↓	2	06	0	0		SPARE (12 TRKS)
12																	
13																	
14																	
15																	
16																	
17		000	000	009	00	1	0	6	2	U	00	0	07	0	1		
18		↓	001	↓	↓	4	0	4	2	↓	↓	2	06	0	0		
19																	
20			010			1	1	5	6		01	2	06	3	0		ASYM. CONTRX
21																	
22																	
23																	
24																	
25		000	000	023	00	0	1	5	6	U	01	0	04	2	1		(B) SDIA 192-01
26		↓	012			1	0	7					3	0			(SW 02)
27		↓	018			1	2	3					↓	3	1		
28		↓	013	↓		4	3	6					05	0	1		
29		↓	020	022		0	3	5						1	0		
30		↓	000	029		4	2	0	↓					1	1		AU RING
31		↓	003	039	↓	0	0	5	4	↓	00	0	04	2	1		CONTR
32		000	000	033	00	0	3	6	6	U	01	2	14	0	1		↓ HTST
33		↓	003			1	0	5						1	0		(C) SDIA 219-01
34		↓	008			4	1	0						1	1		↓
35		↓	011			4	2	3						2	0		
36		↓	000	↓	↓	0	0	7	↓	↓	↓	↓	↓	2	1		
37																	
38																	
39																	
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44																	
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ESS 1203 7-68

TRUNK NETWORK NUMBER RECORD

TEL. CO. 3 4 5

NO. 1 ESS

TRUNK LINK NET 18 19BASE 6 7 8 9 CONT. GR. 10 11ESS UNIT TRUNK SWITCH FRAME 20FORM CODE 2A
12 13GRID 21

TRK NET NO.		TRUNK GROUP			TRUNK CLASS CODE	EQUIPMENT LOCATION						REC. COMP. TRUNK NO.	PORT I.D.	TRUNK ORDER CODE	REMARKS		
SWITCH	LEVEL	NAME	GROUP	TRUNK		FR TYPE	FR NO.	BAY	HORIZONTAL MTG. PLT.	VERT. FILE CKT. NO. H M (UT)							
22	23		25 27 28	30	31 33	34	35	37 38	39 40	41	43	44	46	47	48 49	52	54
4	0																
4	1																
4	2																
4	3																
4	4																
4	5																
4	6																
4	7																
5	0																
5	1																
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7	2																
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7	4																
7	5																
7	6																
7	7																

NOTES

TRUNK NETWORK NUMBER RECORD

ESS 1203 7-68

TRUNK LINK NETWORK 00

NO. 1 ESS

TEL. CO. 3 4 5TRUNK SWITCH FRAME 0ESS UNIT SUSUNAEBASE 6 7 8 9 CONT. GR. 10 11GRID 0FORM CODE 2A

TRK. NET NO.	TRUNK GROUP			TRUNK CLASS CODE	EQUIPMENT LOCATION						REC. COMP. TRUNK NO.	PORT I.D.	TRUNK ORDER CODE	REMARKS
	SWITCH	LEVEL	NAME		FR TYPE	FR NO.	BAY	HORIZONTAL MTG. PLT.	VERT. FILE CKT. NO. H M (UT)					
0	0													
0	1													
0	2													
0	3													
0	4													
0	5													
0	6													
0	7													
1	0		SUSUNAE-DOON 0123	001	002	007	U	00	0	08	0	1		
1	1		↓ - PARTNT	004	003	040	U	00	0	11	1	1		
1	2		DODDY - SUSUNAE 1	014	004	009	U	00	0	05	3	1		TRK. No. 02
1	3		SUSUNAE-SUSUNAE 1 AND	023	004	033	U	00	0	14	2	1		
1	4		DEDOYL TOLL - RU 0123	040	004	028	U	00	0	02	3	0		TRK. No. 004
1	5		SUSUNAE - RML 0123	065	004	010	M	00	0	02		00		
1	6		↓ - STA. RT. 550	075	001	026	M	03	0	26		00		
1	7													
2	0		SUSUNAE-DOON 0123	001	044	007	U	00	0	08	1	0		
2	1		↓ - NHWK 2TS	006	003	040	U	00	0	12	2	0		
2	2		HDOPTO - SUSUNAE 1	016	001	009	U	00	2	04	0	0		TRK. No. 01
2	3		SUSUNAE- AND	023	000	033	U	00	0	14	3	0		
2	4		DODDY TOLL - CONTR. 041	003	029	U	00	0	03	1	0			TRK. No. 008
2	5		SUSUNAE- ↓ CN CONT	070	001	027	M	01	0	30		00		
2	6			000	000	025	M	03	2	13		00		(SPARE - CNABG STR)
2	7													
3	0													
3	1													
3	2													
3	3													
3	4													
3	5													
3	6													
3	7													

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TRUNK NETWORK NUMBER RECORD

TEL. CO

NO. 1 ESS

TRUNK LINK NET

BASE

CONT GR.

ESS UNIT

TRUNK SWITCH FRAME

FORM CODE 2A

GRID

TRK NET NO		TRUNK GROUP			EQUIPMENT LOCATION										TRUNK ORDER CODE		REMARKS						
SWITCH	LEVEL	NAME	GROUP	TRUNK	TRUNK CLASS CODE	FR TYPE	FR NO.	BAY	HORIZONTAL MTG. PLT.	VERT. FILE CKT. NO.	H M (UT)	REC. COMP. TRUNK NO.	PORT I.D.	TRUNK ORDER CODE									
22	23		25	26	28	30	31	33	34	35	37	38	39	40	41	43	44	46	47	48	49	50	54
4	0																						
4	1																						
4	2																						
4	3																						
4	4																						
4	5																						
4	6																						
4	7																						
5	0																						
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7	0																						
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7	3																						
7	4																						
7	5																						
7	6																						
7	7																						

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TRUNK NETWORK NUMBER RECORD

ESS 1203 7-68

TRUNK LINK NETWORK 00

NO. 1 ESS

TEL. CO. 3 4 5TRUNK SWITCH FRAME 0ESS UNIT SUSUNAEBASE 6 7 8 9 CONT. GR. 10 11GRID 9FORM CODE 2A

TRK. NET NO.	TRUNK GROUP			TRUNK CLASS CODE	EQUIPMENT LOCATION					REC. COMP. TRUNK NO.	PORT I.D.	TRUNK ORDER CODE	REMARKS
	SWITCH	LEVEL	NAME		FR TYPE	FR NO.	BAY	HORIZONTAL MTG. PLT.	VERT. FILE CKT. NO. H-M (UT)				
22	23			25 27 28 30 31	32 34	35 37	38	39 40 41	42 43	44 46	47 48 49 50	54	
0	0												
0	1												
0	2												
0	3												
0	4												
0	5												
0	6												
0	7												
1	0												
1	1												
1	2												
1	3												
1	4												
1	5												
1	6												
1	7												
2	0		SUSUNAE-DODGEY 0123	001 043 007	U	01	0	10 3 1					
2	1		↓ - MARRINT	004 001 040	U	01	0	09 0 1					
2	2		HHOPTO - SUSUNAE 1	016 002 009	U	01	2	06 0 0					TRK. No. 52
2	3		SUSUNAE-DODGEY TOLL 0+RCF	037 005 023	U	01	0	01 0 1					
2	4		↓ - SUSUNAE 1 COST REC'DP	092 000 012	M	00	2	08 00					
2	5		↓ - DODGEY TOLL CNDP SING 2	067 004 017	M	03	2	15 00					
2	6		↓ - SUSUNAE 574 R.T. 550	075 003 026	M	03	2	29 00					
2	7												
3	0												
3	1												
3	2												
3	3												
3	4												
3	5												
3	6												
3	7												

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TRUNK CLASS CODE RECORD

NO. 1 ESS

ESS UNIT SUSUNAE

CLASS CODE _____ HUNDRED										CLASS CODE _____ HUNDRED															
TRUNK TRANSLATION CODE (TRUNK TYPE)								TNP	REMARKS	TRUNK TRANSLATION CODE (TRUNK TYPE)								TNP	REMARKS						
TENS	UNITS	22	23	25	28	30	32	33	35	36	37	38	TENS	UNITS	22	23	25	28	30	32	33	35	36	37	38
00	05070	000	000	00									50												
01	05270	000	000	00									51												
02	05370	000	000	00									52												
03	05470	000	000	00									53												
04	05571	000	000	00									54												
05	05771	000	000	00									55												
06	05870	000	000	00									56												
07	00201	000	000	00									57												
08	00240	000	F00	00									58												
09	00412	000	010	00									59												
10	06171	000	000	00									60												
11	06371	000	000	00									61												
12	06470	000	000	00									62												
13	06570	000	000	00									63												
14	06670	000	000	00									64												
15	06770	000	000	00									65												
16	00940	000	F00	00									66												
17	01070	000	500	00									67												
18	01858	000	910	00									68												
19	01169	000	F00	00									69												
20													70												
21													71												
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47													97												
48													98												
49													99												

TRUNK CLASS CODE RECORD

NO. 1 ESS

ESS UNIT _____

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TEL. CO: _____

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FORM CODE: _____

CLASS CODE _____ HUNDRED										CLASS CODE _____ HUNDRED									
TRUNK TRANSLATION CODE (TRUNK TYPE)								TNP	REMARKS	TRUNK TRANSLATION CODE (TRUNK TYPE)								TNP	REMARKS
TENS	UNITS	22	23	24	25	26	27	28		TENS	UNITS	22	23	24	25	26	27	28	
00										50									
01										51									
02										52									
03										53									
04										54									
05										55									
06										56									
07										57									
08										58									
09										59									
10										60									
11										61									
12										62									
13										63									
14										64									
15										65									
16										66									
17										67									
18										68									
19										69									
20										70									
21										71									
22										72									
23										73									
24										74									
25										75									
26										76									
27										77									
28										78									
29										79									
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31										81									
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42										92									
43										93									
44										94									
45										95									
46										96									
47										97									
48										98									
49										99									

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THREE DIGIT TRANSLATIONS

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RATE CENTER 00

1ST DIGIT				1ST DIGIT				1ST DIGIT				1ST DIGIT			
2ND & 3RD DIGITS	RATE & ROUTE PAT.	REMARKS		2ND & 3RD DIGITS	RATE & ROUTE PAT.	REMARKS		2ND & 3RD DIGITS	RATE & ROUTE PAT.	REMARKS		2ND & 3RD DIGITS	RATE & ROUTE PAT.	REMARKS	
00	0010	VC		50	0008	VC		00	0010	VC		50	0045	(609) DTWK TREN	
01	0001	(RESTR PR)		51	0028	35NBWK		01	0002	IMP		51	0022	30 NWRK	
02	0002	1 DC		52	0008	VC		02	0002	1 DEL		52			
03	0002	1 CT		53	↓			03	0006	5 COLP		53			
04	0065	(21 CA) MAN		54	0028	35NBWK		04	0003	2 WVA		54			
05	0005	4 ALA		55	0030	45 FRND		05	0005	4 FLA		55	↓		
06	0007	6 WASH		56	0026	25 PAT		06	0065	(CANADA) SHK		56	0021	25 ↓	
07	0004	3 ME		57	0028	35NBWK		07	0006	5 WVO		57	0008	VC	
08	0007	6 IDA		58	0008	VC		08	0006	5 AEG		58	0067	609	
09	0007	6 CAL		59	0067	609		09	0004	3 IL		59	0027	30 NBWK	
10	0010	VC		60	0008	VC		10	0010	VC		60	0044	DTWK WASH	
11	0031	62		61	0028	35HKK		11	↓			61	0009	(L) DOV	
12	0058	(FATS 2) NY		62	↓	35 ↓		12	0004	3 ILL		62	0018	20 BLVD	
13	0007	6 CAL		63	0067	609 ↓		13	0004	3 AEG		63	0029	40 FRND	
14	0006	5 TEX		64	0028	35NBWK		14	0005	4 FLA		64	↓	40 FRND	
15	0002	1 PA		65	↓	35 ↓		15	0009	2 NY		65	0067	609	
16	0004	3 O		66	0067	609		16	0005	4 KARS		66	0009	(L) DOV	
17	0004	3 ILL		67	0016	10 MRSTN		17	0004	3 IND		67	0008	VC	
18	0005	4 MIN		68	0067	609		18	0005	4 LA		68	0067	609	
19	0004	3 IND		69	0030	45 FRND		19	0005	4 LA		69	0027	30 NEWK	
20	0008	VC		70	0042	DTWK DOV		20	0040	WATS PR		70	0008	VC	
21	↓			71	0026	25 PAT		21	0008	VC		71	0022	30 NWRK	
22	0029	40 APK		72	0021	25 NWRK		22	0021	25 NWRK		72			
23	↓	↓		73	0020	20 ↓		23	0008	VC		73			
24	0028	35 HKK		74	0026	25 PAT		24	0027	30 NBWK		74			
25	0008	VC		75	0008	VC		25	0021	25 NWRK		75	↓		
26	0020	20 NWRK		76	0021	25 NWRK		26	0008	VC		76	0021	25 ↓	
27	0020	20 NWRK		77	0020	20 ↓		27	0027	30 PAT		77	0017	15 MRSTN	
28	0020	20 NWRK		78	0026	25 PAT		28	0013	(PICTIN NY) (L) DOV		78	0008	VC	
29	0029	40 APK		79	↓	25 ↓		29	0028	35 NBWK		79	0021	25 NWRK	
30	0008	VC		80	0043	DTWK NWRK		30	0041	NWRK TST		80	0048	DOV TST TWK CODE	
31	0027	30 SDBG		81	0008	VC		31	0008	VC		81	0022	30 NWRK	
32	0021	25 NWRK		82	↓			32	0023	35 NWRK		82	↓	30 ↓	
33	↓	↓		83	0027	30 NBWK		33	↓	35 ↓		83	0017	15 NEWT	
34	0022	15 MRSTN		84	0022	30 NWRK		34	0080	15 MRSTN		84	0028	35 HKK	
35	0022	30 NWRK		85	0016	10 MRSTN		35	↓	15 ↓		85	↓	35 ↓	
36	0025	20 FLEM		86	0008	VC		36	0022	30 NWRK		86	0067	609	
37	0028	VC		87	0027	30 NEWK		37	0026	25 PAT		87	↓		
38	↓	↓		88	↓	30 HKK		38	0021	25 NWRK		88	0022	30 NWRK	
39	0021	25 NWRK		89	0022	30 NWRK		39	0022	30 ↓		89	0008	VC	
40	0028	VC		90	0008	VC		40	0042	DTWK DOV		90	0044	DTWK WASH	
41	0021	25 NWRK		91	0028	35 APK		41	0030	45 FRND		91	0028	35 HKK	
42	0022	30 ↓		92	0067	609		42	0027	30 HKK		92	0067	609	
43	↓	30 ↓		93	0027	30 MDTN		43	↓	30 ↓		93			
44	0022	45 FRND		94	0008	VC		44	0067	609		94			
45	0022	25 NWRK		95	↓			45	↓	↓		95			
46	0027	30 NBWK		96	0067	609		46	0008	VC		96			
47	↓	30 ↓		97	0027	30 NBWK		47	0011	(L) DOV		97	↓	↓	
48	0022	30 NWRK		98	0067	609		48	0067	609		98	0011	(L) DOV	
49	0027	30 NBWK		99	↓	↓		49	0030	45 FRND		99	0067	609	

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NO. 1 ESS

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<u>4</u> 1ST DIGIT				<u>4</u> 1ST DIGIT				<u>5</u> 1ST DIGIT				<u>5</u> 1ST DIGIT			
2 ND 3 RD DIGITS	RATE & ROUTE PAT.	REMARKS		2 ND 3 RD DIGITS	RATE & ROUTE PAT.	REMARKS		2 ND 3 RD DIGITS	RATE & ROUTE PAT.	REMARKS		2 ND 3 RD DIGITS	RATE & ROUTE PAT.	REMARKS	
00				50				00				50			
01				51				01				51			
02				52				02				52			
03				53				03				53			
04				54				04				54			
05				55				05				55			
06				56				06				56			
07				57				07				57			
08				58				08				58			
09				59				09				59			
10				60				10				60			
11				61				11				61			
12				62				12				62			
13				63				13				63			
14				64				14				64			
15				65				15				65			
16				66				16				66			
17				67				17				67			
18				68				18				68			
19				69				19				69			
20	0042	30 PAT		70	0008 VC			20	0008 VC			70	0008 VC		
21	0008 VC			71	0022	30 NWK		21	0028	35 NWK		71	0022	Dosit B	
22	↓			72	↓			22	0067	609		72	0008 VC		
23	0027	30 PAT		73	↓			23	0026	25 PAT		73			
24	0067	609		74	↓			24	0027	30 NWK		74			
25	0017	15 WASH		75	0019	25 BLVD		25	0026	25 PAT		75			
26	0008 VC			76	0067	609		26	0021	25 NWK		76			
27	0027	30 PAT		77	0029	40 APK		27	0008 VC			77			
28	0067	609		78	0022	30 NWK		28	↓			78			
29	↓	↓		79	0027	30 FLEM		29	0027	30 PAT		79			
30				80				30				80			
31				81				31				81			
32				82				32				82			
33				83				33				83			
34				84				34				84			
35				85				35				85			
36				86				36				86			
37				87				37				87			
38				88				38				88			
39				89				39				89			
40				90				40				90			
41				91				41				91			
42				92				42				92			
43				93				43				93			
44				94				44				94			
45				95				45				95			
46				96				46				96			
47				97				47				97			
48				98				48				98			
49				99				49				99			

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NO. 1 ESS

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RATE CENTER 00

6 th 1ST DIGIT				6 th 1ST DIGIT				7 th 1ST DIGIT				7 th 1ST DIGIT			
2 ND & 3 RD DIGITS	RATE & ROUTE PAT.	REMARKS		2 ND & 3 RD DIGITS	RATE & ROUTE PAT.	REMARKS		2 ND & 3 RD DIGITS	RATE & ROUTE PAT.	REMARKS		2 ND & 3 RD DIGITS	RATE & ROUTE PAT.	REMARKS	
00				50				00				50			
01				51				01				51			
02				52				02				52			
03				53				03				53			
04				54				04				54			
05				55				05				55			
06				56				06				56			
07				57				07				57			
08				58				08				58			
09				59				09				59			
10				60				10				60			
11				61				11				61			
12				62				12				62			
13				63				13				63			
14				64				14				64			
15				65				15				65			
16				66				16				66			
17				67				17				67			
18				68				18				68			
19				69				19				69			
20				70				20				70			
21				71				21				71			
22				72				22				72			
23				73				23				73			
24				74				24				74			
25				75				25				75			
26				76				26				76			
27				77				27				77			
28				78				28				78			
29				79				29				79			
30	0047	WASH		80	0008	VC		30	0008	VC		80	0042	DTWX PAT	
31	0003	VC		81	0029	40APK		31	0021	25NWRK		81	0008	VC	
32				82	0021	25NWRK		32	0008	VC		82	0027	30FLEM	
33				83	0008	VC		33				83	0021	25NWRK	
34		30NWRK		84	0026	25PAT		34				84	0067	609	
35		20NWRK		85	0008	VC		35	0026	25FLEM		85			
36		30NWRK		86	0021	25NWRK		36	0021	25NWRK		86	0016	10NEWT	
37	0017	15BLVD		87				37	0067	609		87	0028	35APK	
38	0025	20FLEM		88				38	0008	VC		88	0008	VC	
39	0007	609		89	0019	25WASH		39				89	0021	25NWRK	
40	0045	NASH		90	0008	VC		40				90	0044	TWX WASH	
41	0007	609		91	0067	609		41	0028	35APK		91	0027	30PAT	
42	0022	30NWRK		92				42	0026	25PAT		92	0023	35NWRK	
43		30		93				43	0021	25NWRK		93	0030	45APK	
44				94	0025	20PAT		44				94	0008	VC	
45		30NWRK		95	0067	609		45	0008	VC		95	0023	35NWRK	
46	0007	609		96	0025	20PAT		46	0021	25NWRK		96	0027	30PAT	
47	0017	15MRSTN		97				47	0028	35APK		97			
48	0021	30NWRK		98	0067	609		48	0021	25NWRK		98	0023	35NWRK	
49	0032	NJ BELL TEL CO		99	0044	DTWX WASH		49	0008	VC		99	0067	609	

PAGE ____ OF ____

THREE DIGIT TRANSLATIONS

NO. 1 ESS

ESS 1300-B, 7-68

TEL. CO. 1 2 3 4 5

ESS UNIT _____

BASE _____ CONT. GR. 1 2 3 4 5

RATE CENTER _____

FORM CODE: 14 50 15

1ST DIGIT				1ST DIGIT				1ST DIGIT				1ST DIGIT			
2ND & 3RD DIGITS	RATE & ROUTE PAT.	REMARKS		2ND & 3RD DIGITS	RATE & ROUTE PAT.	REMARKS		2ND & 3RD DIGITS	RATE & ROUTE PAT.	REMARKS		2ND & 3RD DIGITS	RATE & ROUTE PAT.	REMARKS	
00				50				00				50			
01				51				01				51			
02				52				02				52			
03				53				03				53			
04				54				04				54			
05				55				05				55			
06				56				06				56			
07				57				07				57			
08				58				08				58			
09				59				09				59			
10				60				10				60			
11				61				11				61			
12				62				12				62			
13				63				13				63			
14				64				14				64			
15				65				15				65			
16				66				16				66			
17				67				17				67			
18				68				18				68			
19				69				19				69			
20				70				20				70			
21				71				21				71			
22				72				22				72			
23				73				23				73			
24				74				24				74			
25				75				25				75			
26				76				26				76			
27				77				27				77			
28				78				28				78			
29				79				29				79			
30				80				30				80			
31				81				31				81			
32				82				32				82			
33				83				33				83			
34				84				34				84			
35				85				35				85			
36				86				36				86			
37				87				37				87			
38				88				38				88			
39				89				39				89			
40				90				40				90			
41				91				41				91			
42				92				42				92			
43				93				43				93			
44				94				44				94			
45				95				45				95			
46				96				46				96			
47				97				47				97			
48				98				48				98			
49				99				49				99			

ESS 1301, 7-68

TEL. CO:

BASE

FORM CODE:

CONT. GR.

SIX DIGIT TRANSLATIONS

NO. 1 ESS

ESS UNIT SUSUNAENPA CODE 609PAGE 1 OF 4FOREIGN AREA TRANS. 0 / 1

2 1ST DIGIT			2 1ST DIGIT			3 1ST DIGIT			3 1ST DIGIT		
2ND & 3RD DIGITS	RATE & ROUTE PAT.	REMARKS	2ND & 3RD DIGITS	RATE & ROUTE PAT.	REMARKS	2ND & 3RD DIGITS	RATE & ROUTE PAT.	REMARKS	2ND & 3RD DIGITS	RATE & ROUTE PAT.	REMARKS
00	0061	VC	50	0061	VC	00	0061	VC	50	0061	VC
01			51			01			51		
02			52			02			52		
03			53			03			53		
04			54			04			54		
05			55			05			55		
06			56			06			56		
07			57			07			57		
08			58			08			58	0053	50 WDBY
09			59	0051	40 TREN	09			59	0061	VC
10			60	0061	VC	10			60		
11			61			11			61		
12			62			12			62		
13			63	0055	60 ACY	13			63		
14			64	0061	VC	14			64		
15			65			15			65	0052	45 CAM
16			66	0054	55 ACY	16			66	0061	VC
17			67	0051	40 MTH	17			67		
18			68	0052	45 ↓	18			68	0055	60 W/LD
19			69	0061	VC	19			69	0061	VC
20			70			20			70		
21			71			21			71		
22			72			22			72		
23			73			23			73		
24			74			24			74		
25			75			25			75		
26			76			26			76		
27	0052	45 WDBY	77			27			77		
28	0061	VC	78			28			78		
29			79			29			79		
30			80			30			80		
31			81			31			81		
32			82			32			82		
33			83			33			83		
34			84			34			84		
35			85			35			85		
36	0061	VC	86			36			86	0051	40 BURL
37			87			37			87		
38			88			38			88	0061	VC
39			89			39			89		
40			90			40			90		
41			91			41			91		
42			92	0050	35 TREN	42			92	0050	35 TREN
43			93	0061	VC	43			93		
44			94			44	0054	55 ACY	94		
45			95			45			95		
46			96	0053	50 BRGT	46	0061	VC	96		
47			97	0061	VC	47			97		
48			98	0051	40 TREN	48	0054	55 ACY	98	0061	VC
49			99	0053	50 PGR	49	0061	VC	99	0054	55 ACY

NPA CODE _____
PAGE _____ OF _____SIX DIGIT TRANSLATIONS
NO. 1 ESS

ESS UNIT _____

ESS1301, 7-68

TEL. CO: _____

BASE _____ CONT. GR. _____

FORM CODE: _____

FOREIGN AREA TRANS. _____

1 ST DIGIT			1 ST DIGIT			1 ST DIGIT			1 ST DIGIT		
2 ND & 3 RD DIGITS	RATE & ROUTE PAT.	REMARKS	2 ND & 3 RD DIGITS	RATE & ROUTE PAT.	REMARKS	2 ND & 3 RD DIGITS	RATE & ROUTE PAT.	REMARKS	2 ND & 3 RD DIGITS	RATE & ROUTE PAT.	REMARKS
00			50			00			50		
01			51			01			51		
02			52			02			52		
03			53			03			53		
04			54			04			54		
05			55			05			55		
06			56			06			56		
07			57			07			57		
08			58			08			58		
09			59			09			59		
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18			68			18			68		
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23			73			23			73		
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29			79			29			79		
30			80			30			80		
31			81			31			81		
32			82			32			82		
33			83			33			83		
34			84			34			84		
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36			86			36			86		
37			87			37			87		
38			88			38			88		
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42			92			42			92		
43			93			43			93		
44			94			44			94		
45			95			45			95		
46			96			46			96		
47			97			47			97		
48			98			48			98		
49			99			49			99		

ESS 1302-A, 7-68

TEL. CO:

BASE

FORM CODE:

701
CONT. GR.

42

OFFICE CHARGE RECORD

NO1 ESS

ESS UNIT SUSUNAECHARGE INDEX 0 HUNDRED

TENS UNITS	CHARGE INDEX	TYPE							DAY RATE				COIN ZONE CHARGE COND.	COIN ZONE OPR. ROUTE INDEX	REMARKS	
		FREE	DET. BILL	LOC. COIN	UNTIMED BULK BILL	TIMED BULK BILL	HOTEL MES.	COIN ZONE	MESSAGE BILLING IND.	INITIAL		OVERTIME				
										CHARGE 5¢ OR UNIT	TIME MINUTES	CHARGE 5¢ OR UNIT				TIME MINUTES
00																
01								01	01	05	01	05				
02								02								
03								03								
04								04								
05								05								
06								06								
07								07								
08								08								
09								09								
10								10								
11								11								
12								12								
13								13								
14								14								
15								15								
16								16	01						(SPECIAL INDEX FOR TRIAL SUBSCRIBERS)	
17																
18																
19								01	01	05	01	05				
20								03	05	01	02	0	0	15¢	(GRP 1 (0) = ODD RATES)	
21								04	05	01	02	0	1	20¢	(GRP 2 (1) = EVEN RATES)	
22								05	03	01	01	1	0	25¢		
23								06	03	02	01	1	1	30¢		
24								07	03	02	01	2	0	35¢		
25								08	03	02	01	2	1	40¢		
26								09	03	03	01	3	0	45¢		
27								10	03	03	01	3	1	50¢		
28								11	03	03	01	4	0	55¢		
29								12	03	03	01	4	1	60¢		
30								13	03	04	01	5	0	65¢		
31								14	03	04	01	5	1	70¢		
32								07	03	02	01	6	0	35¢	NEW YORK	
33								08	03	02	01	6	1	40¢	NEW YORK	
34																
35																
36																
37																
38																
39																
40																
41																
42																
43																
44																
45																
46																
47																
48																
49																

OFFICE CHARGE RECORD

ESS UNIT _____ NO.1 ESS _____

ESS 1302-A, 7-68

BASE _____

TEL. CO. _____

CONT. GR. _____

FORM CODE _____

CHARGE INDEX 0 HUNDRED

TENS UNITS	CHARGE INDEX	TYPE	DAY RATE		COIN ZONE CHARGE COND.	COIN ZONE OPR. ROUTE INDEX	REMARKS
			INITIAL	OVERTIME			
			CHARGE 5¢ OR UNIT	TIME MINUTES			
50	1	FREE					
50	2	DET. BILL					
50	3	LOC. COIN					
50	4	UNTIMED BULK BILL					
50	5	TIMED BULK BILL					
50	6	MOTEL MES					
50	7	COIN ZONE					
50	8	MESSAGE BILLING IND.					
50	9	CHARGE 5¢ OR UNIT					
50	0	TIME MINUTES					
50	1	CHARGE 5¢ OR UNIT					
50	2	TIME MINUTES					
50	3	COIN ZONE CHARGE COND.					
50	4	COIN ZONE OPR. ROUTE INDEX					
50	5						
50	6						
50	7						
50	8						
50	9						
50	0						
50	1						
50	2						
50	3						
50	4						
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50	6						
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50	9						
50	0						
50							

TRUNK & SERVICE CIRCUIT
ROUTE INDEX RECORDESS UNIT SUSUNAEROUTE INDEX 1ST & 2ND DIGITS 00

ROUTE INDEX 3RD & 4TH DIG.	NAME	TRUNK GROUP NO.	OUTPULSING INFO								TRANSMITTER TYPE	CLASS TONE REQUIRED	INITIAL COIN RETURN	FREE CALL	TRANSFER PERMITTED	OPTIONS	REMARKS	NEXT ROUTE INDEX
			DIGITS DELETED	DIGITS TO BE PREFIXED														
				D 1	D 2	D 3	D 4	D 5*	D 6*	D 7*								
00	ROUTE TRANS. A - DOSITB 611	061																
01	B - DONTINT "328"	032									MF			✓		00		0251
02	C -																	0211
03	D -																	
04	E -																	
05	F -																	
06	G -																	
07	H -																	
08	J -																	
09	K -																	
10	L -																	
11	(010) M - NY2AVETGT	000																0246
12	(006) N - NNWK 2T3	000																0013
13	(038) P - NNWK 2T3	000																0211
14	(010) Q - NY2AVETGT	000																0246
15	(010) R - NY2AVETGT	000																0246
16	A' - 611 INT TRANS	061												✓		00		STOP
17	B' - DONTINT "328"										MF							STOP
18	C -																	
19	D -																	
20	E -																	
21	F -																	
22	G -																	
23	H -																	
24	J -																	
25	K -																	
26	L -																	
27	M - NY2AVETGT	010									MF							0246
28	N - NNWK 2T3	006									MF							0013
29	P - NNWK 2T3	088									MF							0211
30	Q - NY2AVETGT	010	03								MF							0246
31	ROUTE TRANS. R - NY2AVETGT	010	03	0	1	4					MF							0249
32	RINGING - PHASE *1	065																0036
33	RINGING - PHASE *2	074																0037
34	RINGING - PHASE *3	084																0035
35	RINGING ADVANCE - PHASE *1	065																0049
36	RINGING ADVANCE - PHASE *2	074																0050
37	RINGING ADVANCE - PHASE *3	084																0039
38	SPECIAL RINGING CKT.	077																STOP
39	RINGING ADVANCE - PHASE *1	065																STOP
40	AUDIBLE RINGING - PHASE *1	023																0044
41	AUDIBLE RINGING - PHASE *2	033																0045
42	AUDIBLE RINGING - PHASE *3	034																0043
43	AUDIBLE RINGING ADV. - PHASE *1	023																0047
44	AUDIBLE RINGING ADV. - PHASE *2	033																0048
45	AUDIBLE RINGING ADV. - PHASE *3	034																0046
46	AUDIBLE RINGING ADV. - PHASE *1	023																STOP
47	AUDIBLE RINGING ADV. - PHASE *2	033																STOP
48	AUDIBLE RINGING ADV. - PHASE *3	034																STOP
49	RINGING ADVANCE - PHASE *2	074																STOP

* IF THESE DIGITS ARE TO BE PREFIXED THE SUCCEEDING ROUTE INDEX MUST BE LEFT BLANK

TRUNK & SERVICE CIRCUIT

ROUTE INDEX RECORD

ESS UNIT SUSUNAE

ESS 1303-A, 7 68

TEL. CO: 401

BASE _____ CONT. GR. _____

FORM CODE: 40

ROUTE INDEX 1ST & 2ND DIGITS 00

ROUTE INDEX 1ST 2ND 3RD & 4TH DIG.	NAME	TRUNK GROUP NO.	OUTPULSING INFO														TRANSMITTER TYPE	CLASS TONE REQUIRED	INITIAL COIN RETURN	FREE CALL	TRANSFER PERMITTED	OPTIONS	REMARKS	NEXT ROUTE INDEX
			DIGITS DELETED	DIGITS TO BE PREFIXED																				
				D 1	D 2	D 3	D 4	D 5*	D 6*	D 7*														
50	RINGING ADVANCE - PHASE #3	084																		STOP				
51	BUSY TONE	027																		STOP				
52	MANUAL ORIGINATING LINES																							
53	ACCESS CODE DIALED IN ERROR	031													✓		04			STOP				
54	ACCESS CODE NOT DIALED																							
55	PERSON TO PERSON NOT ALLOWED																							
56	C and P TEST W/O TRANSMITTER	—																		STOP				
57	M.F. TRANSMITTER -	069																						
58	DIAL PULSE TRANS -																							
59	REVERTIVE TRANS -																							
60	P.C.I. TRANSMITTER -																							
61	-																							
62	-																							
63	- TRAN																							
64	INTRACOFFICE TRUNK																							
65	M.F. RECEIVER - REC	068																						
66	DIAL PULSE REC -																							
67	REVERTIVE REC -																							
68	P.C.I. RECEIVER -																							
69	-																							
70	-																							
71	-																							
72	-																							
73	-																							
74	-																							
75	-																							
76	CUST DP-OFL GRP -																			STOP				
77	CUSTOMER DIAL PULSE - REC	063																		STOP				
78	CUSTOMER COMB. TOUCH TONE-REC	064																		STOP				
79	MCC TOUCH TONE - REC	086																		0078				
80	REGULAR OVERFLOW	028																		STOP				
81	COMMON OVERFLOW	024																		STOP				
82	DEVERTING NUMBER-OPR HANDLED	043													✓		01							
83	TEMPORARY DISCONNECT	049													✓		11							
84	UNRECORDED NUMBER	049													✓		11							
85	UNRECORDED NUMBER	049													✓		15							
86	UNRECORDED NUMBER	049													✓		15							
87	UNRECORDED SERVICE - ERROR	031													✓		04							
88	UNRECORDED INTERCEPT	044													✓		01							
89	VACANT CODE	031													✓		04			STOP				
90	HOLDING TRUNKS	026													✓					STOP				
91	RECEIVER OFF HOOK-ANN.	030													✓		04							
92	TRUNK & LINE TEST R.I. 0	—	02																					
93	" " " " " 1	—	03																					
94	" " " " " 2	—	04																					
95	MCC ACCESS TRUNK	052	01																					
96	PEARSON BUSY NO. - TEST	027																						
97	MILLINAY TEST -	059																		STOP				
98	SYNCH INC. TRK. -	000																						
99	LOOP AROUND - PORT#0-TEST	062													✓					STOP				

* IF THESE DIGITS ARE TO BE PREFIXED THE SUCCEEDING ROUTE INDEX MUST BE LEFT BLANK

** ALTERNATE ROUTE TO ROUTE INDEX 0101 OR 0102

Issue 2: December 1, 1970

ESS 1303-B, 7-68
 TEL. CO: 401
 BASE _____ CONT. GR. _____
 FORM CODE: 40

TRUNK & SERVICE CIRCUIT
 ROUTE INDEX RECORD
 ESS UNIT SUSUNAE

12-45

ROUTE INDEX 1ST & 2ND DIGITS 01

ROUTE INDEX 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49		NAME	TRUNK GROUP NO. 25 27	OUTPULSING INFO.														TRANSMITTER TYPE 37 38	CLASS TONE REQUIRED 39	INITIAL COIN RETURN 40	FREE CALL	TRANSFER PERMITTED 42	OPTIONS 43 44	REMARKS	NEXT ROUTE INDEX 45 46																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
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*IF THESE DIGITS ARE TO BE PREFIXED THE SUCCEEDING ROUTE INDEX MUST BE LEFT BLANK

TRUNK & SERVICE CIRCUIT ROUTE INDEX RECORD

ESS UNIT _____

ESS 1303-B, 7-68

TEL. CO: _____

BASE _____ CONT. GR. _____

FORM CODE: _____

ROUTE INDEX 1ST & 2ND DIGITS 0 1

ROUTE INDEX 3RD & 4TH DIG.	NAME	TRUNK GROUP NO.	OUTPULSING INFO.							TRANSMITTER TYPE	CLASS TONE REQUIRED	INITIAL COIN RETURN	FREE CALL	TRANSFER PERMITTED	OPTIONS	REMARKS	NEXT ROUTE INDEX
			DIGITS DELETED	DIGITS TO BE PREFIXED													
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*IF THESE DIGITS ARE TO BE PREFIXED THE SUCCEEDING ROUTE INDEX MUST BE LEFT BLANK

TEL. CO: 401
 BASE _____ CONT. GR. _____
 FORM CODE: 40

 TRUNK & SERVICE CIRCUIT
 ROUTE INDEX RECORD
 ESS UNIT SUSUNAE
ROUTE INDEX 1ST & 2ND DIGITS 02

ROUTE INDEX 3rd & 4th DIG.	NAME	TRUNK GROUP NO.	OUTPULSING INFO							TRANSMITTER TYPE	CLASS TONE REQUIRED	INITIAL COIN RETURN	FREE CALL	TRANSFER PERMITTED	OPTIONS	REMARKS	NEXT ROUTE INDEX	
			DIGITS DELETED	DIGITS TO BE PREFIXED														
				D 1	D 2	D 3	D 4	D 5*	D 6*									D 7*
00	DODVLTOLL DIRCF (RESTR)	037										✓		01		STOP		
01	DODVLTOLL O+RCM (RESTR)	039										✓		01		STOP		
02	DODVLTOLL O+RC CN (RESTR)	038									—	✓		01	PUBLIC COIN	STOP		
03	DODVLTOLL O+RC CN (RESTR)	038									H	✓		03	SEMI- PUBLIC	STOP		
04	DODVLT FREQ (PREFIX 0 ON 201 + ALL NPA CODES & ROW TO 320)	011								MF						0205		
05	DODVLT FIN (PREFIX 0 ON 201 + ALL NPA CODES & ROW TO 320)	007								MF						STOP		
06	DODVLT 571	060														STOP		
07	DODVLTOLL DIRCF (SUBSCRIBERS)	037									H	✓		03		STOP		
08	DODVLT FREQ (REF NPA)	011								MF						0207		
09	DODVLT FIN (REF NPA)	007								MF						STOP		
10	DODVLT INT.	008								MF						0211		
11	DODVLT FIN	007								MF						STOP		
12																		
13	MRMRTNT	004								MF						0211		
14	DODVLT INT (DTWX)	008								MF						0211		
15	MRMRTNT (320)	004								MF						0217		
16	RESERVE FOR USE WITH RTE INDEX PRECEDING																	
17	DODVLT FIN (320)	007								MF						STOP		
18	RESERVE FOR USE WITH RTE INDEX PRECEDING																	
19	DODVLT 012 (347-398)	002 02								MF			✓			STOP		
20	MRMRTNT (DTWX)	004								MF						0211		
21	DODVLT 0123 (361-366-895)	001 02								MF			✓			STOP		
22	AKAK NY 012 (625-627)	003 02								MF			✓			STOP		
23	MRMRTNT 012 (538-539)	005 02								MF						0213		
24	DODVLTOLL DIRCF (0+211)	037									—	✓		01		STOP		
25	DODVLTOLL O+RCM	039									—	✓		01		STOP		
26	DODVLTOLL O+RC CN-PUB	038									—	✓		01		STOP		
27	DODVLTOLL O+RC CN-SEMI	038									H	✓		03		STOP		
28	MRMRTNT IFITC 411	009									—	✓		00		STOP		
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* IF THESE DIGITS ARE TO BE PREFIXED THE SUCCEEDING ROUTE INDEX MUST BE LEFT BLANK

TRUNK & SERVICE CIRCUIT ROUTE INDEX RECORD

ESS 1303-C, 7-68

ESS UNIT _____

 TEL. CO: _____
 BASE _____ CONT. GR. _____

ROUTE INDEX 1ST & 2ND DIGITS _____

FORM CODE: _____

ROUTE INDEX 1ST 2ND 3RD & 4TH DIG.	NAME	TRUNK GROUP NO.	OUTPULSING INFO.							TRANSMITTER TYPE	CLASS TONE REQUIRED	INITIAL COIN RETURN	FREE CALL	TRANSFER PERMITTED	OPTIONS	REMARKS	NEXT ROUTE INDEX
			DIGITS DELETED	DIGITS TO BE PREFIXED													
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* IF THESE DIGITS ARE " " BE PREFIXED THE SUCCEEDING ROUTE INDEX MUST BE LEFT BLANK

PAGE 1 OF 7

RATE AND ROUTE CHART

TITLE REGULAR

NO. 1 ESS

ESS UNIT SUSUNAE

ESS 1304-A, 7-68

TEL. CO: 401BASE CONT. GR. FORM CODE: 46CHART NO. 01

SCREENING CODE	SUBS. CLASS OF SERVICE										SCREENING CODE	SUBS. CLASS OF SERVICE										SCREENING CODE	SUBS. CLASS OF SERVICE																														
	COLUMN 0 0 0 1											COLUMN 0 0 0 2											COLUMN 0 0 0 3																														
	FLAT IND - 2 PTY - PBX											MESSAGE-IND-2 PTY- PBX											TWL (3 ROW) E/W LAMA																														
	SPEC ROUTE INDEX	CHG.	ACC	SPCALL TYPE	REMARKS							SPEC ROUTE INDEX	CHG.	ACC	SPCALL TYPE	REMARKS							SPEC ROUTE INDEX	CHG.	ACC	SPCALL TYPE	REMARKS																										
22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37						
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01	0200	000	--	13						01	0201	000	--	13			01	0089	000	--	13											01	0089	000	--	13																	
02	REGL	017	--	--						02	REGL	017	--	--			02	REGL	017	--	--											02	REGL	017	--	--																	
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05	REGL	000	--	--						05	0225	000	--	03			05	0089	000	--	01										05	0089	000	--	01																		
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ESS 1304-A, 7-68

RATE AND ROUTE CHART

PAGE 2 OF 8
 TEL. CO: 401
 BASE _____ CONT. GR. _____
 FORM CODE: 46

 NO. 1 ESS
 ESS UNIT SUSUNAE
CHART NO. 01

SCREENING CODE	SUBS. CLASS OF SERVICE										SCREENING CODE	SUBS. CLASS OF SERVICE										SCREENING CODE	SUBS. CLASS OF SERVICE									
	COLUMN 0 0 0 4											COLUMN 0 0 0 5											COLUMN 0 0 0									
	TXL (# ROW) E/W LAMA											HOTEL - MOTEL											IMR IMB									
SPEC ROUTE INDEX	CHG.	ACC	SPCALL TYPE	REMARKS	SPEC ROUTE INDEX	CHG.	ACC	SPCALL TYPE	REMARKS	SPEC ROUTE INDEX	CHG.	ACC	SPCALL TYPE	REMARKS	SPEC ROUTE INDEX	CHG.	ACC	SPCALL TYPE	REMARKS													
00	REGL	000	-	-		00	0089	000	-	01		00	0089	000	-	01		00	0089	000	-	01										
01	REGL	017	-	-		01	0089	000	-	13		01	0089	000	-	13		01	0089	000	-	13										
02	0204	017	-	-	10	02	0089	000	-	13		02	0089	000	-	13		02	REGL	017	-	-										
03	0089	000	-	-	00	03	REGL	019	-	-		03	REGL	019	-	-		03	REGL	016	-	-										
04	0089	000	-	-	00	04	0089	000	-	00		04	0089	000	-	00		04	REGL	017	-	-										
05	0089	000	-	-	01	05	0089	000	-	03		05	0089	000	-	03		05	0204	000	-	-	03									
06	0089	000	-	-	01	06	REGL	000	-	-		06	REGL	000	-	-		06	REGL	016	-	-										
07	0231	017	-	-	10	07	0089	000	-	13		07	0089	000	-	13		07	0089	000	-	-	13									
08	0233	017	-	-	10	08	0089	000	-	13		08	0089	000	-	13		08	0089	000	-	-	13									
09	0235	017	-	-	10	09	0089	000	-	13		09	0089	000	-	13		09	0089	000	-	-	13									
10	0237	017	-	-	10	10	0089	000	-	13		10	0089	000	-	13		10	0089	000	-	-	13									
11	0239	017	-	-	10	11	0089	000	-	13		11	0089	000	-	13		11	0089	000	-	-	13									
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PAGE ____ OF ____

RATE AND ROUTE CHART
TITLE _____

NO. 1 ESS

ESS UNIT _____

ESS 1304-A, 7-68

TEL. CO: _____

BASE _____ CONT. GR. _____

FORM CODE: _____

CHART NO. _____

SCREENING CODE		SUBS. CLASS OF SERVICE					SCREENING CODE		SUBS. CLASS OF SERVICE					SCREENING CODE		SUBS. CLASS OF SERVICE				
		COLUMN 18 19 20 21							COLUMN 18 19 20 21							COLUMN 18 19 20 21				
SPEC ROUTE INDEX	CHG.	ACC I O	SPCALL TYPE	REMARKS	CCD	SPEC ROUTE INDEX	CHG.	ACC I O	SPCALL TYPE	REMARKS	CCD	SPEC ROUTE INDEX	CHG.	ACC I O	SPCALL TYPE	REMARKS	CCD			
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ESS 1305, 7-68

TEL. CO:

BASE CONT. GR. FORM CODE:

RATE & ROUTE PATTERN RECORD

NO. 1 ESS

ESS UNIT RATE & ROUTE PATTERN 1ST & 2ND DIGITS

RBR PAT. 3RD & 4TH DIG	RATE & ROUTE CHART NO.															REG CALL TYPE	REGULAR ROUTE INDEX	F.A.T. NO.	OVERLAP OP.	REMARKS
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15					
	SCREENING CODES																			
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RATE & ROUTE PATTERN RECORD

ESS 1305, 7-68

TEL. CO: 401

NO. 1 ESS
ESS UNIT SUSUNAE

BASE _____ CONT. GR. _____

RATE & ROUTE PATTERN 1ST & 2ND DIGITS 0 0FORM CODE: 44

R&R PAT 3rd 4th DIG	REG CN INTRA INTER PBX															RATE & ROUTE CHART NO.	REG CALL TYPE	REGULAR ROUTE INDEX	FAT NO	OVERLAP OP	REMARKS
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15						
00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17	-	-	-	TRAFFIC COUNTS	
01	01	14	01	07	01	-	-	-	-	-	-	-	-	-	-	10	0204	-	-	(RESID PA.)	
02	02	14	01	01	01	-	-	-	-	-	-	-	-	-	-	10	0209	-	-	BAND 1	
03	02	14	01	02	01	-	-	-	-	-	-	-	-	-	-	10	0202	-	-	2	
04	02	14	01	03	01	-	-	-	-	-	-	-	-	-	-	10	0202	-	-	3	
05	02	14	01	04	01	-	-	-	-	-	-	-	-	-	-	10	0202	-	-	4	
06	02	14	01	05	01	-	-	-	-	-	-	-	-	-	-	10	0202	-	-	5	
07	02	14	01	06	01	-	-	-	-	-	-	-	-	-	-	10	0202	-	-	6	
08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	00	0058	-	-	(VE 10/6 175)	
09	03	00	02	02	02	-	-	-	-	-	-	-	-	-	-	07	0221	-	-	(331-346-175)	
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	0058	-	-	(VE 10 10/175)	
11	03	00	02	02	02	-	-	-	-	-	-	-	-	-	-	07	0217	-	-	(347-379) FS	
12	03	00	02	02	02	-	-	-	-	-	-	-	-	-	-	07	0222	-	-	(625-671)	
13	03	00	02	02	02	-	-	-	-	-	-	-	-	-	-	07	0221	-	-	(328)	
14	03	00	02	02	02	-	-	-	-	-	-	-	-	-	-	05	0021	-	-	(584)	
15	04	00	02	02	03	-	-	-	-	-	-	-	-	-	-	07	0223	-	-	(538-539) 104	
16	04	00	02	02	03	-	-	-	-	-	-	-	-	-	-	07	0213	-	-	MRTN (104)	
17	04	01	02	02	03	-	-	-	-	-	-	-	-	-	-	07	0213	-	-	(154)	
18	04	02	02	02	04	-	-	-	-	-	-	-	-	-	-	07	0213	-	-	(204)	
19	04	02	02	02	05	-	-	-	-	-	-	-	-	-	-	07	0213	-	-	(254)	
20	04	02	02	02	04	-	-	-	-	-	-	-	-	-	-	07	0012	-	-	NNWK 273 (204)	
21	04	02	02	02	05	-	-	-	-	-	-	-	-	-	-	07	0012	-	-	(254)	
22	04	04	04	02	01	-	-	-	-	-	-	-	-	-	-	07	0012	-	-	(334)	
23	04	05	04	02	01	-	-	-	-	-	-	-	-	-	-	07	0012	-	-	(354)	
24	04	01	02	02	03	-	-	-	-	-	-	-	-	-	-	07	0210	-	-	DODNT INT (154)	
25	04	02	02	02	04	-	-	-	-	-	-	-	-	-	-	07	0210	-	-	(234)	
26	04	03	04	02	05	-	-	-	-	-	-	-	-	-	-	07	0210	-	-	(254)	
27	04	04	04	02	01	-	-	-	-	-	-	-	-	-	-	07	0210	-	-	(204)	
28	04	05	04	02	01	-	-	-	-	-	-	-	-	-	-	07	0210	-	-	(354)	
29	04	06	04	02	01	-	-	-	-	-	-	-	-	-	-	07	0210	-	-	(404)	

ESS 1306, 7:68

TEL. CO:

BASE

CONT. GR.

FORM CODE:

10

LINE CLASS CODE RECORD

NO. 1 ESS

ESS UNIT SUSUNAEITEM 1ST & 2ND DIGIT 00

ITEM 22	CLASS CODE 23	CHART CLASS 24 25		MAJOR CLASS 26 27		REMARKS	ITEM 22	CLASS CODE 23	CHART CLASS 24 25		MAJOR CLASS 26 27		REMARKS
		CHART	COLUMN	ORIG	TERM				CHART	COLUMN	ORIG	TERM	
00	IFR	01	0001	04	04	IND FLAT RES	50	FSC	01	0001	04	04	FLAT PBX SER. COMPL
01	IFB	01	0001	04	04	IND FLAT BUS	51	MSC	01	0002	04	04	MSG
02	2FR	01	0001	06	06	2 PTY FLAT RES	52	TD3	05	0016	04	04	TOLL DIV PBX 1ST
03	2FB	01	0001	06	06	2 PTY FLAT BUS	53	TD4	05	0017	04	04	{ { { 204 } NOTE 1
04	THB	01	0005	23	23	HOTEL MOTEL MSG	54	TD5	05	0018	04	04	{ { { 204 } REL
05	IPC	02	0006	21	21	PUBLIC COIN	55	MCC	01	0001	20	20	MCC TEST LINE
06	IPH	02	0006	21	21	IND CN NON-TRANS	56	PBX	01	0001	04	04	
07	ISP	03	0007	21	21	SEMI-PUBLIC CN	57	2FL	01	0001	04	04	
08	AFH	01	0001	04	04	IND FLAT RES ADD'L	58	TWX	01	0003	04	04	(3 ROW TWX)
09	IFW	01	0001	04	04	{ { { W/O TEL.	59	4TX	01	0004	04	04	(3 ROW TWX)
10	IFC	01	0001	04	04	{ { { ADD'L W/O TEL.	60	IMR	01	00200	04	04	SELECTED SUBCR FEATURE TRIAL
11	TFR	01	0001	04	04	{ { { TRUNK RES	61	IMB	01	00200	04	04	{ { {
12	TFB	01	0001	04	04	COMB FLAT RES TRK	62	IMN	01	0001	01	01	MANUAL ORIGINATION (PSTN)
13	2FW	01	0001	06	06	2 PTY FLAT RES W/O TEL.	63	SBL	01	0001	22	22	SERVICE ORDER ACTIVATION LINE
14	SLN	01	0001	04	04	AUX LINE	64	DNY	01	0001	06	06	2 WAY DENIED
15	ALY	01	0001	04	04	{ { { W/O TEL	65	IDN	01	0001	02	02	DENIED ORIGINATION INDIVID
16	IFK	01	0001	04	04	IND FLAT BUS ADD'L	66	RDN	01	0001	02	02	DENIED ORIGINATION 2 PTY
17	IFL	01	0001	04	04	{ { { W/O TEL	67	DN1	01	0001	04	04	DENIED TERMINATION INDIVID
18	IXV	01	0001	04	04	{ { { W/O TEL ADD'L	68	DN2	01	0001	06	06	DENIED TERMINATION 2 PTY
19	TFB	01	0001	04	04	{ { { TRUNK BUS	69	TTT	01	0021	04	04	TOUCHTONE DEMONSTRATORS
20	TFB	01	0001	04	04	ANNOUNCEMENT LINE	70	RMN	01	0001	01	01	MANUAL ORIGINATION (PSTN)
21	TEC	01	0001	04	04	COMB FLAT TRK BUS	71	IER	01	0022	04	04	OPTIONAL EXTENDED AREA SERVICE
22	JPD	01	0001	04	04	DIR INWARD DIAL TRK	72						
23	TFU	01	0001	04	04	FLAT TRK BUS 1 WAY OUT	73						
24	ESU	01	0002	04	04	IND MSG EXHIB. SVC	74						
25	TE3	01	0002	04	04	{ { { TRK EXHIB. SVC	75						
26	VHB	01	0002	04	04	HOTEL MET MSG TRK	76						
27	TSY	03	0019	21	21	NON COIN IND SEMI-PUB	77						
28	IBF	01	0001	04	04	IND LINE	78						
29	IFL	01	0001	04	04	{ { { W/O TEL	79						
30	IFC	01	0001	04	04	TRUNK	80						NOTE 1 - ARBITRARY ASSIGN
31	IFB	02	0006	21	21	AUX CN TRANS	81						OF USOC CODE FOR
32	IFB	02	0006	21	21	{ { { NON-TRANS	82						TOLL DIVERSION
33	IFB	02	0006	21	21	Co ATT. PUB. CN	83						
34	IFB	02	0006	21	21	CN TEL EXHIB. SVC	84						
35	IFB	02	0007	04	04	WATS 7A	85						
36	IFB	02	0008	04	04	{ { { 7B	86						
37	IFB	02	0009	04	04	{ { { 7C	87						
38	IFB	02	0010	04	04	WATS BAND 1 (F)	88						
39	IFB	02	0010	04	04	{ { { 1 (M)	89						
40	IFB	02	0011	04	04	{ { { 2 (F)	90						
41	IFB	02	0011	04	04	{ { { 2 (M)	91						
42	IFB	02	0012	04	04	{ { { 3 (F)	92						
43	IFB	02	0012	04	04	{ { { 3 (M)	93						
44	IFB	02	0013	04	04	{ { { 4 (F)	94						
45	IFB	02	0013	04	04	{ { { 4 (M)	95						
46	IFB	02	0014	04	04	{ { { 5 (F)	96						
47	IFB	02	0014	04	04	{ { { 5 (M)	97						
48	IFB	02	0015	04	04	{ { { 6 (F)	98						
49	IFB	02	0015	04	04	{ { { 6 (M)	99						

LINE CLASS CODE RECORD

NO. 1 ESS

ESS 1306, 7-68

TEL. CO: _____

BASE _____ CONT. GR. _____

FORM CODE: _____

ITEM 1ST & 2ND DIGIT _____

ESS UNIT _____

ITEM 3 RD & 4 TH DIG.	CLASS CODE	CHART CLASS		MAJOR CLASS		REMARKS	ITEM 3 RD & 4 TH DIG.	CLASS CODE	CHART CLASS		MAJOR CLASS		REMARKS
		CHART	COLUMN	ORIG	TERM				CHART	COLUMN	ORIG	TERM	
00							50						
01							51						
02							52						
03							53						
04							54						
05							55						
06							56						
07							57						
08							58						
09							59						
10							60						
11							61						
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42							92						
43							93						
44							94						
45							95						
46							96						
47							97						
48							98						
49							99						

ESS-1502A (7-68)

ABBREVIATED CLASS CODE RECORD

TEL. CO. 401ORIGINATING
NO. 1 ESSBASE 6 7 8 9 CONT. GR. 10 11FORM CODE 06ESS UNIT SUSUNAE

ABBR. CODE NUMBER	ORIGINATING CODES																CHART COLUMN	SUPP. ABB. CLASS CODE TABLE NO.	REMARKS
	MAJOR CLASS	EQUIPMENT				FEATURES				DTR	CNF	ADO	SBN						
		TTC	TES	GND															
21	04																0001	INDIVIDUAL FLAT	
22	04	✓															0001	INDIVIDUAL WITH TOUCH TONE	
23	06																0001	2 PTY FLAT	
24	21			✓													0006	PUBLIC COIN	
25																			
26																			
27																			
28																			
29																			
30																			
31																			
32																			
33																			
34																			
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62																			
63																			

NOTE: ABBREVIATED CODES 00-20 ARE PRE-ASSIGNED FOR ALL ESS OFFICES.

ABBREVIATED CLASS CODE RECORD

TERMINATING

NO. 1 ESS

ESS 1502 B, 7-68

TEL. CO: 401CONT. GR. 5 4 3FORM CODE: 08

BASE

6 7 8 910 11ESS UNIT SUSUNAE

ABBR. CODE NUMBER		TERMINATING CODES													REMARKS		
		MAJOR CLASS	RING COMB.		EQUIPMENT						FEATURES						
			MULT.	CODE	GND	FRE					CWT	ADO	SER				
21	02																INDIVIDUAL FLAT
22	06	1															2 PTY FLAT (PARTY 1)
23	06	3															↓ ↓ (PARTY 2)
44	21				✓												PUBLIC COIN
25																	
26																	
27																	
28																	
29																	
30																	
31																	
32																	
33																	
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NOTE: ABBREVIATED CODES 00-20 ARE PRE-ASSIGNED FOR ALL ESS OFFICES.

OUTGOING AUTOMATIC TRUNK
TESTING ASSIGNMENTTEL. CO:

NO. 1 ESS

BASE CONT. GR. FORM CODE: 22ESS UNIT

ITEM	TRUNK GROUP	TEST TABLE	REMARKS	ITEM	TRUNK GROUP	TEST TABLE	REMARKS
00				50			
01				51			
02				52			
03				53			
04				54			
05				55			
06				56			
07				57			
08				58			
09				59			
10				60			
11				61			
12				62			
13				63			
14				64			
15				65			
16				66			
17				67			
18				68			
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48				98			
49				99			

OUTGOING AUTOMATIC TRUNK
TESTING ASSIGNMENT

ESS 1504, 7-68

NO. 1 ESS

ESS UNIT SUSUNAETEL. CO: 401BASE 1 CONT. GR. 11FORM CODE: 22

ITEM	TRUNK GROUP	TEST TABLE	REMARKS	ITEM	TRUNK GROUP	TEST TABLE	REMARKS
00	001	001	DODOL 0123 (366-361-895)	50			
01	002	002	HHAPT 012 (398-347)	51			
02	005	002	MRMATH 012 (538-539)	52			
03	003	003	RRKKNY 012 (627-625)	53			
04	003	003	COSES TESTING MRMATH	54			
05	003	003	COSES TESTING MNWRTS (2-12-68)	55			
06	003	003	COSES TESTING DOLOVT	56			
07	010	010	COSES TESTING NYE METER	57			
08	011	011	COSES TESTING DODOLFO (2-12-68)	58			
09	003	003	COSES TESTING MNWRTS (2-12-68)	59			
10	007	007	COSES TESTING DOLOVT FIN	60			
11				61			
12				62			
13				63			
14				64			
15				65			
16				66			
17				67			
18				68			
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47				97			
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49				99			

NO. 1 ESS

W.E. ORDER NO: 40223

ESS UNIT ~~Supra~~

FORM CODE: 72

TABLE NUMBER 0 HUNDRED

[illegible]

2 2 2 2 2 REGISTERS 2 2 2 QUES 2 2 2

6.2.2.2 STORE TABLE ASSIGNMENT SECTION

654 41 F G I S T E R S

646 #TABLE	647 #NAME	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	1222	1223	1224	1225	1226	1227	1228	1229	1230	1231	1232	1233	1234	1235	1236	1237	1238	1239	1240	1241	1242	1243	1244	1245	1246	1247	1248	1249	1250	1251	1252	1253	1254	1255	1256	1257	1258	1259	1260	1261	1262	1263	1264	1265	1266	1267	1268	1269	1270	1271	1272	1273	1274	1275	1276	1277	1278	1279	1280	1281	1282	1283	1284	1285	1286	1287	1288	1289	1290	1291	1292	1293	1294	1295	1296	1297	1298	1299	1300	1301	1302	1303	1304	1305	1306	1307	1308	1309	1310	1311	1312	1313	1314	1315	1316	1317	1318	1319	1320	1321	1322	1323	1324	1325	1326	1327	1328	1329	1330	1331	1332	1333	1334	1335	1336	1337	1338	1339	1340	1341	1342	1343	1344	1345	1346	1347	1348	1349	1350	1351	1352	1353	1354	1355	1356	1357	1358	1359	1360	1361	1362	1363	1364	1365	1366	1367	1368	1369	1370	1371	1372	1373	1374	1375	1376	1377	1378	1379	1380	1381	1382	1383	1384	1385	1386	1387	1388	1389	1390	1391	1392	1393	1394	1395	1396	1397	1398	1399	1400	1401	1402	1403	1404	1405	1406	1407	1408	1409	1410	1411	1412	1413	1414	1415	1416	1417	1418	1419	1420	1421	1422	1423	1424	1425	1426	1427	1428	1429	1430	1431	1432	1433	1434	1435	1436	1437	1438	1439	1440	1441	1442	1443	1444	1445	1446	1447	1448	1449	1450	1451	1452	1453	1454	1455	1456	1457	1458	1459	1460	1461	1462	1463	1464	1465	1466	1467	1468	1469	1470	1471	1472	1473	1474	1475	1476	1477	1478	1479	1480	1481	1482	1483	1484	1485	1486	1487	1488	1489	1490	1491	1492	1493	1494	1495	1496	1497	1498	1499	1500	1501	1502	1503	1504	1505	1506	1507	1508	1509	1510	1511	1512	1513	1514	1515	1516	1517	1518	1519	1520	1521	1522	1523	1524	1525	1526	1527	1528	1529	1530	1531	1532	1533	1534	1535	1536	1537	1538	1539	1540	1541	1542	1543	1544	1545	1546	1547	1548	1549	1550	1551	1552	1553	1554	1555	1556	1557	1558	1559	1560	1561	1562	1563	1564	1565	1566	1567	1568	1569	1570	1571	1572	1573	1574	1575	1576	1577	1578	1579	1580	1581	1582	1583	1584	1585	1586	1587	1588	1589	1590	1591	1592	1593	1594	1595	1596	1597	1598	1599	1600	1601	1602	1603	1604	1605	1606	1607	1608	1609	1610	1611	1612	1613	1614	1615	1616	1617	1618	1619	1620	1621	1622	1623	1624	1625	1626	1627	1628	1629	1630	1631	1632	1633	1634	1635	1636	1637	1638	1639	1640	1641	1642	1643	1644	1645	1646	1647	1648	1649	1650	1651	1652	1653	1654	1655	1656	1657	1658	1659	1660	1661	1662	1663	1664	1665	1666	1667	1668	1669	1670	1671	1672	1673	1674	1675	1676	1677	1678	1679	1680	1681	1682	1683	1684	1685	1686	1687	1688	1689	1690	1691	1692	1693	1694	1695	1696	1697	1698	1699	1700	1701	1702	1703	1704	1705	1706	1707	1708	1709	1710	1711	1712	1713	1714	1715	1716	1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4.3.5.5. SYNOPSIS

E	22	NTK	1104264,1104264
E	0	NTRO0	
E	0	NTRO1	
E	22	NTRO2	
E	2	NTM	1104265
E	1	NTM	
E	66	NTM	
E	0	NTRO0	
E	0	NTRO1	
E	66	NTRO2	
E	2	NTRC	1107001
E	1	NTM	
E	4	NTS	1104261,1104261,1104262,1104262,1104263,1104263,1104264,1104264,1104265,1104265,1104266,1104266 1104267,1104267,1104270,1104270,1104271,1104271,1104272,1104272,1104273,1104273,1104274,1104274 1104275,1104275,1104276,1104276,1104277,1104277,1104300,1104300,1104301,1104301,1104302,1104302 1104303,1104303,1104304,1104304,1104305,1104305,1104306,1104306,1104307,1104307,1104310,1104310 1104311,1104311,1104312,1104312,1104313,1104313,1104314,1104314,1104315,1104315,1104316,1104316
E	0	NTSC0	
E	0	NTS01	1106640,1106642,1106644,1106646,1106650,1106652,1106654,1106656,1106660,1106662,1106664,1106666 1106670,1106672,1106674,1106676,1106700,1106702,1106704,1106706,1106710,1106712,1106714,1106716 1106720,1106722,1106724,1106726,1106730,1106732
E	4	NTS02	1106640,1106642,1106644,1106646,1106650,1106652,1106654,1106656,1106660,1106662,1106664,1106666 1106670,1106672,1106674,1106676,1106700,1106702,1106704,1106706,1106710,1106712,1106714,1106716 1106720,1106722,1106724,1106726,1106730,1106732
E	2	NTSC	1107043,1107045,1107047,1107051,1107053,1107055,1107057,1107061,1107063,1107065,1107067,1107071 1107073,1107075,1107077,1107101,1107103,1107105,1107107,1107111,1107113,1107115,1107117,1107121 1107123,1107125,1107127,1107131,1107133,1107135
E	1	NTSF	
E	76	NTWK	
T	20565	Q2RFL	
T	71354	Q2RFL	
E	1107021	QAXR	1104223,1107021
E	1	QCTN	
E	42516	QPC1	
E	1106757	QPER	1104250,1106757
E	44172	QRC1	
E	26713	QRCR	
E	1106761	QRCR	1104224,1106761
E	763	QOCC	
E	727	QOCC1	
E	752	QO1C0	
E	726	QO101	
E	745	QO2C0	
E	721	QO2C1	
E	1	QBTN	

12/29/6 17:52:22 IP 17 00FF00 50

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HEPERS 2 2 2 REGISTERS 2 2 2 QUES 2 2 2

1418 *. C.7 FLASH TIME SCAN JUNIOR REGISTER INITIALIZATION - CC ONLY

1420 EXERN ESSEAD,ESLAST

1106743 110 11710 00000000 1424 WX 110100102*5-NFLD1*5

1106744 100 25105 00000000 1425 LP 0,XA,PS

1106745 100 25105 00000000X 1426 LP ESLAST,XA,PS

1106746 710 05710 00000002 1427 WX 2,X

1106747 100 25105 00000000 1428 LP 0,XA,PS

1429 FEATURE

1430 *. C.8 WRITE NUMBER OF TIME SCAN JR REGISTERS IN B6TSJR(CF)-SP,3-TSJRC

1431 FEATURE

1106750 010 03010 00000000 1432 T 0,J

1424 *. C.9 JUNIOR REGISTER HEAD CELL INITIALIZATION AND LINKING DATA

1106751 C100640020034 1437 AMARE DATA16 6=AMPC-1,10=13,21=Y4HAM AMA

1438 CCATA 14=610

1106752 0046100023404 1439 CCATA 23=9988

1106753 0100500020036 1440 CNKR DATA16 6=ACKC-1,10=10,21=Y4HCAK COIN KONTROL

1441 CCATA 14=8

1106754 0000400042776 1442 CCATA 23=17918

1443 FEATURE

1106755 C100400020040 1444 DISR DATA16 6=NCRC-1,10=8,21=Y4HDR DISCONNECT

1445 CCATA 14=32

1106756 0002000043116 1446 CCATA 23=17998

1106757 C100740020042 1447 OPER DATA16 6=NOPC-1,10=15,21=Y4HOP OPERATOR

1448 CCATA 14=20

1106760 0001200043516 1449 CCATA 23=18254

1106761 C101040020044 1450 BRGR DATA16 6=NORC-1,10=17,21=Y4HOR ORIGINATING

1451 CCATA 14=188

1106762 0012600044172 1452 CCATA 23=18554

1106763 0101040017716 1453 IISR DATA16 6=SXRC-1,10=17,21=Y4HISR SXS+FX TRK ORIG

1106764 0001500060270 1454 DATA 14=SXRC02-SXRC01,23=SLC01

1455 FEATURE

1106765 0100200017770 1456 IBLJA DATA16 6=BLJAC-1,10=4,21=20101111 SXS JR A

1457 DATA 14=BLJAC02-BLJAC01,23=SLC01

1106766 0001000062445 1458 IBLJB DATA16 6=BLJEC-1,10=4,21=20101111 SXS JR B

1459 DATA 14=BLJEC02-BLJEC01,23=SLC01

1106770 0000500062552 1460 IBLJC DATA16 6=BLJCC-1,10=4,21=20101111 SXS JR C

1106771 0100200017774 1461 DATA 14=BLJCC02-BLJCC01,23=SLC01

1106772 0000040062627 1462 FEATURE

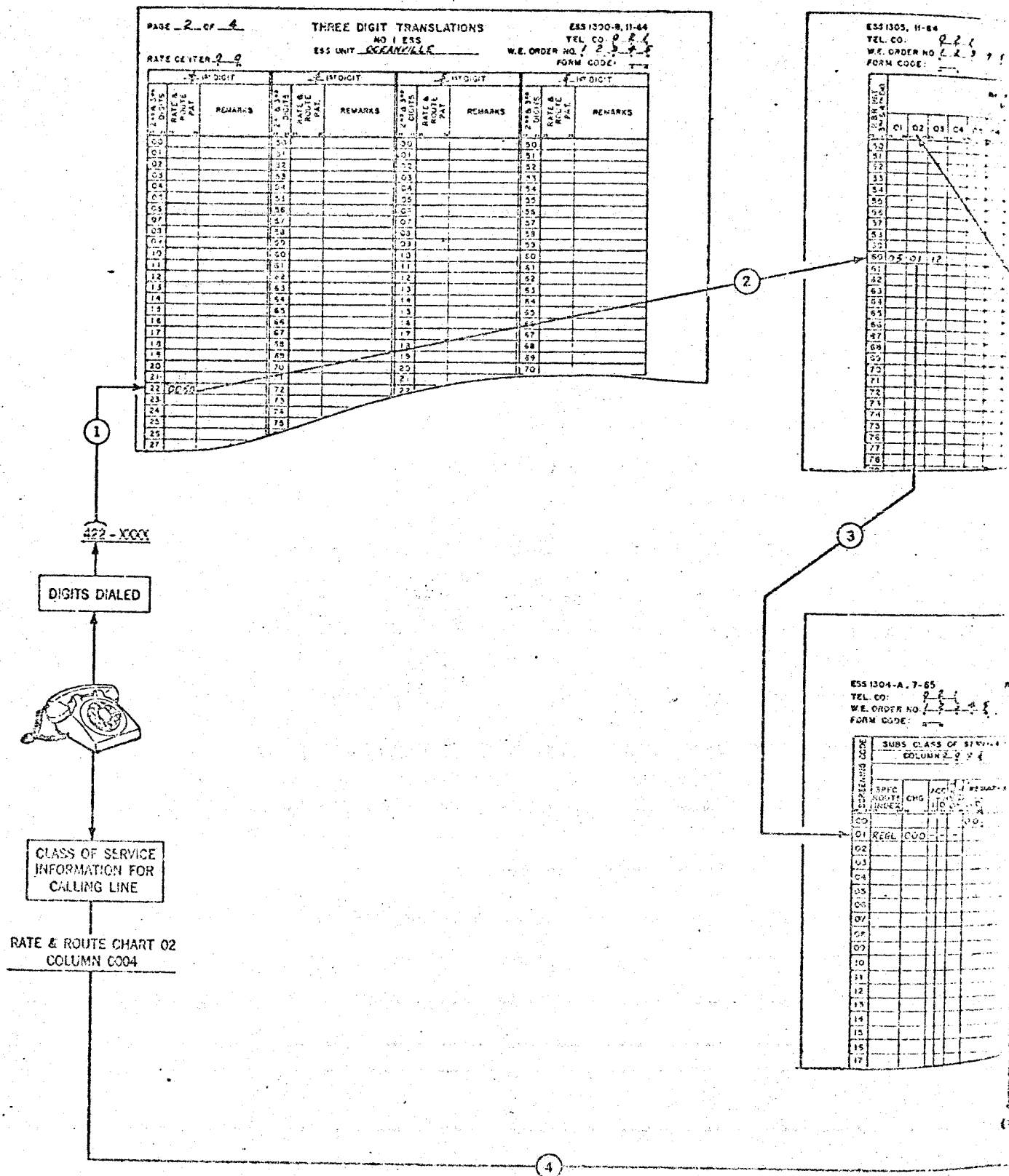
000001000021000100

6=1

10 bits = 17

17ms
188 / 3196

ROUTING AND CHARGE



12-67

CHART 2.

624 0325-6, 0-64
 TEL. CO.: *0000*
 U.S. ORDER NO. *0000*
 FORM CODE: *0000*

TRUNK & SERVICE CIRCUIT
 ROUTE INDEX RECORD
 ESS UNIT *OCEANVILLE*

ROUTE INDEX NO. & 2ND DIGITS *0-0*

LINE NO.	NAME	TRUNK & SERVICE CIRCUIT	ROUTE INDEX RECORD	ESS UNIT	ROUTE INDEX NO. & 2 ND DIGITS
01					
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20	<i>TAYNEAL</i>	<i>SES</i>	<i>-</i>	<i>NR</i>	<i>-</i>
21					
22					
23					
24					
25					

(DIRECT ROUTE) 112 02 DP - - - - 0120

TAYNEAL SES - NR - - - - STEP

ALTERNATE
ROUTE

CALL
TYPE

5A

SUBS CLASS OF SERVICE COLUMN 1-2-3-4		SUBS CLASS OF SERVICE COLUMN 1-2-3-4		SUBS CLASS OF SERVICE COLUMN 1-2-3-4	
SPEC NOTE	CHG INDEX	ADD INDEX	REMARKS	SPEC NOTE	CHG INDEX
00	00	00		00	00
01	01	01		01	01
02	02	02		02	02
03	03	03		03	03
04	04	04		04	04
05	05	05		05	05
06	06	06		06	06
07	07	07		07	07
08	08	08		08	08
09	09	09		09	09
10	10	10		10	10
11	11	11		11	11
12	12	12		12	12
13	13	13		13	13
14	14	14		14	14
15	15	15		15	15
16	16	16		16	16
17	17	17		17	17

(CHART 02 COLUMN 0034)

[illegible]

**CHARGING
ACTION
(FREE CALL)**

ROUTING AND CHARGING ASSIGNMENTS FOR TEN-DIGIT TOLL CALL USING SIX-DIGIT TR

[illegible]

- 015-353-XXXX

DIGITS DIALED



CLASS OF SERVICE
INFORMATION FOR
CALLING LINE

DATE & ROUTE CHART 02,
COLUMN 0003

1 st DIGIT				2 nd DIGIT				3 rd DIGIT				4 th DIGIT			
IN DUITS	RAIL ROUTE	PAI PAT	REMARKS	IN DUITS	RAIL ROUTE	PAI PAT	REMARKS	IN DUITS	RAIL ROUTE	PAI PAT	REMARKS	IN DUITS	RAIL ROUTE	PAI PAT	REMARKS
00				00				00				00			
01				01				01				01			
02				02				02				02			
03				03				03				03			
04				04				04				04			
05				05				05				05			
06				06				06				06			
07				07				07				07			
08				08				08				08			
09				09				09				09			
10				10				10				10			
11				11				11				11			
12				12				12				12			
13				13				13				13			
14				14				14				14			
15				15				15				15			
16				16				16				16			
17				17				17				17			
18				18				18				18			
19				19				19				19			
20				20				20				20			
21				21				21				21			
22				22				22				22			
23				23				23				23			
24				24				24				24			
25				25				25				25			

[illegible]

CHART 02, COLUMN 0003

CA
TY

TEN-DIGIT TOLL CALL USING SIX-DIGIT TRANSLATION

RATE AND RUTE CHART

TITLE 2nd RATE

PIESS 0

ESS UNIT 00000000

PAGE 3 OF 7

CHART NO. 0 0

CF	DATE	CLASS OF SERVICE	DATE	CLASS OF SERVICE
01	01	01	01	01
02	02	02	02	02
03	03	03	03	03
04	04	04	04	04
05	05	05	05	05
06	06	06	06	06
07	07	07	07	07
08	08	08	08	08
09	09	09	09	09
10	10	10	10	10
11	11	11	11	11
12	12	12	12	12
13	13	13	13	13
14	14	14	14	14
15	15	15	15	15
16	16	16	16	16

CALL TYPE

[illegible][illegible]