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EASTERN CANADA TELEMETERED NETWORK
DATA FILE FORMATS

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EASTERN CANADA TELEMETERED NETWORK DATA FILE FORMATS

29-FEB-84
DR0:[111,3]ECTNFMT.DOC

The various Eastern Canada Telemetered Network (ECTN) data file formats are described in the followins pases. Alons with the data formats are station coordinates and operatins dates, instrument transfer functions and response curves, and plot and other program listings along with the tape Visual Serial Number which contains the source code files.

There are currently six ECTN data formats datins from the beginnins of ECTN Mark I RT-11 system up to the current format which interfaces with the SAM graphics package. The various formats are listed by the time periods for which the various formats were applicable. The files for each format are made up of a file information record of one to six blocks (1 block = 512 bytes) followed by the data records which are of varyins lensth. Each data record has an information section at the beginning of the record. For all formats except the current SAM demultiplexed format each data record contains one second of data from all components. The actual component seismic sample values are multiplexed in the data records except for the current SAM demultiplexed format in which all of one component's sample values for the event file follows the previous component's values. For ECTN Mark I data files the samples from the four channels are multiplexed as follows: component 1 sample 1, component 2 sample 1, component 3 sample 1, component 4 sample 1, component 1 sample 2, etc. For all other formats except the SAM demultiplexed format each one second data block contains one second of data from component one followed by the same second of data from component two, etc. The data record format sheets describe where in each data block the component values start plus where the date/time is located in the information section. All components are sampled at 60 samples per second except for GAC short-period components which are sampled at 30 samples per second and the GAC lons-period and auxilary channels which are sampled at an effective one sample per second.

Event files are normally stored on 9-track magnetic tape. These files were written to ANSI standard labelled tapes using the DEC utility PIP. Except for the Mark I (RT-11 system) event files, all the files can be retrieved from tape by mounting the tape (the Volume label on all tapes is ECTN) and using the current version of PIP or COPY to copy the desired files to disk for processing. For the Mark I files a special program called PIPRT2RS was written. This program will read the old Mark 1 RT-11 PIP format tape files onto disk. This program is included on the tape of plot program source code files. If at any time you do not wish to use the above methods to transfer event files to disk for processing but wish to read the tapes and labels with special software, (perhaps into a non-DEC computer) the order of the bytes on tape must be noted. The standard DEC PDP 11 16-bit disk/memory word contains two 8-bit bytes. The low order byte (bits 0 to 7) is written to tape first followed by the high order byte (bits 8 to 15) of each word. Not all computers follow this convention and hence when reading these tapes into non-DEC computers, each pair of bytes may have to be swapped. This problem occurs only for binary word values written to tape.

ECTN DATA FORMAT TYPES

FORMAT NUMBER	TIME PERIOD	FILE INFO RECORD BLOCK SIZE	DATA RECORD BLOCK SIZE	COMMENTS
3	Feb 24/78-Oct 10/78	1	1	ECTN Mark I - RT-11 system
4A	Oct 11/78-Mar 27/79	2	3	ECTN Mark II - RSX11M
4B	Mar 28/79-Dec 8/80	3	3	ECTN Mark II - RSX11M
4C	Dec 9/80-Oct 28/81	5	5	ECTN Mark III - RSX11M (with front-end LSI)
4D	Oct 28/81-Jul 3/82	6	6	ECTN Mark III - RSX11M Program TRIGGR still produces this type of file after Jul 3/82 but the files are demultiplexed into SAM format
4E	Jul 3/82 to date	1-2	variable	SAM demultiplexed format

VOL = CTNPGM
800bpi

[illegible]	#7	16.	27-FEB-84 [illegible]	For plotting ECTN MARK I files (RT-11 format)
[illegible]	#[illegible]	13.	27-FEB-84 [illegible]	- Set up for plotting on PGC LVII printer/plotter
[illegible]	#10	5.	27-FEB-84 [illegible]	- Sources also on tape SH0829
[illegible]	#10	1.	27-FEB-84 [illegible]	
[illegible]	#100	12.	27-FEB-84 [illegible]	
[illegible]	#4	6.	27-FEB-84 [illegible]	- for plotting ECTN MARK II and III files
[illegible]	#1	184.	27-FEB-84 [illegible]	3,5 & 6 block event files
[illegible]	#51	23.	27-FEB-84 [illegible]	- also on RKOS desk #25 Applsource
[illegible]	#35	15.	27-FEB-84 [illegible]	
FIX.MAC	#10	5.	27-FEB-84 [illegible]	
[illegible]	#21	26.	27-FEB-84 [illegible]	- for plotting ECTN MARK III 6 block event files
[illegible]	#41	36.	27-FEB-84 [illegible]	
FILES.FTN	#1	4.	27-FEB-84 [illegible]	
FFIX.MAC	#[illegible]	8.	27-FEB-84 [illegible]	
[illegible]	#[illegible]	10.	27-FEB-84 [illegible]	
[illegible]	#1	1.	27-FEB-84 [illegible]	
[illegible]	[illegible]	76.	27-FEB-84 [illegible]	
[illegible]	#36	16.	27-FEB-84 [illegible]	for reading RT-11 ANSI labelled tapes
[illegible]	#23	65.	27-FEB-84 [illegible]	

Total of 526. 526. blocks in 19. files

Note:
- Sources may require compiling under FOR (FORTRAN V2.5) compiler instead of F77
- changes may have to be made for plotting on different printer/plotters (e.g. for 100 nibs/inch plotter, 200 nibs/inch plotter or V80 plotter)

EASTERN CANADA TELEMETERED NETWORK SEISMIC STATION INFORMATION

?-FEB-84
[illegible].DAT

STATION CODE	STATION PLACE NAME	LATITUDE DEGREES NORTH	LONGITUDE DEGREES WEST	ELEVATION METRES	SAMPLE VALUE FORMAT	OPERATING DATES
[illegible]	Ottawa, Ont.	45.3942	75.7167	[illegible]	old	Feb 24/74-Apr 25/78 Jan 26/79-to date
[illegible]	Montreal, Que.	[illegible]	[illegible]	[illegible]	old	Feb 24/74-to date
[illegible]	Maniwaki, Que.	46.3??	[illegible]	[illegible]	old	Feb 27/74-Apr 30/81
[illegible]	[illegible], Que.	?.5333	[illegible]	[illegible]	old	Nov 27/74-to date
[illegible]	Gentilly, Que.	[illegible]	[illegible]	[illegible]	old	Apr 26/78-to date
[illegible]	La Grande-?, Que.	[illegible]	[illegible]	[illegible]	old	Oct 15/78-Nov 7/79
[illegible]	La Grande-2, Que.	53.?360	[illegible]	[illegible]	old	Oct 11/78-Nov 7/79
[illegible]	La Grande-?, Que.	[illegible]	[illegible]	[illegible]	old	Oct 13/78-Feb 27/79
[illegible]	La Grande-?, Que.	53.8??	[illegible]	[illegible]	old	Feb 27/79-Mar 10/81
[illegible]	Fitzroy Harbour, Ont.	45.4550	[illegible]	[illegible]	old	Jan 31/79-Jan 11/82
[illegible]	Sherbrooke, Que.	45.3783	[illegible]	[illegible]	new	Aug 12/80-to date
[illegible]	La Pocatière, Que.	47.3409	[illegible]	[illegible]	new	Jun 6/80-to date
[illegible]	Glen Almond, Que.	45.7033	75.4?8?	[illegible]	new	Oct 26/79-to date
[illegible]	[illegible], Que.	?.2300	[illegible]	[illegible]	new	Dec 9/80-to date
[illegible]	Williamsburg, Ont.	45.?003	[illegible]	[illegible]	new	Dec 9/80-to date
[illegible]	Chalk River, Ont.	4?.9944	[illegible]	[illegible]	new	Jan 12/81-to date
[illegible]	Mont-Tremblant, Que.	46.22??	[illegible]	[illegible]	new	Mar 16/81-to date
[illegible]	Grand-Remous, Que.	46.??	[illegible]	[illegible]	new	Mar 16/81-to date
[illegible]	La Grande-3, Que.	53.80??	[illegible]	[illegible]	old	Mar 23/81-Nov 22/82
[illegible]	Grosses-Roches, Que.	48.914?	[illegible]	[illegible]	new	Oct 28/81-to date
EBN	Edmundston, N.B.	47.540	?.241	?99	new	Oct 28/81-to date
[illegible]	St. George, N.B.	45.117	?.8?2	[illegible]	new	Oct 28/81-to date
[illegible]	Caledonia Mtn., N.B.	45.852	64.806	363	new	Oct 28/81-to date
[illegible]	McKendrick Lake, N.B.	46.8433	66.?	[illegible]	new	Jan 28/82-to date
[illegible]	Hauterive, Que.	49.?917	[illegible]	[illegible]	new	Apr 15/82-to date
[illegible]	Welcome, Ont.	44.0??	?.?744	?49	old	Apr 30/82-to date
[illegible]	La Grande-4, Que.	53.?833	?.?230	[illegible]	old	Mar 21/83-to date

ECTN Sample Value Bit Assignments (FIX-1 Format)

(FIX-0 or old ECTN Mark I format)

	High Order Byte								Low Order Byte							
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	P	1	S	E2	E1	EO	M7	M6	P	0	M5	M4	M3	M2	M1	MO

where:

MO:- least significant bit of the Mantissa

EO:- least significant bit of the Exponent

S :- Sign bit - 0 = positive number

1 = negative number

P :- Parity bit

0,1 :- to signify low and high order bytes

Sample value = ± Mantissa x 2^{E}

ECTN Sample Value Bit Assignments (FIX-2 Format)

(FIX-4 or new ECTN format)

	High Order Byte								Low Order Byte							
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	C	X1	XO	S	M10	M9	M8	M7	C	M6	M5	M4	M3	M2	M1	MO

where:

C:- code bit

XO:- least significant bit of Exponent

Sample value = ± Mantissa x 4^{X}

a) Old ECTN stations (OTT, MNT, MIQ, MNQ, GNT) and old Backpack

$$H(f) = \frac{S}{(S + 0.1)} * \frac{S^2}{(S^2 + 2x1\ xD1\ xS + 1^2)} * \frac{20^2}{(S^2+2x20\ xD2\ xS + 20^2)}$$

$$* \frac{20^2}{(S^2 + 2 \times 20x\ D3 \times S + 20^2)} * \frac{20}{S + 20}$$

b) New ECTN - all other ECTN stations (except GAC) and New Backpack

$$H(f) = \frac{S}{(S + 0.1)} * \frac{S^2}{(S^2 + 2 \times 1 \times D1 \times S + 1^2)} * \frac{16^2}{(S^2 + 2 \times 16 \times D4 \times S + 16^2}$$

$$* \frac{16}{(S + 16)}$$

where S = jf

D1 = COS (45°)

D2 = COS (36°)

D3 = COS (72°)

D4 = COS (60°)

one count is 10 nonometers/sec. at midband.

GLEN ALMOND SHORT-PERIOD

TRANSFER FUNCTION POLES AND ZEROS

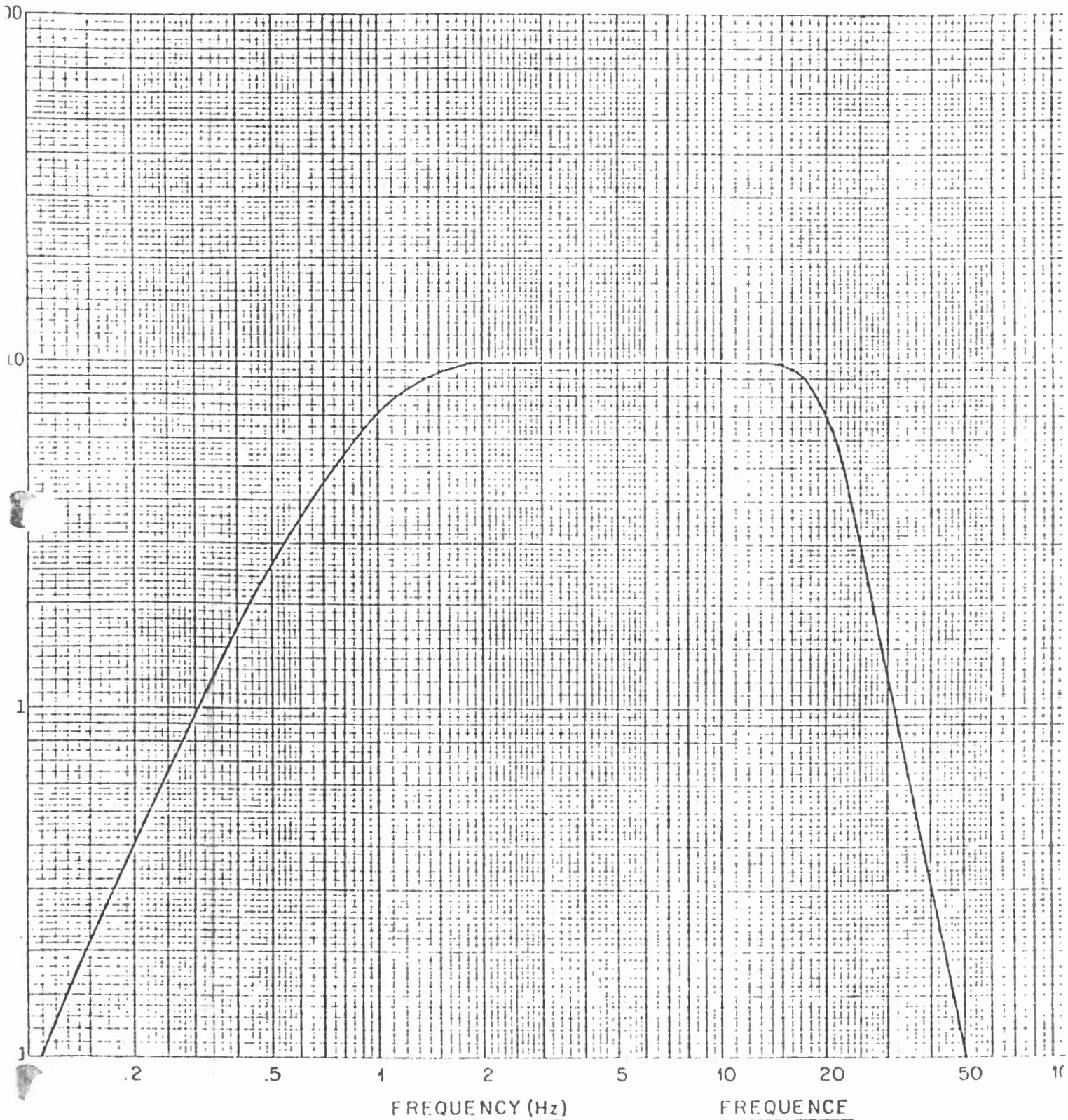
12-MAY-82

	POLES	ZEROS
KS 36000 SEISMO	S+ 4.648 ± 3.463j	S^2
(ALBUQ. "NOMINAL")	S+ .1179	S + .1243
	S+ 40.73	S + 47.62
	S+ 100.0	S
	S+ .1500	
	S+ 264	
EPB SP FILTER	S+ 3.129	S
	S+ 50.00	S
EPB ANTIALIAS FILT.	S+ 25.12 ± 42.28j	
	S+ 52.58	
SCALE FACTOR (Bits/Metre)	1.38×10^{11}	

CURVE REPRESENTS THEORETICAL VELOCITY RESPONSE TO DIGITAL OUTPUT

Courbe qui représente la velocité théorique en réponse à un signal de sortie numérique

STATIONS : ECTN/RTEC – GNT, MIQ, MNQ, MNT, OTT
WCTN/RTOC – ALB, HYC, PGC, PIB, VGZ, WHB

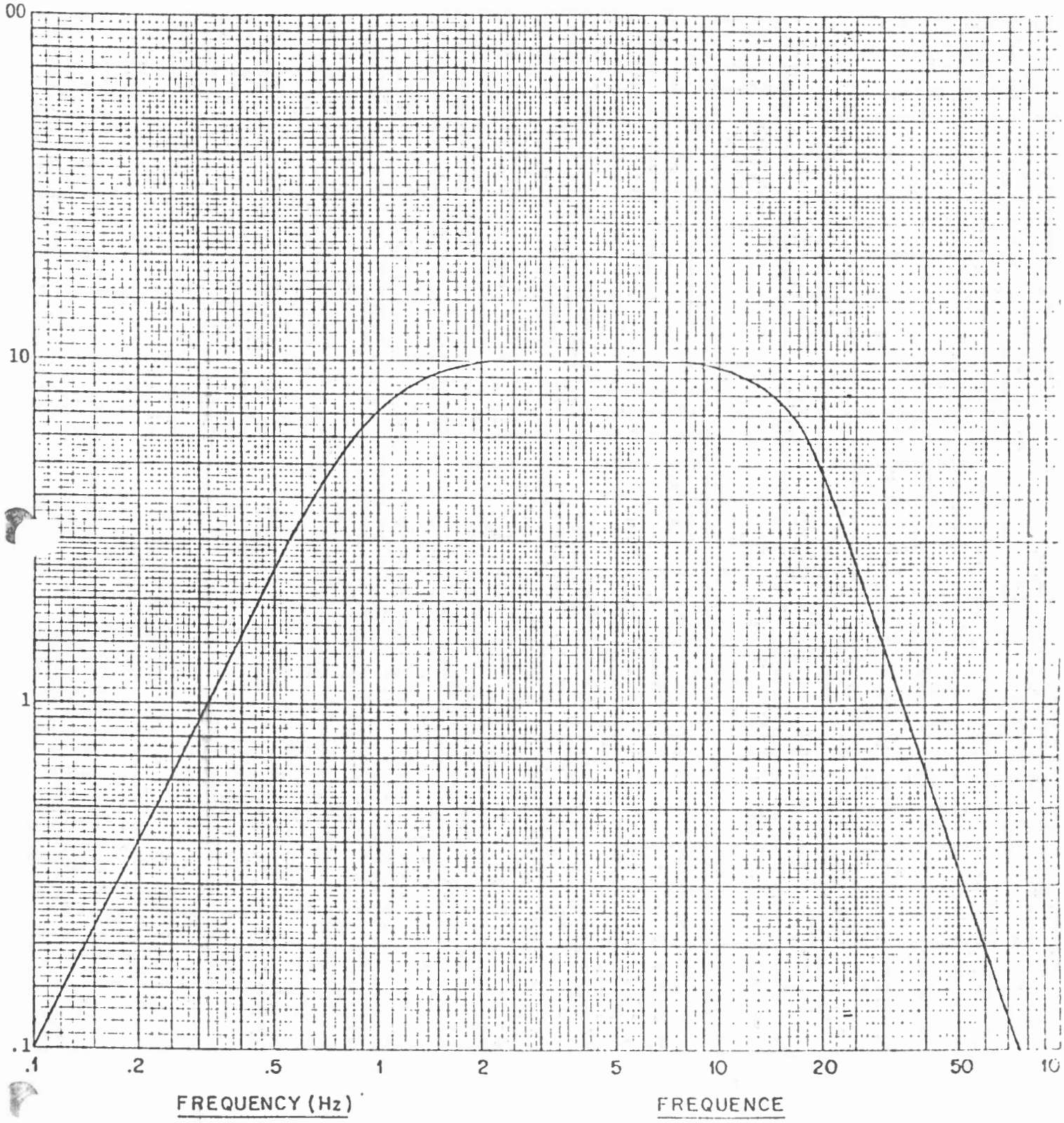


CURVE REPRESENTS THEORETICAL VELOCITY RESPONSE TO DIGITAL OUTPUT

Courbe qui représente la velocité théorique en réponse à un signal de sortie numérique

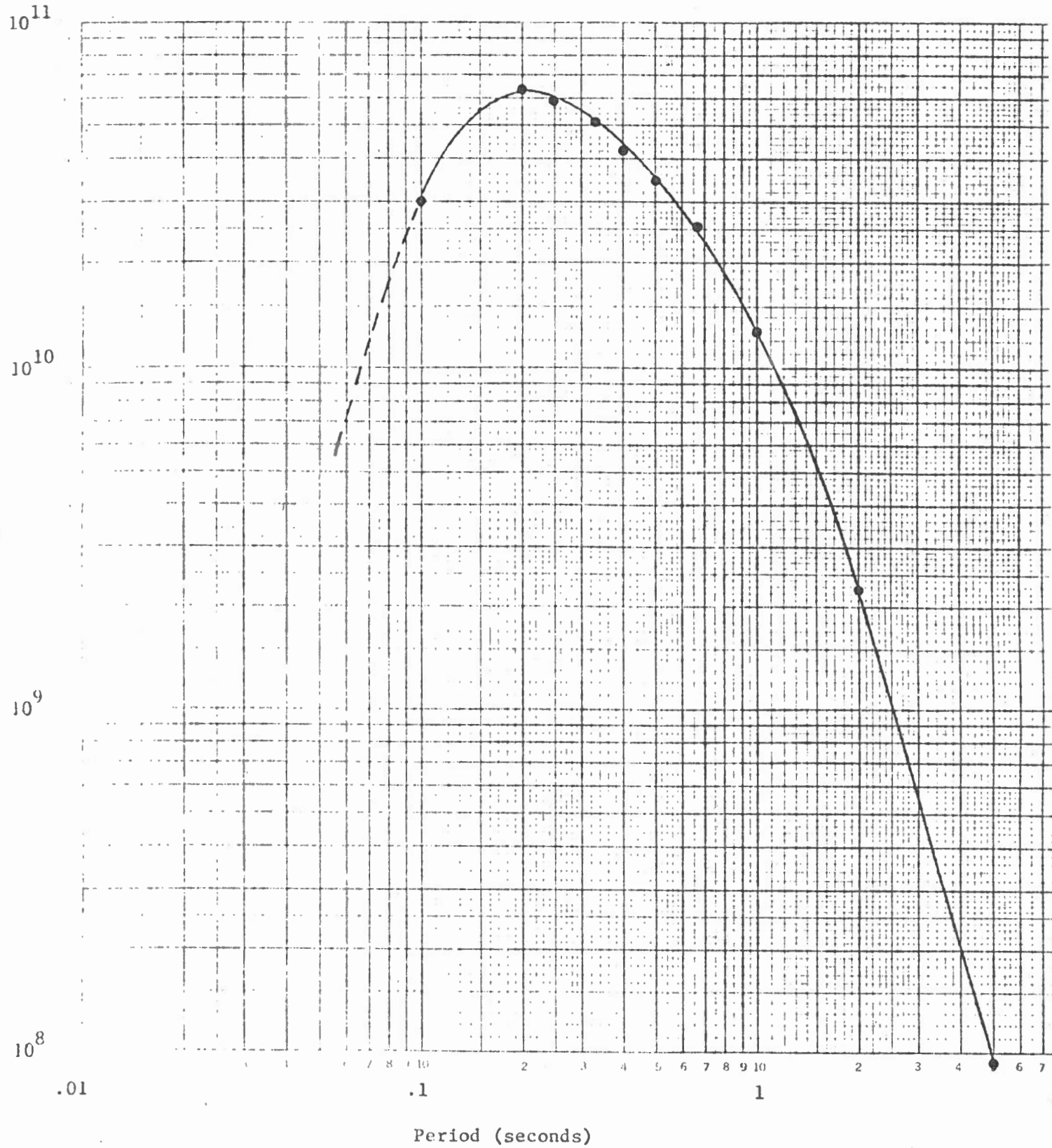
STATIONS: ECTN/RTEC - CKO,EBN,FHO,GGN,GSQ,JAQ,KLN,LDQ,LMN,LPQ,SBQ,VDQ,WBO,WEO

WCTN/RTOC - CCB,HNB,NAB,SHB,SNB



STATION: GAC Calibration: Aug. 27, 1980

Geotech 36000 borehole seismometer with EPB Short Period filter
EPB anti-alias filter: 8Hz, 18 dB/Oct ; 30 samples/second



ECTN MARK I DATA FORMAT

16-FEB-84

DR0:[111,3]ECTNMARKI.DOC

The Mark I ECTN RT-11 data files allowed for four 60 sample per second channels only. The start location of each station's data remained fixed as noted in the attached format description sheets. The four stations came on-line at various times. The Gentilly station replaced the Ottawa station from April 26/78 to October 10/78. The time periods for the four stations are listed below.

TIME PERIOD	CHAN. 1	CHAN. 2	CHAN. 3	CHAN. 4
Feb 24/74-Feb 26/74	OTT	MNT	N/S	N/S
Feb 27/74-Nov 26/74	OTT	MNT	MIQ	N/S
Nov 27/74-Apr 25/78	OTT	MNT	MIQ	MNQ
Apr 26/78-Oct 10/78	GNT	MNT	MIQ	MNQ

N/S = no signal data recorded in data file

RT-11 format

EASTERN CANADA TELEMETERED NETWORK (ECTN) DATA FORMAT

ECTN data is processed using a Digital Equipment Corporation PDP 11 mini computer operating under RT-11. Data is stored on an RK05 disk where each data block is 256 words (16 bit words). Each word can be processed as two 8 bit bytes (characters) where the low order byte (bit positions 1 to 8) is byte one and the high order byte (bit position 9 to 16) is byte two. The most significant bit in a word is bit position 16 and indicates sign where zero is positive and one negative. For positive numbers the remaining 15 bits represent the magnitude directly; for negative numbers, the magnitude is the 2's complement of the remaining 15 bits. Digitization rate is 60 Hz.

Each ECTN triggered event has the first block of data reserved for information on the triggered event. Table 1 describes the various words and/or bytes. Each succeeding data block has header information in the first 16 words and data in the remaining 240 words. Table 2 describes the various words in the header and also the data section of each block.

The theoretical velocity response is indicated on the attached curve for the Model 100 Preamp. At midband A/D conversion (1 bit = 312.5μV) results in a velocity sensitivity of 10 nm/sec. per bit. Dynamic range is 96dB. No further filtering of data is done between the A/D output and computer disk storage. The ground displacement in nanometers is obtained from the ground velocity digital sample value as follows:

$$Ag\ (nm) = V\left(\frac{nm}{sec}\right) \times 10 \times \frac{T}{2\pi}\ (sec)$$

Where T is the period in seconds of the wave and V is the digital sample value.

When using a plot of ECTN data procuced on a LV11 printer/plotter the ground displacement is as follows:

$$Ag\ (nm) = \frac{A_t\ (in)}{Yx10^{-2}\left(\frac{in}{bit}\right)} \times \frac{T\ (sec)}{2\pi} \times \frac{10\ (nm/sec)}{Vs\ (bit)}$$

Where Ag = ground displacemant in nanometers

A_t = plot trace amplitude in inches (zero to peak)

Y = plot Y-axis scale value

T = period in seconds of the wave

Vs = velocity sensitivity off the attached curve for period T (in bits or decimal fractions)

TABLE 1

ECTN Event Format For The First Block
(information block)

Word	Field (values in Octal)
1	Low order byte - Trigger bit map
	High order byte - Number stations triggered
2	Low order byte -Event number
	High order byte - Calibration Flag
3	High order time) These two words combined form a -32 bit
4	Low order time) value indicating the time (U.T.) of the triger in tiks past midnight where a tik is 1/60 sec.
5	Word index showing order of arrival where
6	Ø = OTT channel 2 = MNT channel
7	4 = MIQ channel 6 = MNQ channel
8	177777_8 = -1 indicates no trigger for this channel
9	Trigger time relative to first trigger for the channels
10	
11	
12	
13	Peak amplitude for the 4 channels in (nanometers/second)/10_{10}
14	
15	
16	
17	Date in RT11 Format bits 0-4 = Year past 1972 e.g. 6 => 1978
	bits 5-9 = Day
	bits 10-14 = Month
18	Disc block error count for this event
19	I/O channel used
20	Number blocks in this event
21	
22	Unused - value Ø
23	
24	
25	Long term background noise for the 4 channels at time of
26	trigger
27	
28	
29-256	Undefined

TABLE 2

ECTN Data Block Format

Word	Field (values in Octal)
1	Low order byte - Trigger status at start of this block High order byte - Number triggered currently
2	Undefined
3	High order time for this block, 32 bit value in tiks past
4	Low order time for this block midnight
5	Undefined
6	Current event status
7-16	Undefined
17	Data (1,1) Sample 1 for first channel
18	Data (2,1) Sample 1 for second channel
19	Data (3,1) Sample 1 for third channel
20	Data (4,1) Sample 1 for fourth channel
.	
.	
.	
253	Data (1,60) Sample 60 for first channel
254	Data (2,60) Sample 60 for second channel
255	Data (3,60) Sample 60 for third channel
256	Data (4,60) Sample 60 for fourth channel

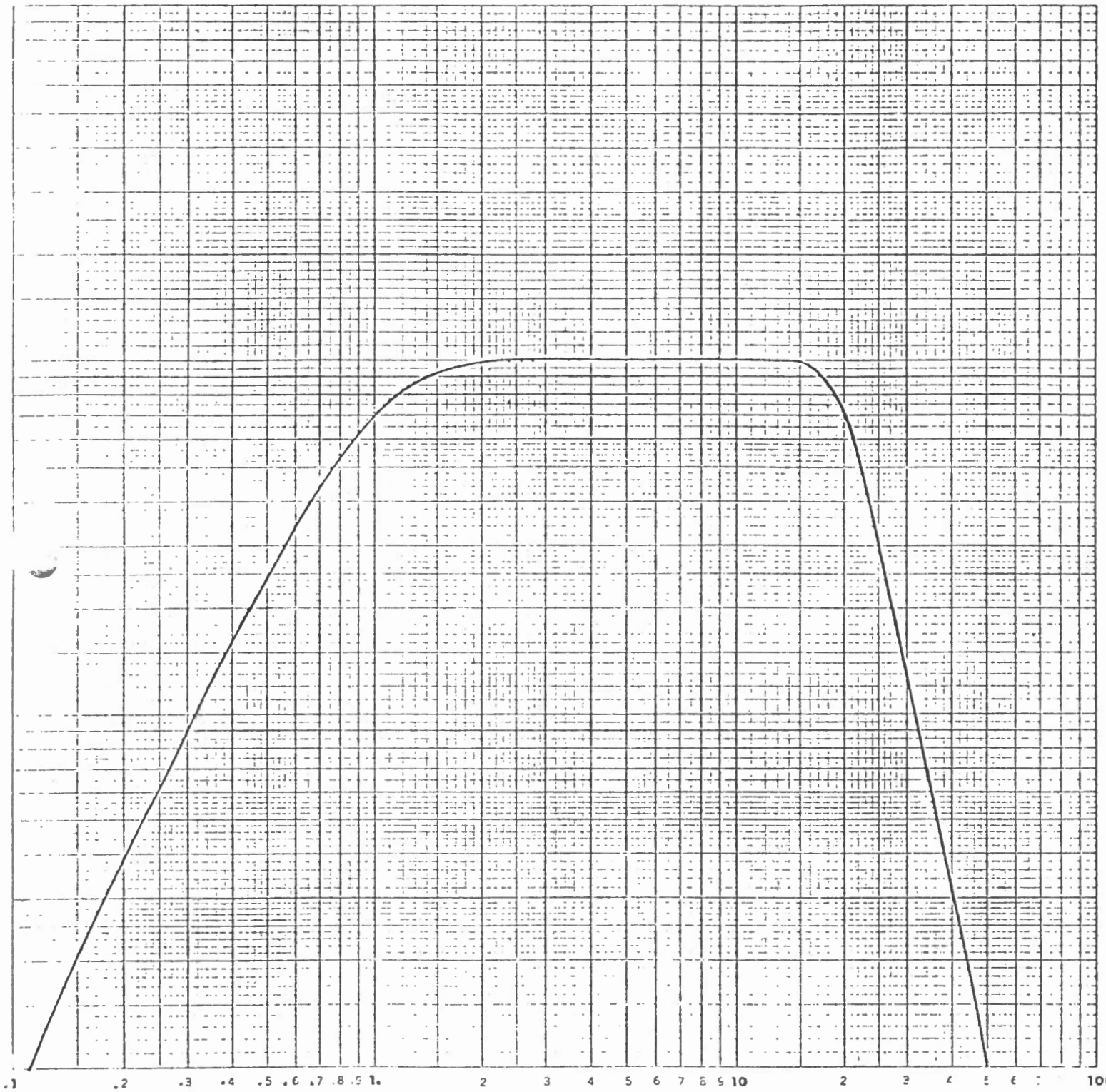
MODEL 100 PREAMP

CURVE REPRESENTS THEORETICAL VELOCITY RESPONSE TO DIGITAL OUTPUT

(Dots indicate actual measured response points.)

STATION: ECTN OUTSTATIONS

ϕ: λ: Alt.:



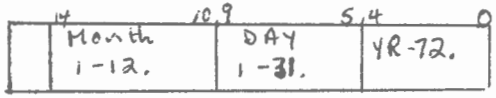
FREQUENCY (Hz)

DATE OF CALIBRATION:
SEISMOMETER: Geotech S-13; Rs 3600 ohms; Ts 1.0 secs.
FILTERS: 0.1 Hz hi-pass; 20 Hz anti alias; 0.5 Hz integrator

EVENT INFORMATION BLOCK FORMAT

```
                ;  EVENT (BYTE Octal)
                ;        0     TRIGGER BIT MAP
                ;        1     # STATIONS TRIGGERED
                ;        2     EVENT #
                ;        3     CAL FLAG
                ;        4,5   HI ORDER EVENT TIME OF 1ST TRIGGER
                ;        6,7   LO ORDER EVENT TIME OF 1ST TRIGGER
                ;
                ;       10,11  0
                ;       12,13  2              WORD INDEX SHOWING ORDER
                ;       14,15  4              OF ARRIVAL
                ;       16,17  6
                ;
                ;       20,21  0
                ;       22,23  2              TRIGGER TIME RELATIVE
                ;       24,25  4              TO FIRST TRIGGER
                ;       26,27  6
                ;
                ;       30,31  0
                ;       32,33  2              PEAK
                ;       34,35  4              AMPLITUDE
                ;       36,37  6
                ;
                ;       40,41          ;DATE RT11 FORMAT
                ;       42,43          ;DISC BLOCK ERROR COUNT FOR THIS EVENT
                ;       44,45          ;I/O CHANNEL USED, 1 OR 2
                ;       46,47          ;DISC CURRENT BLOCK NUMER
                ;
                ;       50,51
                ;       52,53
                ;       54,55          ;TIME OF PEAK AMPLITUDE
                ;       55,56
                ;
                ;      60,61
                ;      62,63           ; NOISE
                ;      64,65
                ;      66,67
                ;
                ;
                ;      DATA BLOCK FORMAT
                ;      -----------------
                ;
                ;       0    TRIGGER STATUS AT START OF THIS BLOCK
                ;       1    NUMBER TIGGERED CURRENTLY
                ;       2    LO ORDER TIME
                ;       4    HI ORDER TIME
                ;       6    LO ORDER DATE
                ;       10   HI ORDER DATE
                ;       12   CURRENT EVENT STATUS
                ;       14
                ;       16
                ;       20     NOISE(1)
                ;       22     NOISE(1)
                ;       24     NOISE(2)
                ;       26     NOISE(2)
                ;       30   NOISE (3)
```

RT-11 DATE WORD FORMAT



```
                ;       32      NOISE (3)
                ;       34      NOISE (4)
                ;       36      NOISE (4)
                ;       40      DATA (0,0)
                ;       42      DATA (0,1)
                ;       44      DATA (0,2)
                ;
                ;
                ;       770     DATA (59,1)
                ;       772     DATA (59,2)
                ;       774     DATA (59,3)
                ;       776     DATA (59,4)
                ;
000001'         .END
```

4
A

ECTN FILE HEADER RECORD FORMAT

Time Period: Oct 11/78 - Mar 27/79

2 blocks/record
1 block - 512 bytes

BYTE POSITION	A: ASCII B: BINARY	FIELD DESCRIPTION
1-670	B	11 = undefined or non-useful data
		STORAGE ACCESS DIRECTORY
671	B	DZ port number - starting from 0
672	B	Component number - starting from 0
673-678	A	Component name e.g. OTTSPZ.
679-680	B	Link by channel
681	B	Data record block number - starting from 0
682	B	word offset to start of component data in record
683-684	B	Link by contiguity in Secbuf
685-686	B	Compound status bits
687-688	B	Pointer to trigger table - always 0
		The above table repeats for each component until a zero is found in the DZ port number and component number bytes. Only the component name and word offset to data in the data record appear to be useful. Not all component data exists for the components listed (no GAC data). Also FHOSPZ is called CFOSPZ. This directory appears to be the only useful data in the Header record.

CTN FILE DATA RECORD FORMAT

Time Period: Oct 11/78 - Mar 27/79

3 blocks/record
1 block = 512 bytes

BYTE POSITION	WORD POSITION	FIELD DESCRIPTION
1-8	1-4	U = undefined
9-10	5	Year (2 digits)
11-12	6	Month "
13-14	7	Day "
15-16	8	Hour "
17-18	9	Minute "
19-20	10	Second "
21-22	11	Tik " - always Ø where 1 tik = 1/60 sec.
23-68	12-34	U
69-188	35-94	60 two-byte sample values - OTT (restarted Jan 26/79)
189-192	95-96	U
193-312	97-156	60 " " " " - MNT
313-316	157-158	U
317-436	159-218	60 " " " " - MIQ
437-518	219-259	U
519-638	260-319	60 " " " " - MNQ
639-642	320-321	U
643-762	322-381	60 " " " " - GNT
763-766	382-383	U
767-886	384-443	60 " " " " - LAQ (started Oct 15/78)
887-890	444-445	U
891-1010	446-505	60 " " " " - LBQ (started Oct 11/78)
1011-1030	506-515	U
1031-1150	516-575	60 " " " " - LCQ (Oct 13/78 to Feb 27/79) - LDQ (Feb 27/79 to Mar 27/79)
1151-1346	576-673	U
1347-1466	674-733	60 " " " " - FHO (started Jan 31/79)
1467-1536	734-768	U

ECTN Sample Value Bit Assignments (FIX-1 Format)

(FIX-0 or old ECTN Mark I format)

	High Order Byte								Low Order Byte							
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	P	1	S	E2	E1	EO	M7	M6	P	0	M5	M4	M3	M2	M1	MO

where:

MO:- least significant bit of the Mantissa

EO:- least significant bit of the Exponent

S :- Sign bit - 0 = positive number

1 = negative number

P :- Parity bit

0,1 :- to signify low and high order bytes

Sample value = ± Mantissa x 2^E

ECTN Sample Value Bit Assignments (FIX-2 Format)

(FIX-4 or new ECTN format)

	High Order Byte								Low Order Byte							
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	C	X1	XO	S	M10	M9	M8	M7	C	M6	M5	M4	M3	M2	M1	MO

where:

C:- code bit

XO:- least significant bit of Exponent

Sample value = ± Mantissa x 4^X

4
B

ECTN FILE HEADER RECORD FORMAT

Time Period: Nov 28/79 - Dec 8/80

3 blocks/record
1 block - 512 bytes

BYTE POSITION	A: ASCII B: BINARY	FIELD DESCRIPTION
1-158		U = undefined or non-useful data
		DIRECTORY ACCESS TABLE
159	B	DZ port number - starts from 0
160	B	Component number - starts from 0
161-166	A	Component name e.g. OTTSP2
167-168	B	Link by channel (SALNK1)
169-170	B	Byte offset to component data in data record
171-172	B	LINK by contiguity in SECBUF (SALNK2)
173-174	B	Compound status bits (SASTS)
175-176	B	Pointer to trigger table (SASPR) - usually zero
		The above table repeats for each component until a zero is found in bytes 159-160 (DZ port number and component number.) Only the component name and byte offset to data in data record appear to be useful. The Directory ACCESS TABLE appears to be the only useful data section in the Header record.

ECTN FILE DATA RECORD FORMAT

Time Period: Mar 26/79 – Dec 8/80

3 blocks/record
1 block = 512 bytes

BYTE POSITION	WORD POSITION	FIELD DESCRIPTION
1-4	1-2	U = Undefined or non-useful data
5-6	3	ASCII SB
7-8	4	U
9-10	5	Year (2 digit) } Date/Time of first sample of each component in data record
11-12	6	Month "
13-14	7	Day "
15-16	8	Hour "
17-18	9	Minute "
19-20	10	Second "
21-22	11	Tike " always Ø 1 Tik = 1/60 sec.
23-68	12-34	U
69-188	35-94	60 two-byte sample values - CTTSPZ
189-192	95-96	U
193-312	97-156	60 " " " " " - HNTSPZ
313-316	157-158	U
317-636	159-218	60 " " " " " - HIQSPZ
637-440	219-220	U
441-442	221	1 " " " " " - GACLPZ
443-446	222-223	U
447-448	224	1 " " " " " - GACLPN
449-452	225-226	U
453-454	227	1 " " " " " - GACLPE
455-522	228-261	U
523-642	262-321	60 " " " " " - HNQSPZ
643-646	322-323	U
647-766	324-383	60 " " " " " - GNTSPZ
767-770	384-385	U

ECTN FILE DATA RECORD FORMAT

Time Period: Mar 28/79 - Dec 8/80
cont.

3 blocks/record
1 block = 512 bytes

BYTE POSITION	WORD POSITION	FIELD DESCRIPTION
771-890	386-445	60 two-byte sample values - LAQ Mar 28/79 - Nov 7/79; SBQ Aug 12/80 - Dec 8/80
891-894	446-447	LL
895-1014	448-507	60 " " " - LBQ Mar 28/79 - Nov 7/79; LPQ Jun 6/80 - Dec 8/80 (POCSPZ)
1015-1038	508-519	LL
1039-1158	520-579	60 " " " - LDQSPZ
1159-1162	580-581	LL
1163-1222	582-611	30 " " " - GACSPZ
1223-1226	612-613	LL
1227-1286	614-643	30 " " " - GACSPN started Oct 26/79
1287-1290	644-645	LL
1291-1350	646-675	30 " " " - GACSPE
1351-1354	676-677	LL
1355-1474	678-737	60 " " " - FHOSPZ
1475-1536	738-768	LL

ECTN Sample Value Bit Assignments (FIX-1 Format)

(FIX-0 or old ECTN Mark I format)

	High Order Byte								Low Order Byte							
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	P	1	S	E2	E1	EO	M7	M6	P	0	M5	M4	M3	M2	M1	MO

where:

MO:- least significant bit of the Mantissa

EO:- least significant bit of the Exponent

S :- Sign bit - 0 = positive number

1 = negative number

P :- Parity bit

0,1 :- to signify low and high order bytes

Sample value = ± Mantissa x 2^{E}

ECTN Sample Value Bit Assignments (FIX-2 Format)

(FIX-4 or new ECTN format)

	High Order Byte								Low Order Byte							
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	C	X1	XO	S	M10	M9	M8	M7	C	M6	M5	M4	M3	M2	M1	MO

where:

C:- code bit

XO:- least significant bit of Exponent

Sample value = ± Mantissa x 4^{X}

Eastern Canada Telemetered Network - ECTN

RSX-11M Data Format

Current ECTN data is processed using a DEC PDP11 minicomputer operating under RSX-11M Version 3.1. A 16 bit PDP11 word is composed of two 8 bit bytes: a low order byte (the least significant byte) and a high order byte. On writing to a 9-track magnetic tape, the least significant byte is written first. In a 16 bit interger word, the most significant bit is the sign bit with 0 indicating positive numbers; 1, negative numbers with 2's complement notation used for negative numbers. Event files are written to tape using ANSI standard labels where the labels are 80 bytes long and the data blocks are 512 bytes or 256 words long. Table 1 describes RSX-11M ANSI magnetic tape formats.

For event files, the first three blocks (256 words or 512 bytes per block) contain file information. Currently the file information format is not well defined. The actual seismic data is in the following blocks. The seismic data is grouped in one second logical records. As one second logical block of data is contained in 3 x 512 bytes or 768 16-bit PDP11 words. When reading the data from magnetic tape, three magnetic tape blocks of data should be read into consecutive locations of an array which contains 768 words. In Table 2 the location, in the 768 array, of each channels' data is noted plus the common start time of each of the channels' first sample. Each successive sample is 1/60 (or for GAC 1/30) second later than the previous sample. The gain-ranged sample values are packed in a 16 bit word as a sign, exponent and mantissa. For negative numbers the mantissa is in 2's complement notation. Table 3 gives the bit assignments for the two different fix formats. Table 4 lists the ECTN Station coordinates and elevation.

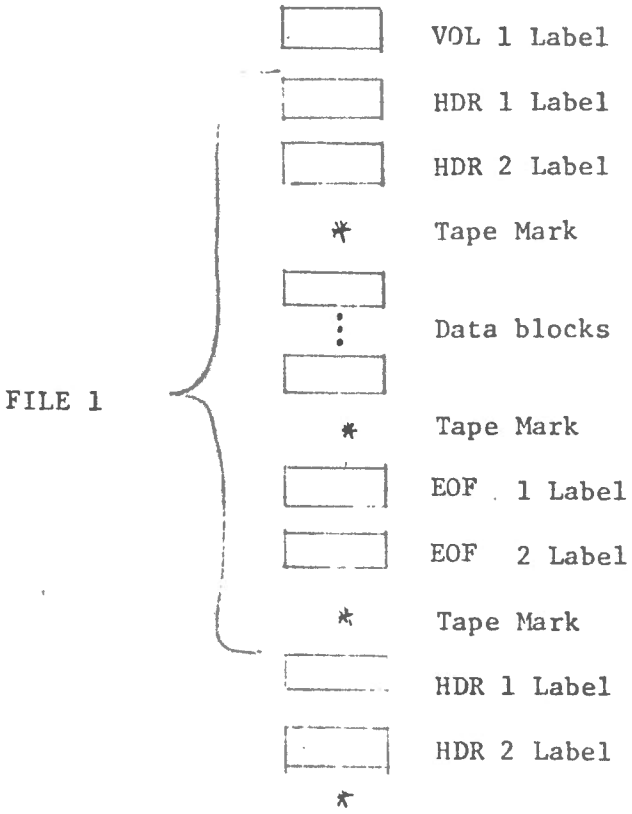
.../2

TABLE 1

RSX-11 ANSI

Magnetic tape format

RSX-11M Tape Format



- End of Information on tape is indicated by a 2 consecutive tape marks after the EOF 2 label.
- Mag tape label blocks contain 80 bytes and are ANSI standard
- Data blocks are 512 bytes (8-bit bytes) or 256 words.

TABLE 2

RSX ECTN logical data block format

Word	Description
1-4	Undefined
5	Year - 2 digit
6	Month
7	Day
8-11	Hour, minute, sec. and tiks (1 tik = 1/60 sec)
12-34	Undefined
35-94	Station OTT 60 consecutive sample values
95-96	Undefined
97-156	Station MNT " " " "
157-158	Undefined
159-218	Station MIQ " " " "
219-261	Undefined
262-321	Station MNQ " " " "
322-323	Undefined
324-383	Station GNT " " " "
384-385	Undefined
386-445	Station LAQ/SBQ " " "
446-447	Undefined
448-507	Station LBQ/LPQ " " "
508-519	Undefined
520-579	Station LDQ 60 " " "
580-581	Undefined
582-611	Station GAC-Z 30 consecutive sample values
612-613	Undefined
614-643	Station GAC-N " " " "
644-645	Undefined
646-675	Station GAC-E " " " "
676-677	Undefined
678-737	Station FHO 60 consecutive sample values
738-768	Undefined

Time Period: Jan 31/79 - Dec 6/80 ?

TABLE 4

ECTN Station Coordinates

Station Code	FIX Format Type	Place Name	Latitude	Longitude	Elevation Metres
OTT	1	Ottawa, Ont.	45.394°N	75.716°W	77
MNT	1	Montreal, Que.	45.502°N	73.623°W	112
MIQ	1	Maniwaki, Que.	46.367°N	75.967°W	199
MNQ	1	Manicouagan, Que.	50.533°N	68.774°W	156
GNT	1	Gentilly, Que.	46.363°N	72.372°W	10
LAQ	1	La Grande, Que.	53.824°N	77.020°W	183
LBQ	1	La Grande, Que.	53.536°N	77.354°W	183
LCQ	1	La Grande, Que.	53.541°N	76.973°W	290
LDQ	1	La Grande, Que.	53.806°N	77.428°W	198
FHO	1	Fitzroy Harbour, Ont.	45.455°N	76.217°W	72
SBQ	2	Sherbrooke, Que.	45.378°N	71.926°W	265
LPQ	2	La Pocatière, Que.	47.341°N	70.009°W	126
GAC	2	Glen Almond, Que.	45.703°N	75.478°W	62

TABLE 3

ECTN Sample Value Bit Assignments (FIX-1 Format)

	High Order Byte								Low Order Byte							
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	P	1	S	E2	E1	E0	M7	M6	P	0	M5	M4	M3	M2	M1	M0

where:

M0:- least significant bit of the Mantissa

E0:- least significant bit of the Exponent

S :- Sign bit - 0 = positive number

1 = negative number

P :- Parity bit

0,1 :- to signify low and high order bytes

Sample value = ± Mantissa x 2^{E}

ECTN Sample Value Bit Assignments (FIX-2 Format)

	High Order Byte								Low Order Byte							
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	C	X1	X0	S	M10	M9	M8	M7	C	M6	M5	M4	M3	M2	M1	M0

where:

C:- code bit

X0:- least significant bit of Exponent

Sample value = ± Mantissa x 4^{X}

Transfer Functions - ECTN, BACKPACK May 4, 1982

a) Old ECTN stations (OTT, MNT, MIQ, MNQ, GNT) and old Backpack

$$H(f) = \frac{S}{(S + 0.1)} * \frac{S^2}{(S^2 + 2x1\ xD1\ xS + 1^2)} * \frac{20^2}{(S^2 + 2x20\ xD2\ xS + 20^2)}$$

$$* \frac{20^2}{(S^2 + 2 \times 20 \times D3 \times S + 20^2)} * \frac{20}{S + 20}$$

b) New ECTN - all other ECTN stations (except GAC) and New Backpack

$$H(f) = \frac{S}{(S + 0.1)} * \frac{S^2}{S^2 + 2 \times 1 \times D1 \times S + 1^2)} * \frac{16^2}{(S^2 + 2 \times 16 \times D4 \times S + 16}$$

$$* \frac{16}{(S + 16)}$$

where S = jf

D1 = COS (45°)

D2 = COS (36°)

D3 = COS (72°)

D4 = COS (60°)

one count is 10 nonometers/sec. at midband.

GLEN ALMOND SHORT-PERIOD

TRANSFER FUNCTION POLES AND ZEROS

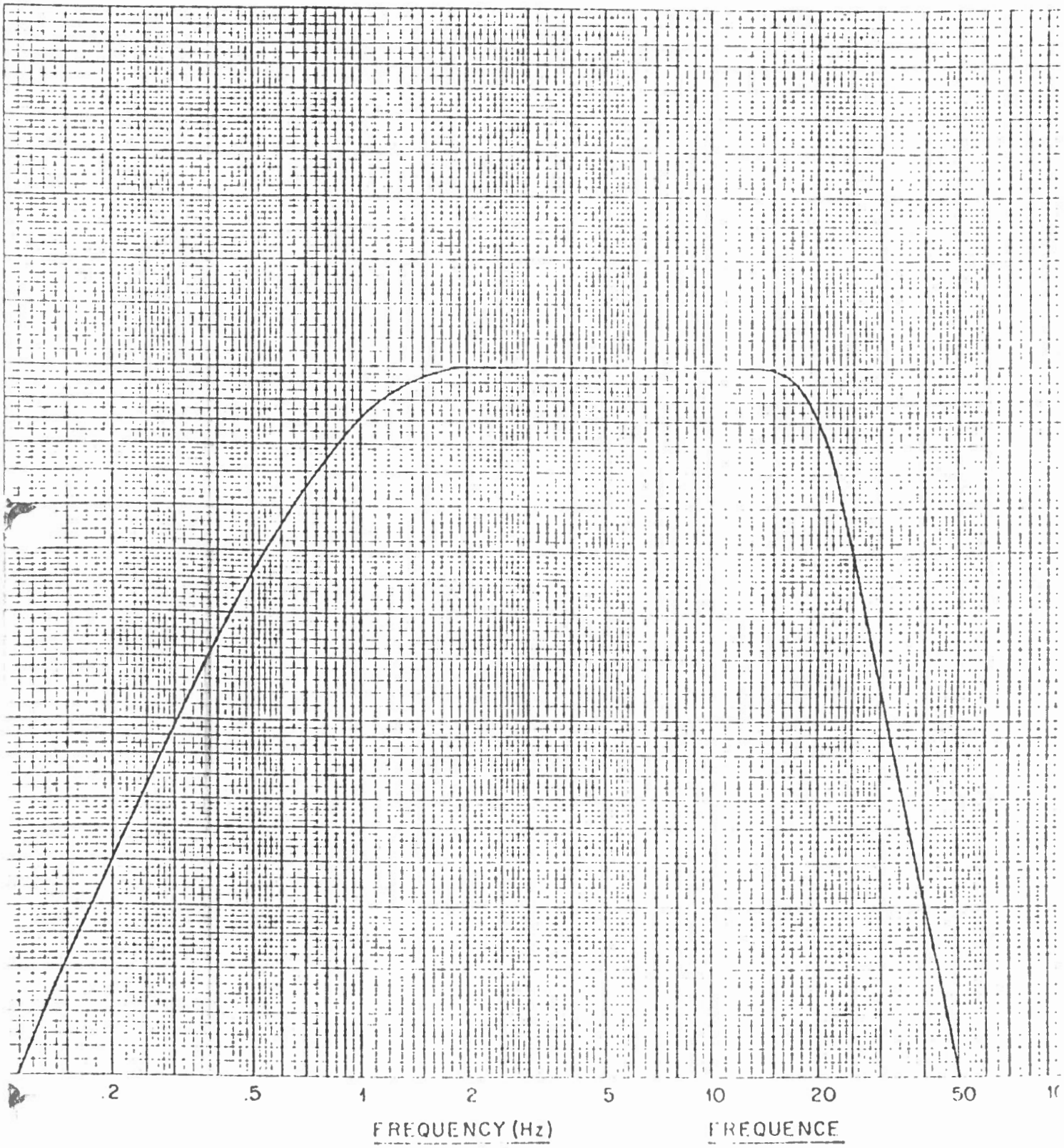
12-MAY-82

	POLES	ZEROS
KS 36000 SEISMO	S+ 4.648 ± 3.463j	S^2
(ALBUQ. "NOMINAL")	S+ .1179	S + .1243
	S+ 40.73	S + 47.62
	S+ 100.0	S
	S+ .1500	
	S+ 264	
EPB SP FILTER	S+ 3.129	S
	S+ 50.00	S
EPB ANTIALIAS FILT.	S+ 25.12 ± 42.28j	
	S+ 52.58	
SCALE FACTOR (Bits/Metre)	1.38×10^{11}	

CURVE REPRESENTS THEORETICAL VELOCITY RESPONSE TO DIGITAL OUTPUT

Courbe qui représente la velocité théorique en réponse à un signal de sortie numérique

STATIONS : ECTN/RTEC – GNT, MIQ, MNQ, MNT, OTT
WCTN/RTOC – ALB, HYC, PGC, PIB, VGZ, WHB

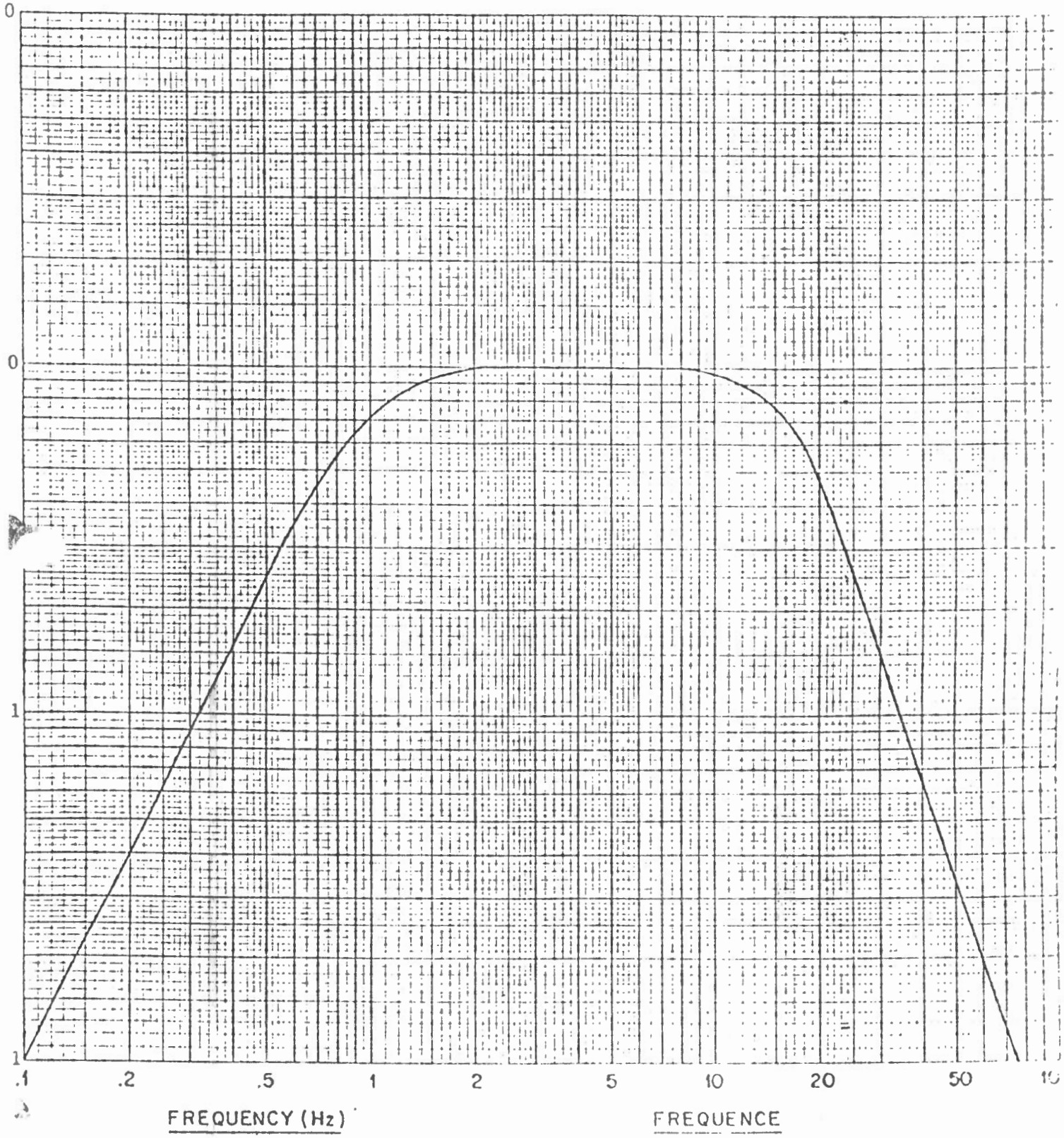


CURVE REPRESENTS THEORETICAL VELOCITY RESPONSE TO DIGITAL OUTPUT

Courbe qui représente la velocité théorique en réponse à un signal de sortie numérique

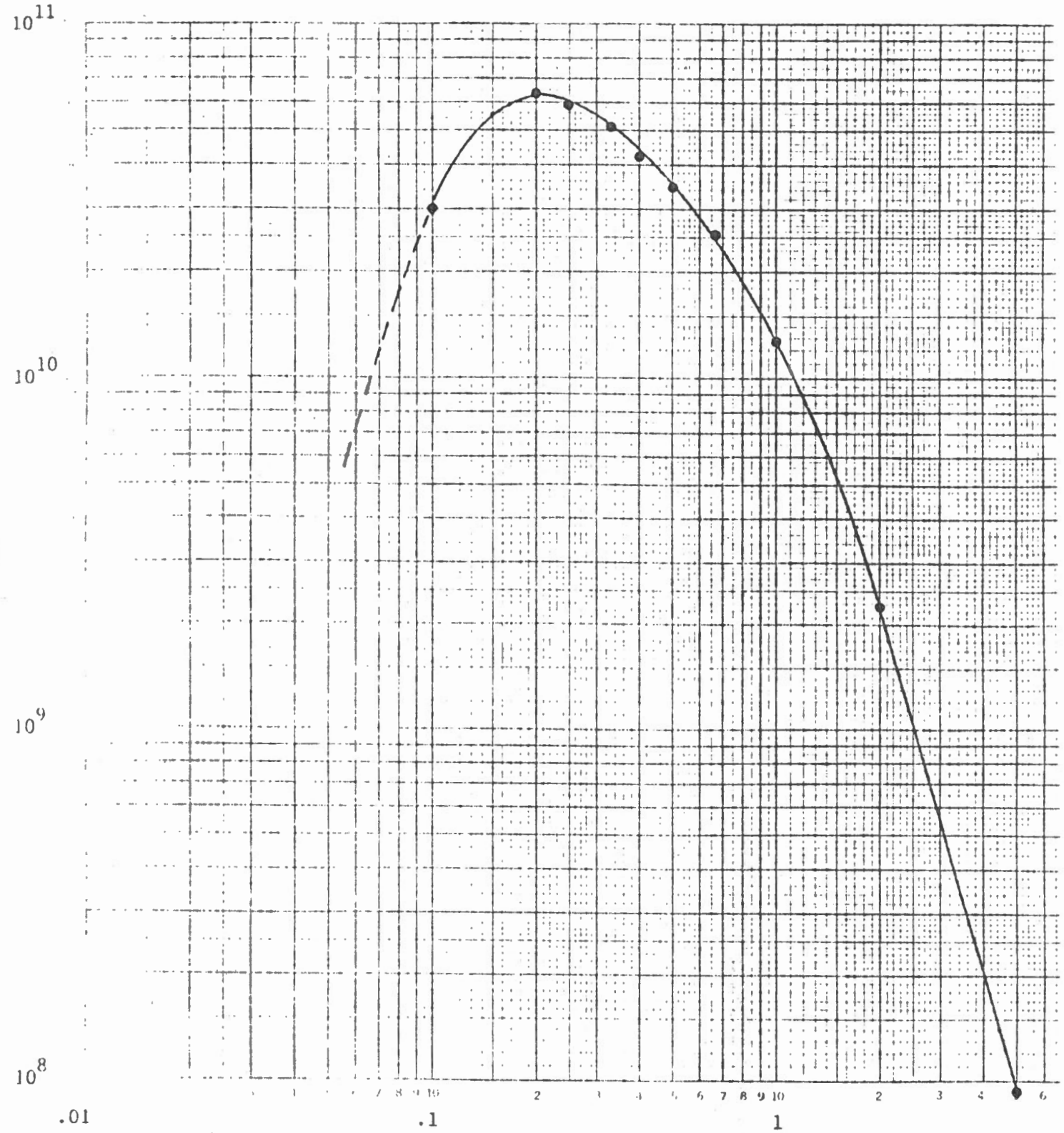
STATIONS: ECTN/RTEC - CKO,EBN,FHO,GGN,GSQ,JAQ,KLN,LDQ,LMN,LPQ,SBQ,VDQ,WBO,WEO

WCTN/RTOC - CCB,HNB,NAB,SHB,SNB



STATION: GAC Calibration: Aug. 27, 1980

Geotech 36000 borehole seismometer with EPB Short Period filter
EPB anti-alias filter: 8Hz, 18 dB/Oct ; 30 samples/second



ECTN FILE HEADER RECORD FORMAT

Time Period: Dec 9/80 - Oct 26/81

5 blocks/record
1 block - 512 bytes

BYTE POSITION	A: ASCII B: BINARY	FIELD DESCRIPTION
1-2	A	ASCII HD
3-4	B	Byte offset to SAD - first Secbuf Access Table entry
5-60		U = undefined or non useful data
61-62	B	Byte offset to TSL - Trigger Sequence List
63-64	B	Byte offset to next free space
		First Secbuf Access Table Entry (SAT)
65	B	DZ. port number - starts at 0
66	B	Component number - starts at 0
67-72	A	Component name e.g. OTTSPZ
73-74	B	Fix code 0 = old Mark I format 4 = New Format
75-76	B	Number of data bytes
77-78	B	Byte offset data Pointer in Data Record
79-80	B	Byte offset to next SAT entry (0 if last entry)
81-82	B	TT Pointer
83-84	B	Byte offset to ADB - implimented 9-Jul-81
		The above 20 byte entry repeats itself for each component. The last entry has zero in offset to the next SAT. Directly after last component entry at the offset (address) given in bytes 61-62 (offset to TSL) the Trigger Sequence List starts. See TSL format below. Note that when an offset is given it is an offset from the beginning of the record where the first byte in the record is at offset 0.

ECTN FILE HEADER RECORD FORMAT

Time Period: Dec 9/80 - Oct 26/81
Cont.

5 blocks/record
1 block - 512 bytes

BYTE POSITION	A= ASCII B= BINARY	FIELD DESCRIPTION
		TRIGGER SEQUENCE LIST (TSL)
1-6	A	ASCII component name of triggered component
7-8	B	Year (2 digit) } Trigger Date/Time
9-10	B	Month "
11-12	B	Day "
13-14	B	Hour "
15-16	B	Minute "
17-18	B	Second "
19-20	B	Tik " always ϕ
21-24	B	STA- Short Term Average before trigger - DEC real format
25-28	B	LTA- Long Term Average " " " "
29-30	B	Peak Amplitude - always ϕ - not implimented
		The Trigger Sequence List repeats for each triggered component. When bytes 1 and 2 are zero in the TSL, the last triggered component has already been read.

ECTN FILE DATA RECORD FORMAT

Time Period: Dec 9/80 - Oct 28/81
cont.

5 blocks/record
1 block = 512 bytes

BYTE POSITION	WORD POSITION	FIELD DESCRIPTION
1-2	1	ASCII SB
3-302	2-151	U = undefined or non-useful data
303-304	152	Year (2 digit)
305-306	153	Month "
307-308	154	Day "
309-310	155	Hour "
311-312	156	Minute "
313-314	157	Second "
315-316	158	Tiks " always ϕ 1 Tik = 1/60 sec.
317-436	159-218	60 two-byte sample values - OTTSPZ
437-556	219-278	60 " " " " - HNTSPZ
557-676	279-338	60 " " " " - HIQSPZ ends Apr 30/81
677-796	339-398	60 " " " " - HNQSPZ
797-916	399-458	60 " " " " - GNTSPZ
917-1036	459-518	60 " " " " - SBQSPZ
1037-1156	519-578	60 " " " " - LPQSPZ
1157-1216	579-638	60 " " " " - LDQSPZ / JAQSPZ Dec 9/80 to Mar 10/81 started Mar 23/81
1217-1396	639-698	60 " " " " - FHOSPZ
1397-1456	699-728	30 " " " " - GACSPZ
1457-1516	729-758	30 " " " " - GACSPN
1517-1576	759-788	30 " " " " - GACSPE
1577-1578	789	1 " " " " - GACBPZ
1579-1580	790	1 " " " " - GACLPN
1581-1582	791	1 " " " " - GACLPE
1583-1584	792	1 " " " " - GACAX1
1585-1586	793	1 " " " " - GACAX2
1587-1588	794	1 " " " " - GACAX3

ECTN FILE DATA RECORD FORMAT

Time Period: Dec 9/80 - Oct 28/81

5 blocks/record
1 block = 512 bytes

BYTE POSITION	WORD POSITION	FIELD DESCRIPTION
1589-1708	795-854	60 two-byte sample values - VDQSPZ started Dec 9/80
1709-1828	855-914	60 " " " - WBQSPZ started Dec 9/80
1829-1948	915-974	60 " " " - CKQSPZ started Jan 12/81
1949-2068	975-1034	60 " " " - TRQSPZ started Mar 16/81
2069-2188	1035-1094	60 " " " - GRQSPZ started Mar 16/81
2189-2308	1095-1154	"
2309-2428	1155-1214	"
2429-2548	1215-1274	"
2549-2560	1275-1280	"

KPP2SOURCE
RK05 Disk #25

[illegible]

[illegible] DK1:[6,63]
[illegible] FEB-84 14:[illegible]

[illegible]FELT.FTN;[illegible]3[illegible]	20.	30-N[illegible]
[illegible]KFELT.FTN;27	[illegible]6.	3[illegible]-N[illegible]
[illegible]PIKFEL[illegible].FTN;[illegible]4	[illegible]	3[illegible]-N[illegible]-8[illegible]
[illegible]TNE[illegible]R.FTN;[illegible]	1.	30-N[illegible]
[illegible]X4.MAC;[illegible]	3.	30-N[illegible]
[illegible]TNMTW[illegible].FTN;24	[illegible]	30-N[illegible]
[illegible]ELT.BAT;21	24.	30-N[illegible]
[illegible]PETN.FTN;[illegible]	14.	30-NO[illegible]-8[illegible]
FTX.MAC;10	5.	30-N[illegible]-8[illegible]
[illegible]RT[illegible]PNEW.FTN;[illegible]0	10.	30-NO[illegible]-8[illegible]
[illegible]S[illegible]P[illegible]T.FTN;51	[illegible]	30-NO[illegible]-8[illegible]

Total of [illegible] blocks in 11. files

ECTN Sample Value Bit Assignments (FIX-1 Format)

(FIX-0 or old ECTN Mark I format)

	High Order Byte								Low Order Byte							
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	P	1	S	E2	E1	E0	M7	M6	P	0	M5	M4	M3	M2	M1	M0

where:

MO:- least significant bit of the Mantissa

EO:- least significant bit of the Exponent

S :- Sign bit - 0 = positive number

1 = negative number

P :- Parity bit

0,1 :- to signify low and high order bytes

Sample value = ± Mantissa x 2^{E}

ECTN Sample Value Bit Assignments (FIX-2 Format)

(FIX-4 or new ECTN format)

	High Order Byte								Low Order Byte							
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	C	X1	XO	S	M10	M9	M8	M7	C	M6	M5	M4	M3	M2	M1	M0

where:

C:- code bit

XO:- least significant bit of Exponent

Sample value = ± Mantissa x 4^{X}

ECTN FILE HEADER RECORD FORMAT

Time Period: Oct 26/81 - Jul 3/82 (and after but only for TRIGGER output files not for archiving)

6 blocks/record
1 block - 512 bytes

BYTE POSITION	A= ASCII B= BINARY	FIELD DESCRIPTION
1-2	A	ASCII HD
3-4	B	Byte offset to SAD - first secbuf Access Table entry
5-60		U= undefined or non useful data
61-62	B	Byte offset to TSL - Trigger Sequence List
63-64	B	Byte offset to next free Space
		First Secbuf Access Table Entry (SAT TABLE)
65	B	DZ port number - starts at 0
66	B	Component number - starts at 0
67-72	A	Component name e.g. CTTSPZ
73-74	B	Fix code 0= old format 4= new format
75-76	B	Number of data bytes
77-78	B	Byte data offset Pointer in Data Record
79-80	B	Byte offset to next SAT (0 if last entry)
81-82	B	TT Pointer
83-84	B	Byte offset to ADB
		The above 20 byte entry repeats itself for each component. The last entry has zero in offset to the next SAT. Directly after last component entry at the offset (address) given in bytes 61-62 (offset to TSL) the Trigger Sequence List starts. See TSL format below. Note that when an offset is given (usually a byte offset) it is an offset from the beginning of the record where the first byte in the record is at offset 0.

ECTN FILE HEADER RECORD FORMAT

Time Period: Oct 28/81 – Jul. 3/82
cont.

6 blocks/record
1 block - 512 bytes

BYTE POSITION	A: ASCII B: BINARY	FIELD DESCRIPTION
		TRIGGER SEQUENCE LIST
1-6	A	ASCII component name of triggered component
7-8	B	Year (2 digit) — Trigger Date/Time
9-10	B	Month " — Trigger Date/Time
11-12	B	Day " — Trigger Date/Time
13-14	B	Hour " — Trigger Date/Time
15-16	B	Minute " — Trigger Date/Time
17-18	B	Second " — Trigger Date/Time
19-20	B	Tik " always Ø — Trigger Date/Time
21-24	B	STA Short Term Average before trigger - DEC real format
25-28	B	LTA Long Term Average " " " " "
29-30	B	Peak Amplitude - zero always, not implimented.
		The Trigger Sequence List repeats for each triggered component. When bytes 1 and 2 are zero in the TSL, the last triggered component has been already processed.

ECTN FILE DATA RECORD FORMAT

Time Period: Oct 26/81 - Jul 3/82 (and after but only for Trigger output, not archived)

6 blocks/record
1 block = 512 bytes

BYTE POSITION	WORD POSITION	FIELD DESCRIPTION
1-2	1	ASCII SB
3-302	2-151	U = undefined or non-useful data
303-304	152	Year (2 digits) } Date/Time of first sample for each component
305-306	153	Month "
307-308	154	Day "
309-310	155	Hour "
311-312	156	Minute "
313-314	157	Second "
315-316	158	Tiks " always 0 1 Tik = 1/60 sec.
317-436	159-218	60 two-byte sample values - OTTSPZ
437-556	219-278	60 " " " " - MNTSPZ
557-676	279-338	60 " " " " - MNQSPZ Signal moved Apr. 16/82 EEOSPZ
677-796	339-398	60 " " " " - GNTSPZ
797-916	399-458	60 " " " " - SBQSPZ
917-1036	459-518	60 " " " " - JAQSPZ removed Nov 22/82 KAQSPZ started Mar 18/82
1037-1156	519-578	60 " " " " - FNOSPZ removed Jan 11/82 WEOSPZ started Apr 31/82
1157-1216	579-608	30 " " " " - GACSPZ
1217-1276	609-638	30 " " " " - GACSPN
1277-1336	639-668	30 " " " " - GACSPE
1337-1338	669	1 " " " " - GACLPZ
1339-1340	670	1 " " " " - GACLPN
1341-1342	671	1 " " " " - GACLPE
1343-1344	672	1 " " " " - GACAX1
1345-1346	673	1 " " " " - GACAX2
1347-1348	674	1 " " " " - GACAX3
1349-1468	675-734	60 " " " " - VDQSPZ

ECTN FILE DATA RECORD FORMAT

Time Period: Oct 28/81 - Jul 3/82 cont.

6 blocks/record
1 block = 512 bytes

BYTE POSITION	WORD POSITION		FIELD DESCRIPTION
1469-1588	735-794	60	two-byte sample values - WBOSPZ
1589-1708	795-854	60	" " " - CKOSPZ
1709-1828	855-914	60	" " " - TRQSPZ
1829-1948	915-974	60	" " " - GRQSPZ
1949-2068	975-1034	60	" " " - LPQSPZ
2069-2188	1035-1094	60	" " " - GSQSPZ started Oct 28/81
2189-2308	1095-1154	60	" " " - EBNSPZ started Oct 28/81
2309-2428	1155-1214	60	" " " - GGNSPZ started Oct 28/81
2429-2548	1215-1274	60	" " " - LHNSPZ started Oct 28/81
2549-2668	1275-1334	60	" " " - KLNSPZ started Jan 29/81
2669-2788	1335-1394	60	" " " - MNQSPZ moved to here Apr 15/82
2789-2908	1395-1454	60	" " " - HTQSPZ started Apr 15/82
2909-3028	1455-1514	"	
3029-3072	1515-1536	"	

ECTN Sample Value Bit Assignments (FIX-1 Format)

(FIX-0 or old ECTN Mark I format)

	High Order Byte								Low Order Byte							
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	P	1	S	E2	E1	E0	M7	M6	P	0	M5	M4	M3	M2	M1	M0

where:

M0:- least significant bit of the Mantissa

E0:- least significant bit of the Exponent

S :- Sign bit - 0 = positive number

1 = negative number

P :- Parity bit

0,1 :- to signify low and high order bytes

Sample value = ± Mantissa x 2^{E}

ECTN Sample Value Bit Assignments (FIX-2 Format)

(FIX-4 or new ECTN format)

	High Order Byte								Low Order Byte							
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	C	X1	X0	S	M10	M9	M8	M7	C	M6	M5	M4	M3	M2	M1	M0

where:

C:- code bit

X0:- least significant bit of Exponent

Sample value = ± Mantissa x 4^{X}

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DESCRIPTION OF THE TIME SERIES FILE

There is one header record for each event file. The header record is either one block (256 words) or two blocks long depending on the number of triggered stations. After header record, the data for all the stations will follow. Each record is one block long.

In the beginning of each station (component), there is a component header to tell the layout and some information about this station. This will be discussed in detail after the file-header.

TIME SERIES FILE-HEADER LAYOUT

WORD POSITION	TYPE	DESCRIPTION
1 - 8	ASCII	event-ID, 15 digits + 1 space
9	INTEGER	# of triggered components.
10 - 14	------	5 spare words.
15	INTEGER	# of files (= 1, always)
16	INTEGER	sequence # of this file (= 1, always)
17	INTEGER	block # of the triggered station list.
18	INTEGER	offset address (counting from 0) of the triggered station list. (=TOFF)
19	INTEGER	# of components (stations) in file (= 23, for now. Jan. 1983)
20 - 22	ASCII	station-ID of the first component.
23	INTEGER	block # (counting from 1) of first component
24	INTEGER	spare word
..... above 5 words (20-24) are repeated for each component.		
(TOFF+1)-(TOFF+3)	ASCII	fisrt triggered station-ID, where TOFF is the integer value stored in word 18.
(TOFF+4)	INTEGER	year (trigger-time of this station)
(TOFF+5)	INTEGER	month
(TOFF+6)	INTEGER	day
(TOFF+7)	INTEGER	hour
(TOFF+8)	INTEGER	minute
(TOFF+9)	INTEGER	second
(TOFF+10)	INTEGER	millisecond
(TOFF+11)-(TOFF+14)	----	4 spare words
..... above 14 words are repeated for each triggered station.		

COMPONENT HEADER AND DATA

word position	type	description
1	INTEGER	block #.(counting from 1) of start of data for this component.
2	INTEGER	offset address (counting from 0) of data in this block (= 40 , for now, Jan., 1983).
3	INTEGER	logical start sample number.
4	INTEGER	logical stop sample number.
5	INTEGER	number of samples.
6	INTEGER	sampling frequency (= 30 , or =60)
7	INTEGER	total number of replicated samples.
8	INTEGER	# of shifts for exponent base to become 2. (= 0 , for now, Jan. 1983)
9	OCTAL	data mantissa mask (= 0 177760)
10	OCTAL	data exponent mask (= 0 000007)
11	OCTAL	position of validation bits (= 0 000010)
12	ARCHIVE	Max. sample value (in archive format)
13	INTEGER	time correction (in millisecond = 0, for now,Jan.,1983)
14	-----	spare word
15	INTEGER	year (start time of data)
16	INTEGER	month
17	INTEGER	day
18	INTEGER	hour
19	INTEGER	minute
20	INTEGER	second
21	INTEGER	millisecond
22-40	-----	spare words.
41-	ARCHIVE	data values in archive format.

SAM ARCHIVE DATA FORMAT

the 16 bits of the archive data :

```
        S  M  M  M  M  M  M  M  !  M  M  M  M  V  E  E  E
BIT # : 15 14 13 12 11 10 9  8     7  6  5  4  3  2  1  0
```

Where the first 12 bits (bit #15 to bit #4) define the signed mantissa value

mantissa= S M M M M M M M M M M M .

Bit #3 is the validation bit.

The last three bits (bits # 2, 1 and 0) gives the exponential gain value of base 2., i.e.

gain = 2 ** (E E E).

The real data value is

value = mantissa * gain .

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