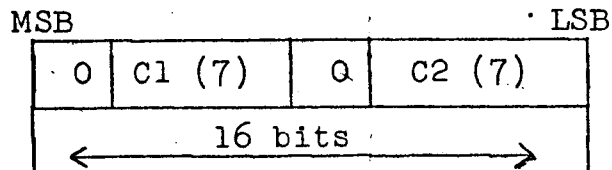


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 DRW
 1/7/71

Display List for Glance - C
 (C = Character)

- A. Character Mode: 2 null characters set display into character mode. Only even sets of characters are acceptable to the display.



- B. Control Mode: A null character followed by ASCII DC2 character will set the display into a control mode.

MSB	LSB
Data (11 bits)	OP-Code
1 _____ 11	12 _____ 16
Escape to CH Mode - All Zero's	1 1 0 0 0
Jump & Wait to Address of M1	1 1 0 0 1
Jump to Address of M1	1 1 0 1 0

Node Communication Format

The design of the communication between the display terminal on the I/O loop and the DDP-516 computer is to let the computer transfer display list, update display list, and to transfer the list of characters in the form of the 2-bit Glance code to the display calculator.

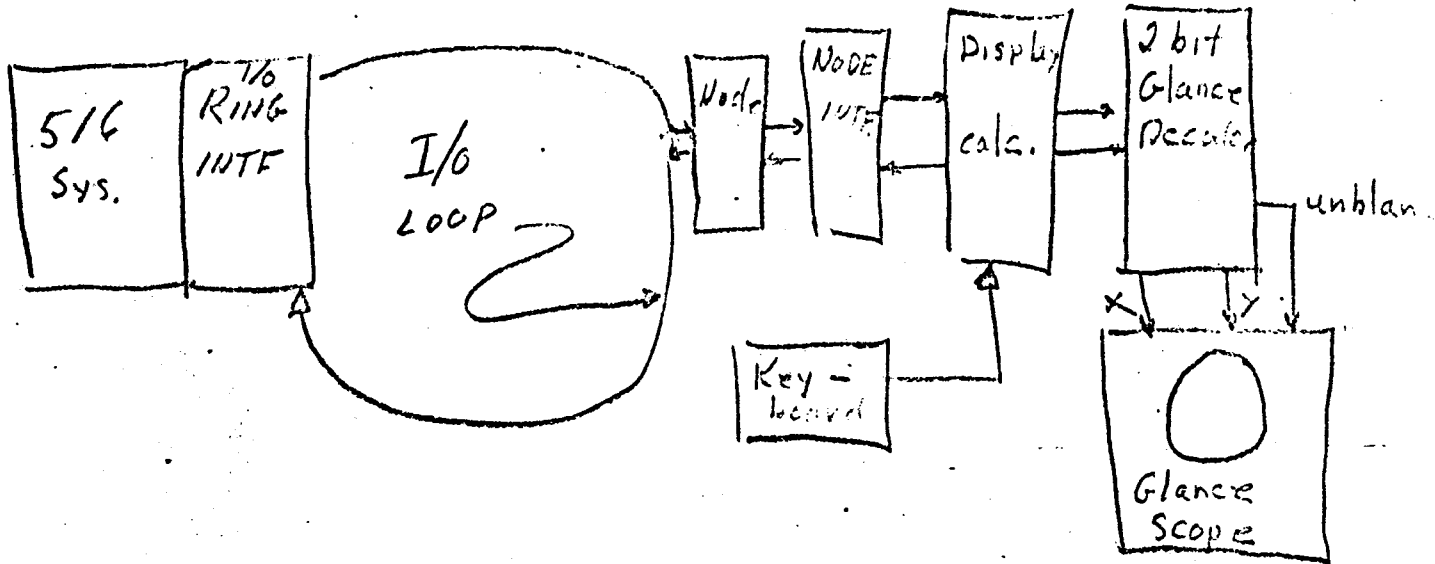
Node	OP Code	MSB										LSB				
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Address of M3										X	Mask 4 bits			
	WC	forces \Rightarrow M3 address to Zero the output of M3 selects node and will read bits 4 thru 11 from the node to the address of M3														
	WC	WD \Rightarrow AR1	0	0	0	0	0	0	0	0	1	0				
		WD \Rightarrow M1	0	0	0	0	0	0	0	1	0	0				
		WD \Rightarrow AR2	0	0	0	0	0	0	0	1	1	0				
		WD \Rightarrow M2	0	0	0	0	0	1	0	0	0	0				
		RD \Rightarrow M1	0	0	0	0	0	1	0	1	0	1*				
		RD \Rightarrow M2	0	0	0	0	0	1	1	0	0	1*				
	WD	to M1 or M2 will increment the memory address AR1 or AR2 after the data is written into memory.														
	RD	from M1 to M2 will read the data to the node register and then increment AR1 or AR2.														

WC = Write Command
WD = Write Data
RD = Read Data

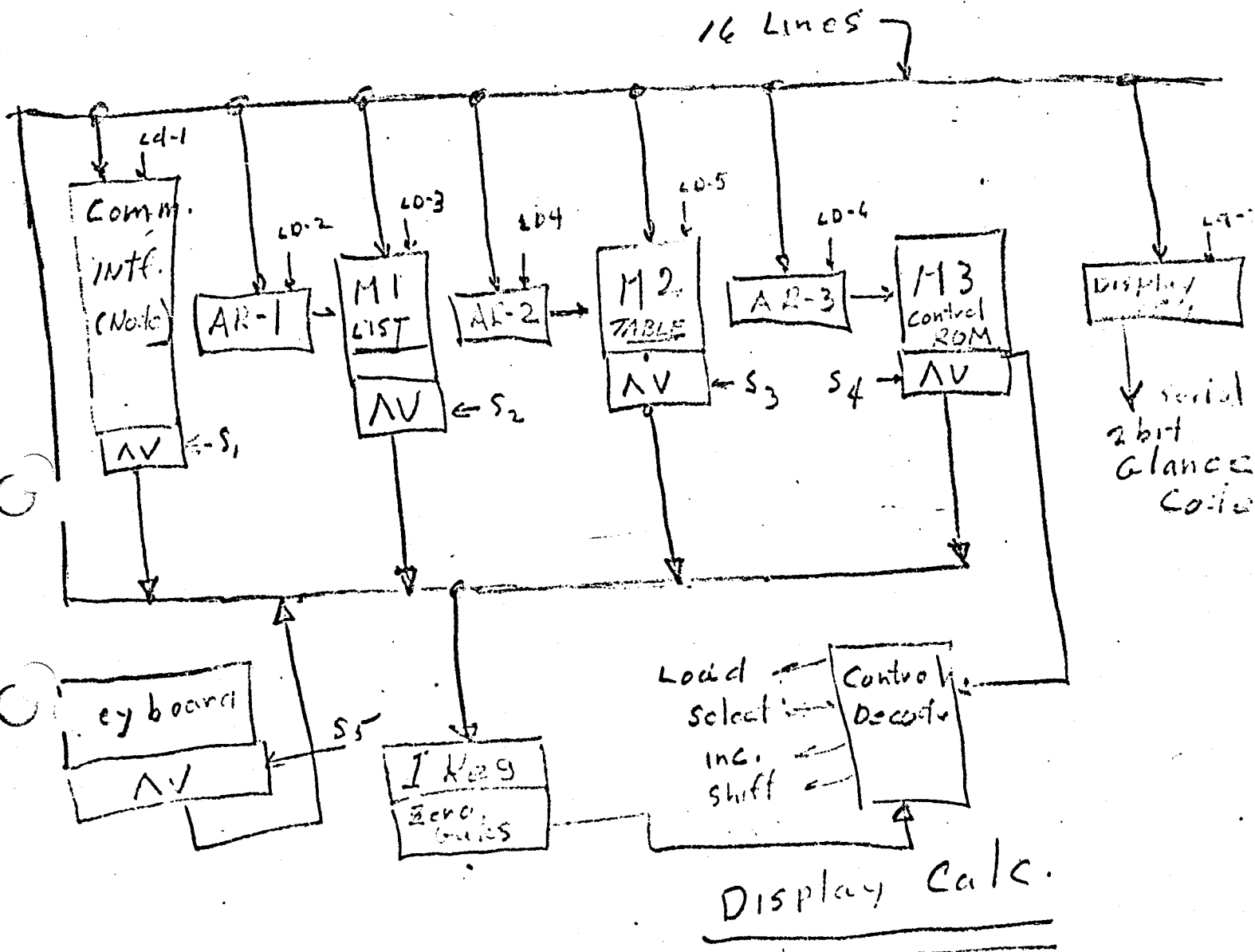
*A WC(write command) with a one in the 12th bit is used for setting up RD(read data) to read the memory into the node output register.

516-34-3
 DRW
 1/14/71

GLANCE DISPLAY Calculator
 for Glance C (Character)



Glance Con 516-Sys-Loop.



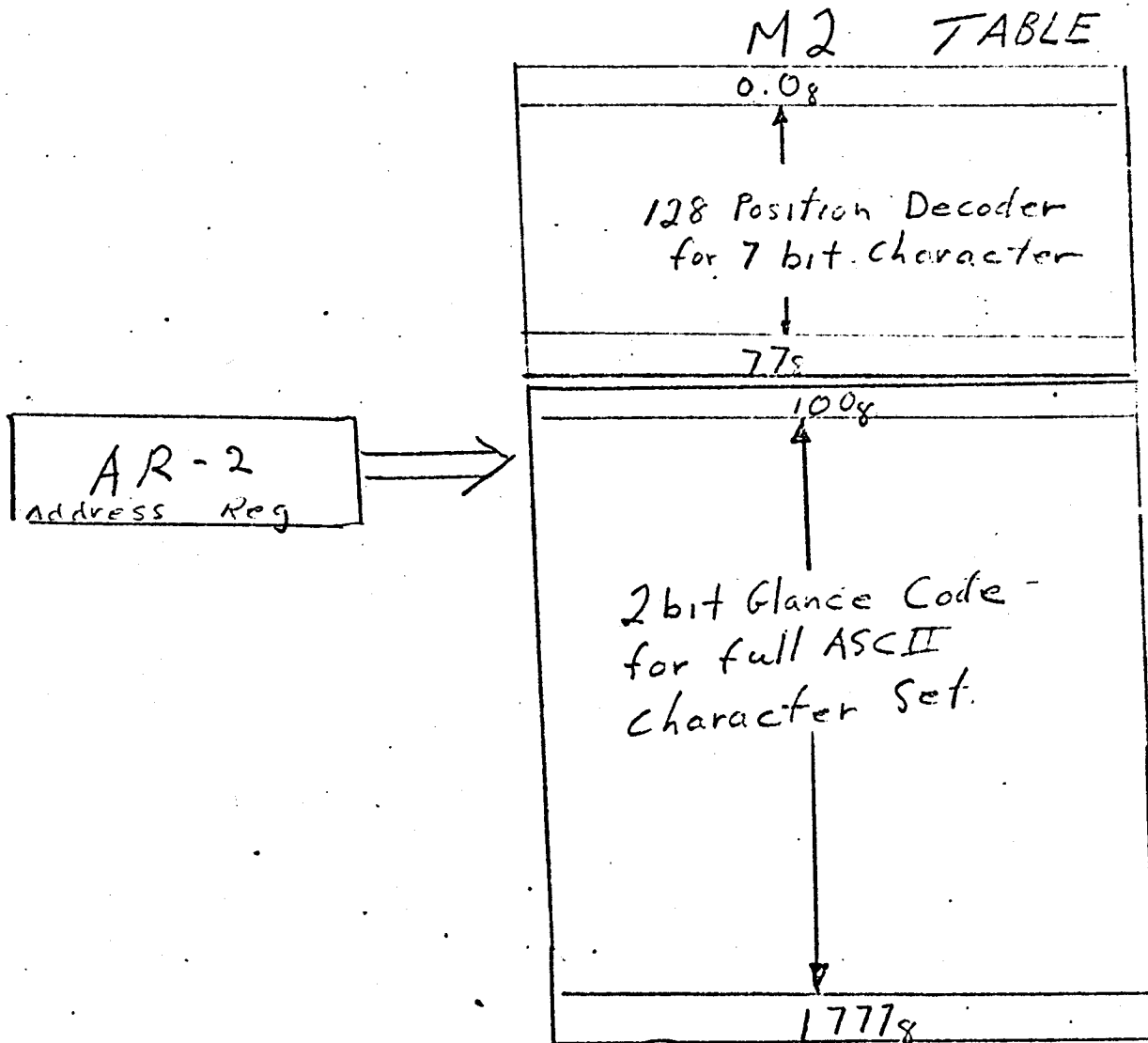
M-2 Format for Character Table

MSB	Pointer	MSB	LSB
1	↓	10	16
M3 Address Pointer	37g	00g	-
M2 Address Pointer	100g to 1777g	N = 2g to 77g	

N = Number of 2 bit bytes of character stored.

DISPLAY LIST control circuit

Table Pointer character



Op	Binary ^{LS}	SA(3) Source Address	DA(4) Destination Address	Destination function DF(2)	Reg(n) (2)	Reg function RF(2)	PC function (3)
00	0000	SNOP	DNOP	DFA w/	RAR1	RFNOP	NOP
01	0001	SN(Node)	DN	DFB(LS)	RAR2	RFA	IPCS
02	0010	SM1	DM1	DFC(HS)	RDR	RFB	IPCL
03	0011	SM2	DM2	DFD(f)	RIR	RFC	IPCW
04	0100	SM3	DAR1	w = word			PC1
05	0101	SK (Keyboard)	DAR2	LS = least sig bits of the word			PC1W
06	0110		DAR3	MS = Most sig bit of the word			SNR5
07	0111		DDR (Display Key)	f = function			BSZR
10	1000		DIR (INDEX Key)				
11	1001		DVG				
12	1010	future	DIR	SNRG = SKIP if Result is Not Zero (LS 6 bits only)			
13	1011		DIR				
14	1100		DPR	BSZR = SKIP if Results are Zero on 6 bits in Index Key inc PC by 1 if 4bit Counter = 0			
15	1101						
16	1110						
17	1111						

- M1 = LIST Memory (RAM)
- M2 = Table Memory (RAM v ROM) character generation
- M3 = Control Memory (ROM)
- AR1 = Address Reg for M1
- AR2 = Address Reg for M2
- AR3 = Address Reg for M3
- DR = Display Reg
- IR = Index Reg
- S = Select Source
- D = Destination
- VG = Vector Generator
- IXR = Incrementing X Reg
- IYR = Incrementing Y Reg
- PR = Parameter Reg (Scale, Signs et)
- DF = Destination function
- RF = Reg function
- IPCS = inc PC short with CO2
- IPCL = inc PC long with CO3
- IPCW = inc PC with return CO
- PC1 = force PC to all ops.

PC	Source	Destination	DA	Reg ₂	Reg ₁	SPIN	ROM	BINARY
00	N	AR3			NOP	NOP	Node WC	resets PC to 0
01	N	AR1			NOP	NOP	Node WD	⇒ AR1
02	N	M1		ARI	inc	NOP	Node WD	⇒ M1 inc AR1
03	N	AR2	DFA		NOP	NOP	Node WD	⇒ AR2
04	N	M2		AR2	inc	NOP	Node WD	⇒ M2 inc AR2
05	M1	N		ARI	inc	NOP	M1	⇒ Node (RD) inc AR1
06	M2	N		AR2	inc	NOP	M2	⇒ Node Rd incl AR1
07	K	N			NOP	NOP	Key Interrupt.	
10	NOP	NOP		ARI	res	IPCL	Start (Display Mode)	
11	M1	AR2	DFB MSCH		NOP	CPCL	MS char ⇒ AR2	
12	M2	IK	DFB LS		NOP	SNRS	is this a control char	
13	M2	AR3	0	(M2) 20			M2 ⇒ AR3 (Next)	
14	M2	AR2	DFA		NOP	IPCL	M2 ⇒ AR2	
15	M2	DR		AR2	inc	IPCS	M2 ⇒ DR	
16	NOP	DR	DFB SHCH	IR	dec	BSER	DR shift & compare	
17	M3	AR3	0	(M3) 15			M3 ⇒ AR3 (Next)	
20	M1	AR2	DFB LSCH	ARI	inc	IPCS	1st 2d char into AR2	
21	M2	IK	DFB LS			SNRS	is this a control char	
22	M2	AR3	DFA	ARI	inc		Pointer to Node jump to 37	
23	M2	AR2	DFA			IPCL	M2 ⇒ AR2	

P.C. Address₃ Address₄ P₂ C1₂ O1₃ R O11 BINARY

24	M2	DR	DFA	AR2	inc	IPCS	M2 ⇒ DR
25	NOP	DR	DFD	IR	dec	BSZR	DR Shift & Compare
26	M3	AR3	0	Next	24		M3 ⇒ AR3 (Next)
27	M3	AR3	0	Next	11		M3 ⇒ AR3 (Next)
30	M3	AR3	0	Next	11		M3 ⇒ AR3 ESCAPE to char mode
31	M1	AR1	DFA			PC1W	Jump (wait)
32	M1	AR1	DFA			PC1	Jump
33							
34							
35							
36							
37	M1	AR3	1	NEXT			C.P. code low order Bits Jump to control function)
15							
14							

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 DRW
 8/27/70

DISPLAY LIST FOR GLANCE X

A. Character Mode

MS LS
 | 0 | C1(7) | 0 | C2(7) |

B. Short Vector Mode

1. A control character in the Character Mode will set the Mode. Two null characters of all zeroes will put the Mode back to the Character Mode.

MS
 2. | Escape | I/V | ± | ΔX(6) | ± | ΔY(6) |
 = 0

C. Control Mode

1. (See B1)

MS
 2. | C Code (4) | data (12) |
 LS

16 bits - 2 - 8 bit bytes

MS				LS
OP Code				Data (12)
0	0	0	0	Escape
0	0	0	1	Trap
0	0	1	0	Jump (Set Memory Address)
0	0	1	1	Parameter (Scale, Brightness, Blink, etc.)
0	1	X	I	} Set X or Y I or V
0	1	X	V	
0	1	Y	I	
0	1	Y	V	
1	+	X	I	} Horizontal or Vertical Vector +/- X/Y I/V
1	+	X	V	
1	+	Y	I	
1	+	Y	V	
1	-	X	I	
1	-	X	V	
1	-	Y	I	
1	-	Y	V	
				0 = I = Invisible 1 = V = Visible 0 = + = Sign Positive 1 = - = Sign Negative

DRW
April 9, 1970

Display List Code (16 bit) for Remote Terminals

Bits	1	2	3				9	10	16			
	MS							LS				
Characters	0	C1 (7)			0	C2 (7)						
SHORT VECTORS	1	0	±	ΔX (6LS)			±	ΔY (6LS)				
Man VECTOR	1	1	0	±	±	±	Δ (10 LS)					
Load X	1	1	1	0	0	±	absolute (10)					
Load Y	1	1	1	1	0		absolute (11)					
Parameter	1	1	1	0	1	S _b	S _a	B _b	B _a	Beam	Blink	spaces (5)
Load trap	1	1	1	1	1	Data (11)						

A.

S _a	S _b	=	Scale
0	0	=	1
1	0	=	2
0	1	=	4
1	1	=	8

B_a B_b = Brightne

0	0	=	Normal
1	0	=	1/2 level
0	1	=	1/4 level
1	1	=	Lowest

B. Load Commands

sets; Sign X = ±
Sign Y = ±
Beam flip flop set to 0 for loading.

C.

* MISC.

Blink off = 0 on = 1
I = Invisible = Beam flip flop = off = 0
V = Visible = Beam flip flop = on = 1
+ = Sign bit = 0 = positive
- = Sign bit = 1 = negative
Beam off = 0 on = 1

D.

Characters

sets Signs positive
sets Beam flip flop off
C1 = 1st character in word
C2 = 2nd character in word.

516-34
 DRW
 Feb. 2, 1970

Display List Code (16 bit)
 For Glance

	LS		C1 (7)				C2 (7)					MS
Characters	0	0										
Short Vector X Major Axis	0	1	Sx*	Sy*	Magnitude(6)		Pointer (6)					
Short Vector Y Major Axis	1	0	Sx	Sy	Magnitude(6)		Pointer(6)					
Man. Vector	1	1	x/y	+/-	.0	I/V	Δ(10)					
Load X	1	1	0	0	1	I/V	absolute (10)					
Load Y	1	1	1	0	1	absolute (11)						
Parameter	1	1	0	1	1	Sa	Sb	Ba	Bb	SVB*		
(Load) Trap	1	1	1	1	1	Data (11)						

Sa Sb = scale

0 0 1
 1 0 2
 0 1 4
 1 1 8

Ba Bb = Brightness

C C = Normal
 1 0 1/2 Level
 0 1 1/4 Level
 1 1 Lowest Level

Load Y = Invisible (Beam Off)

*Note Sx = SignX
 Sy = SignY
 SVB = Short Vector Beam
 0 = Beam Off
 1 = Beam On

Short Vectors:

Magnitude - is the magnitude of the vector in the major direction.

Pointer - is the pointer to an address in a Read Only Memory. The ROM stores 64, 64 bit words as follows:

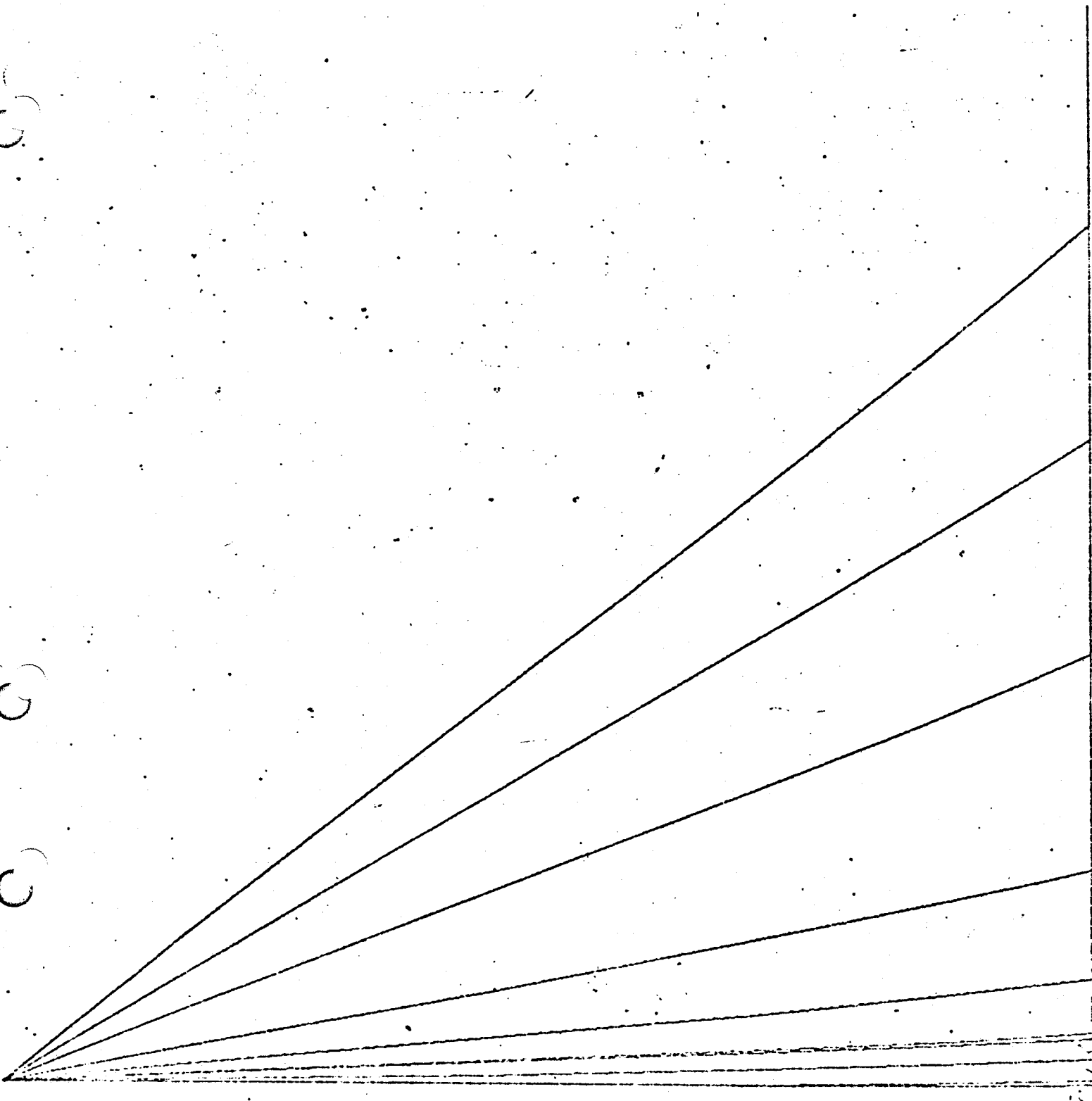
0 = Move in the major direction

1 = Move on the diagonal (X & Y) or a major and minor move together.

Each 64 bit word describes a 64 bit incremental move.

For Vectors shorter than 64 or equal to 64 increments, the magnitude indicates the number of increments to be taken by the short vector. For Vectors longer than 64 increments the algorithm used in the same as used for the Stronberg Carlson 4060 microfilm printer. This algorithm was mapped into the Glance Code and the output was generated on to the Stare equipment. The Stare print is attached, to show the various long vectors with different slopes.

9
9
9
9



516 - 34 . 1 Display List Code (1401) -
 DRW
 Jan 30, 1970 for Glance.

Character's	LS									MS
	0	0	C ₁ (7)			C ₂ (7)				
Vector Visible	0	1	$\frac{+}{-}$	$\frac{+}{-}$		Magnitude (6)			Pointer (6)	
Short Vector Invisible	1	0	$\frac{+}{-}$	$\frac{+}{-}$		Magnitude (6)			Pointer (6)	
Man. Vector	1	1	$\frac{+}{-}$	$\frac{+}{-}$	0	$\frac{+}{-}$	Δ (10)			
Load X	1	1	0	0	1	$\frac{+}{-}$	absolute (10)			
Load Y	1	1	1	0	1		absolute (11)			
Load Parameters	1	1	0	1	1	S _a	S _b	B _a	B _b	Spaces (7)
Load) Trap	1	1	1	1	1	Data (11)				

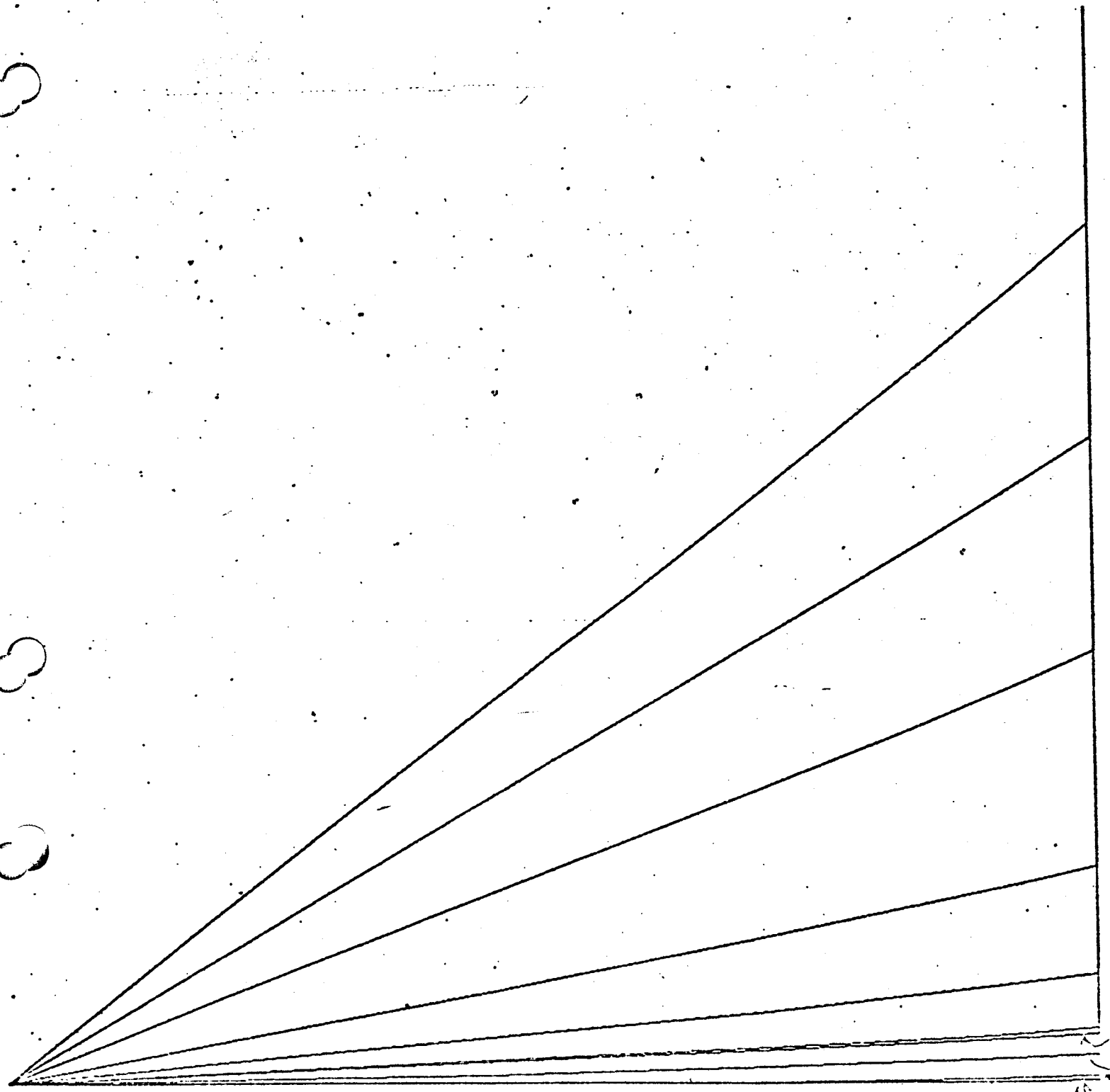
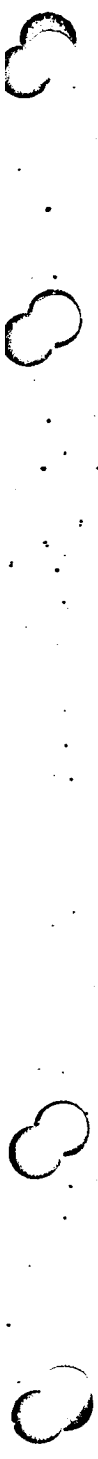
S_a S_b = Scale
 0 0 = 1
 1 0 = 2
 0 1 = 4
 1 1 = 8
 B_a B_b = Brightness
 0 0 = Normal
 1 0 = 1/2 Level
 0 1 = 1/4 Level
 1 1 = Lowest Level

Load Y \Rightarrow Invisible (Beam off)
 Short Vectors:
 Magnitude: is the magnitude of the vector in the major direction
 Pointer: is the pointer to an address in the Read Only Memory.
 The ROM stores 64, 64 bit words as follows
 0 = Move in the Major direction
 1 = Move on the diagonal (X=Y) or a major and minor move together.
 each 64 bit word describes 1 bit incremental move

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DRW.
30, 1970

For vectors shorter than 64 increments, the magnitude indicates the number of increments to be taken by the short vector.

For vectors longer than 64 increments the algorithm used, is the same as used for the Stronberg Carlson 4060 microfilm printer. This algorithm was mapped into the Glance code and ^{the} output ^{was generated} on the Stave equipment. The Stave print is attached, to show the various long vectors with different slopes.



516-34
 DRW
 9/4/69

VECTOR AND CHARACTER CODE FOR GLANCE

	LS		16 bits	
Char. Mode	0 0		7 Bit Char.	7 Bit Char.
Short Vector Visible	1 0	±	ΔX(6LS)	± ΔY(6LS)
Short Vector Invisible	0 1	±	ΔX(6LS)	± ΔY(6LS)
Man. Vector	1 1	0	I/V X/Y	± Δ 10 bits(LS)
Position	1 1	1	I/V X/Y	Abs. 11 bits

All control such as CR, Modes, Trap will be in the character Mode of ASCII (Control).