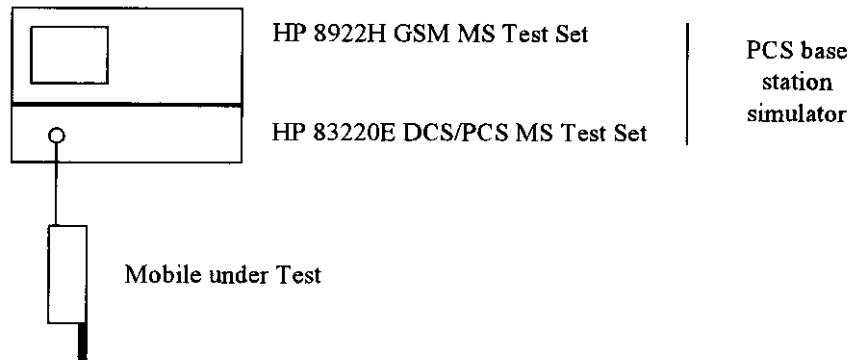


3. TYPE ACCEPTANCE REQUIRED MEASUREMENTS AND RESULTS.

3.1. MEASUREMENTS REQUIRED. RF POWER OUTPUT.

The RF output peak power is measured on the RF connector of the mobile.



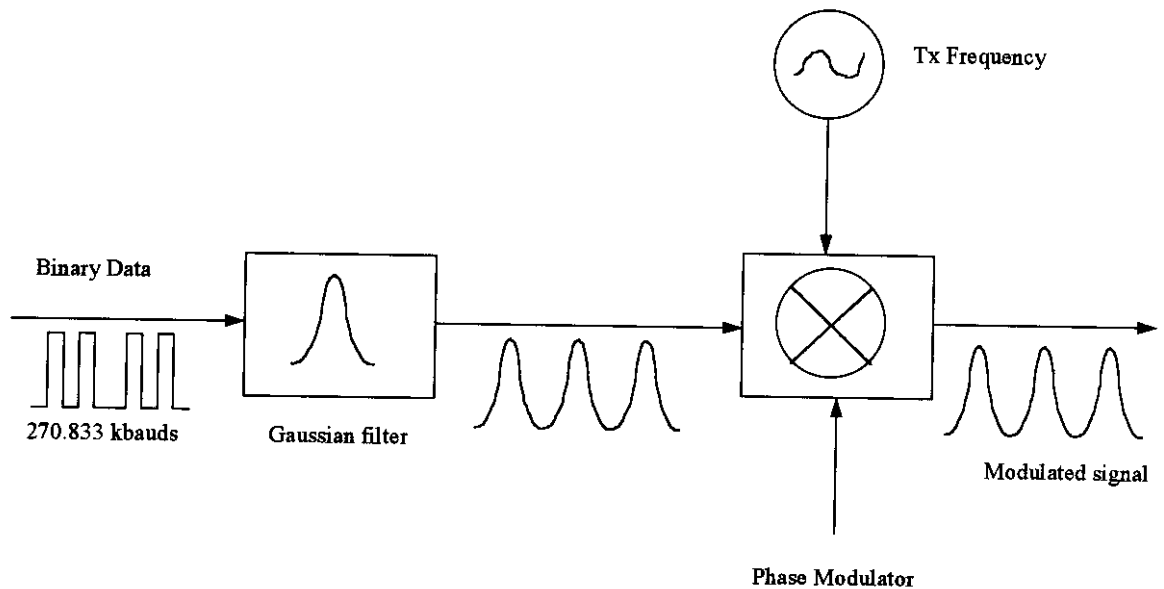
Power Control Level			Channel 512		Channel 661		Channel 810	
Tx Level			1850.2 MHz		1880.0 MHz		1909.8 MHz	
	dBm	W	dBm	W	dBm	W	dBm	W
P0	30	1.0000	29.4	0.8710	29.8	0.9550	29.7	0.9333
P1	28	0.6310	27.8	0.6026	28.0	0.6310	27.8	0.6026
P2	26	0.3981	25.7	0.3715	26.0	0.3981	26.1	0.4074
P3	24	0.2512	23.7	0.2344	24.0	0.2512	24.2	0.2630
P4	22	0.1585	21.6	0.1445	21.9	0.1549	22.1	0.1622
P5	20	0.1000	19.6	0.0912	19.9	0.0977	20.1	0.1023
P6	18	0.0631	17.5	0.0562	17.8	0.0603	18.0	0.0631
P7	16	0.0398	15.3	0.0339	15.7	0.0372	15.9	0.0389
P8	14	0.0251	13.4	0.0219	13.8	0.0240	14.0	0.0251
P9	12	0.0158	11.2	0.0132	11.6	0.0145	11.7	0.0148
P10	10	0.0100	9.2	0.0083	9.6	0.0091	9.8	0.0095
P11	8	0.0063	7.4	0.0055	7.8	0.0060	8.0	0.0063
P12	6	0.0040	5.2	0.0033	5.6	0.0036	5.8	0.0038
P13	4	0.0025	2.4	0.0017	2.8	0.0019	2.9	0.0019
P14	2	0.0016	1.1	0.0013	1.6	0.0014	1.7	0.0015
P15	0	0.0010	-0.3	0.0009	0.1	0.0010	0.3	0.0011

3.2. MEASUREMENTS REQUIRED. MODULATION CHARACTERISTICS.

The modulation used for PCS 1900, the North American version of the GSM standard is a digital type modulation.

The speech is digitised and coded. The binary rate is 270.833 kbauds.

The PCS 1900 modulation scheme is a "constant envelope" modulation scheme, named GMSK (Gaussian Minimum Shift Keying) where data only affects the signal phase, not the frequency.



3.3. MEASUREMENTS REQUIRED. OCCUPIED BANDWIDTH.

When the mobile is in transmitter mode, the occupied bandwidth corresponds to the GMSK modulation with the following characteristics :

- Modulation : Gaussian Minimum Shift Keying, with $B.T = 0.3$.
- (B = Bandwidth of the Gaussian Filter).
- (T = 1 bit duration).
- Modulation rate : 270.833 kbit/s.
- Constant envelope (only the phase is changed by the data).
- GMSK modulation spectrum.

Frequency offset from the carrier	100 kHz	200 kHz	250 kHz	400 kHz	600 kHz
Attenuation in dB (referenced to the carrier)	+0.5 dB	-30 dB	-33 dB	-60 dB	-60 dB

(Attenuation is given with a measurement bandwidth of 30 kHz).

Measurements of the GMSK modulation spectrum for the channel corresponding to the different blocks follow (modulation characteristics with pseudo random bit sequence PRBS input).

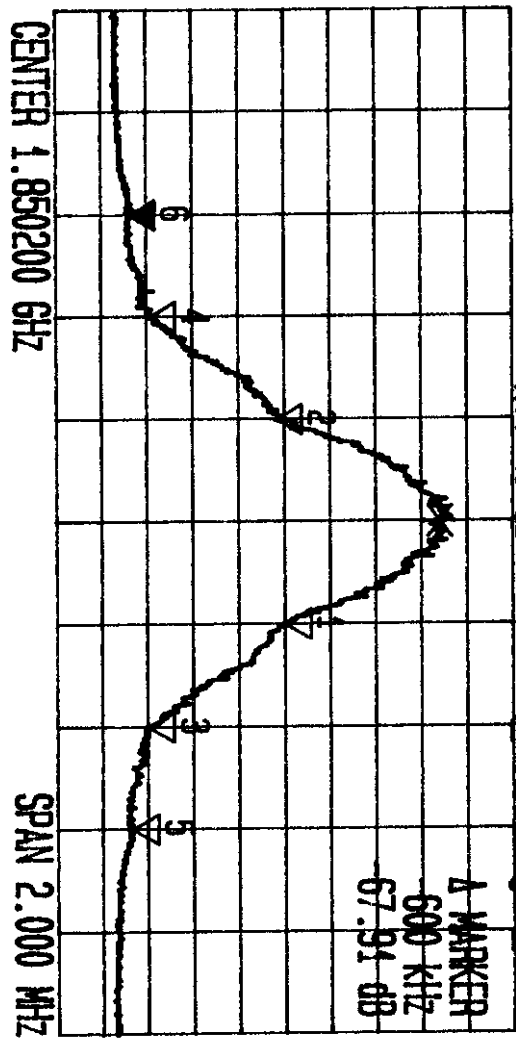
REF 30.0 dBm
10dB/
AG 50/50

CENTER
1.850200 GHz

RBW 30 kHz
VBW 30 kHz
SMP 50 MS

ATT 40 dB

Wed Apr 15 15:52:14 1998
A WriteSav B Blank



*** Multi Marker List ***

NO.1:	200 KHZ	-33.94 dB	A
NO.2:	-200 KHZ	-36.03 dB	A
NO.3:	400 KHZ	-63.97 dB	A
NO.4:	-400 KHZ	-63.50 dB	A
NO.5:	600 KHZ	-67.38 dB	A
NO.6:	-600 KHZ	-67.91 dB	A
NO.7:			
NO.8:			
A:	1.850200 GHz	14.06 dBm	A

GMsk Modulation Spec
Channel 512
f = 1850.2 MHz

Wed Apr 15 17:47:37 1998

REF 31.0 dBm

ATT 40 dB

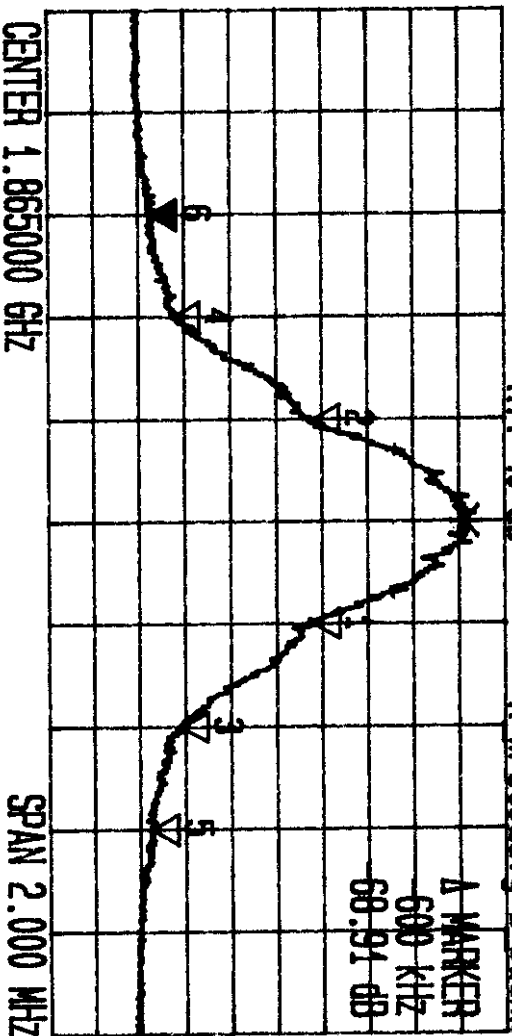
A WriteAvg B blank

10dB/
AG 50/50

CENTER

1.865000 GHz

RBW 30 kHz
VBW 30 kHz
SMP 50 MS



*** Multi Marker List ***

NO.1:	200 KHz	-33.22 dB	A
NO.2:	-200 KHz	-33.16 dB	A
NO.3:	400 KHz	-62.19 dB	A
NO.4:	-400 KHz	-63.56 dB	A
NO.5:	600 KHz	-68.72 dB	A
NO.6:	-600 KHz	-68.91 dB	A
NO.7:			
NO.8:			
A:	1.865000 GHz	22.50 dBm	A

GMSK Modulation Spec
Channel 586
 $f = 1865 \text{ MHz}$

REF 31.0 dBm

10dB/

AG 39/50

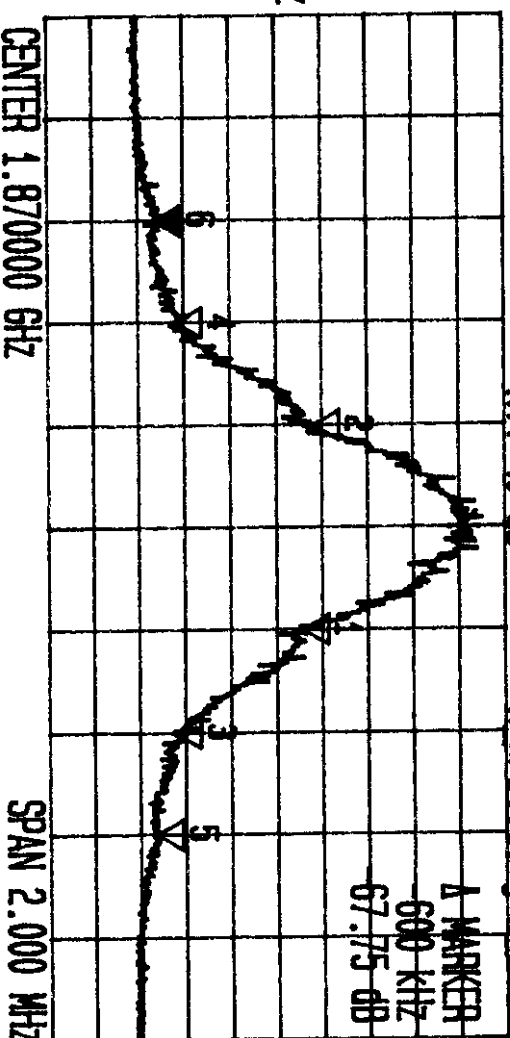
CENTER

1.870000 GHz

RBW 30 kHz
VBW 30 kHz
SMP 50 ms

ATT 40 dB

Wed Apr 15 17:53:34 1998
A writeavg B blank



*** Multi Marker List ***

No.	1:	2:	3:	4:	5:	6:	7:	8:
	200 KHz	-200 KHz	400 KHz	-400 KHz	600 KHz	-600 KHz		
	-35.47 dB	-33.13 dB	-63.47 dB	-62.91 dB	-67.56 dB	-67.75 dB		
	A	A	A	A	A	A		

1.870000 GHz 22.38 dBm A

GSM Modulation Spect
channel 611
f = 1870 MHz

Wed Apr 15 15:58:57 1998

A writeavg B blank

7 MARKEN

~~600 kHz~~
~~68.56 dB~~

1 MARKER
500 kHz
68.56 dB

CENTER 1.880000 GHz

SPAN 2.000 MHz

SPAN 2.000 MHz

-34.69 dB

A

200 KHZ	-34.69 dB	A
-200 KHZ	-39.66 dB	A
400 KHZ	-63.13 dB	A
-400 KHZ	-62.75 dB	A
600 KHZ	-67.94 dB	A
-600 KHZ	-68.56 dB	A

GMSK Modulation Spectra
Channel 66A
 $f = 1980 \text{ MHz}$

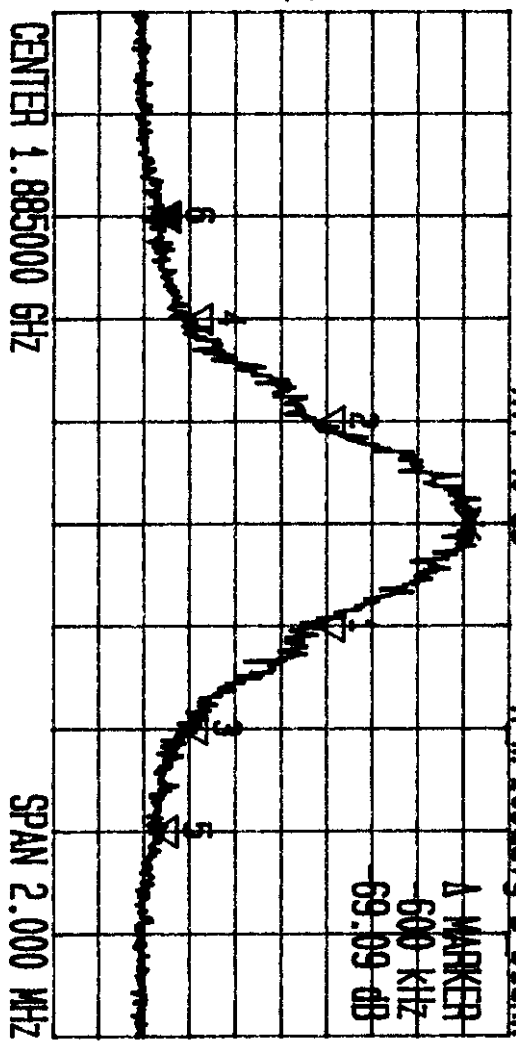
REF 31.0 dBm
10dB/
AG 8/50

CENTER
1.885000 GHz

RBW 30 kHz
VBW 30 kHz
SMP 50 MS

ATT 40 dB

Med Apr 15 17:56:52 1998
A WriteSav B blank



GMSK Modulation Sp
Channel 686
f = 1885 MHz

*** Multi Marker List ***

NO.1:	200 KHZ	-33.09 dB	A
NO.2:	-200 KHZ	-33.00 dB	A
NO.3:	400 KHZ	-63.00 dB	A
NO.4:	-400 KHZ	-61.78 dB	A
NO.5:	600 KHZ	-69.25 dB	A
NO.6:	-600 KHZ	-69.09 dB	A
NO.7:			
NO.8:			
A:	1.885000 GHz	22.19 dBm	A

Wed Apr 15 18:04:26 1998

REF 31.0 dBm

10dB/

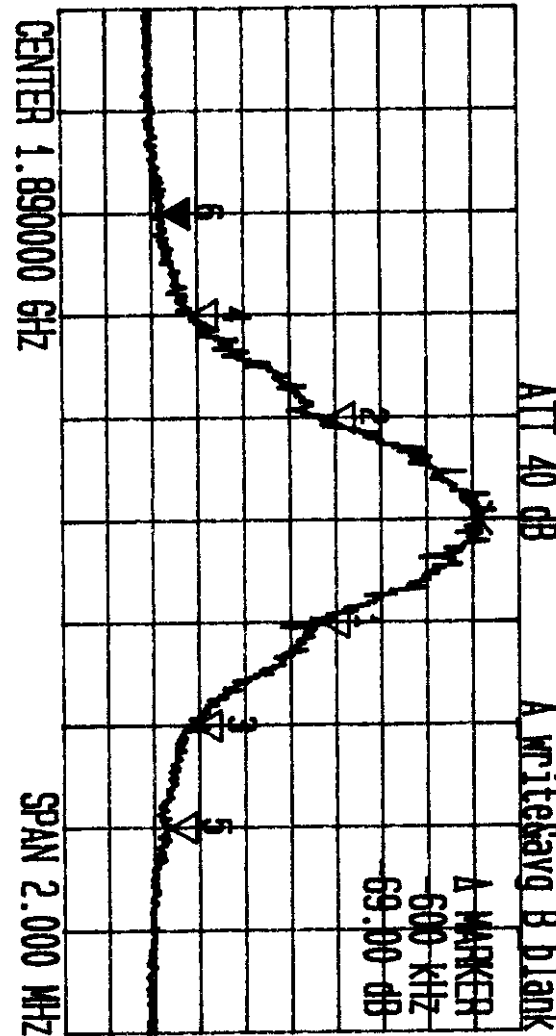
AG 22/50

CENTER

1.890000 GHz

RBW 30 KHz
VBW 30 KHz
SMP 50 MS

SPAN 2.000 MHz



GMSK Modulation Spec
channel #11
f = 1890 MHz

*** Multi Marker List ***

No.1:	200 KHz	-34.91 dB	A
No.2:	-200 KHz	-33.25 dB	A
No.3:	400 KHz	-62.84 dB	A
No.4:	-400 KHz	-63.38 dB	A
No.5:	600 KHz	-68.41 dB	A
No.6:	-600 KHz	-69.00 dB	A
No.7:			
No.8:			
A:	1.890000 GHz	22.97 dBm	A

Med Apr 15 18:11:04 1998

ATT 40 dB

A WriteSav B blank

REF 31.0 dBm

10dB/

AG 19/50

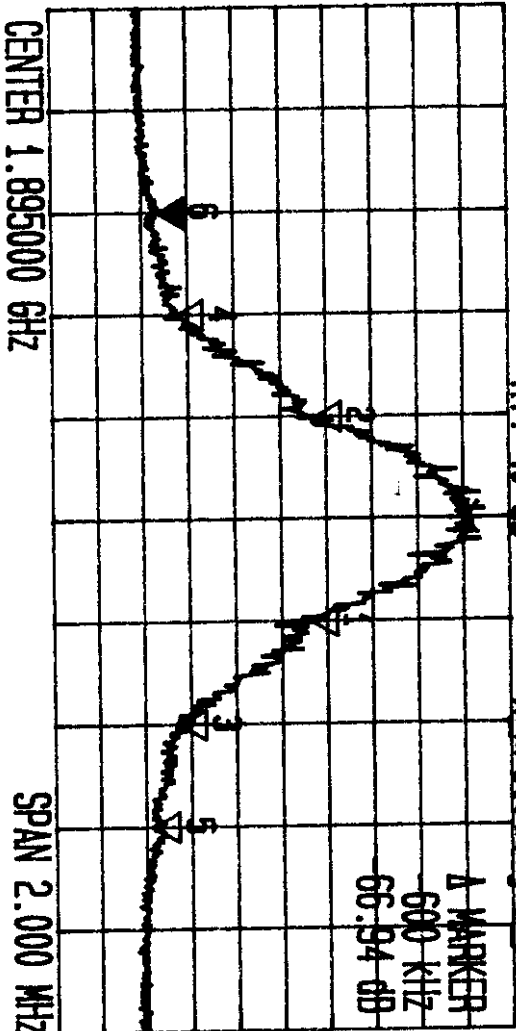
CENTER

1.895000 GHz

RBW 30 KHz

VBW 30 KHz

SMP 50 ms



*** Multi Marker List ***

NO.1:	200 KHz	-33.88 dB	A
NO.2:	-200 KHz	-33.09 dB	A
NO.3:	400 KHz	-62.88 dB	A
NO.4:	-400 KHz	-63.25 dB	A
NO.5:	600 KHz	-69.31 dB	A
NO.6:	-600 KHz	-66.94 dB	A
NO.7:			
NO.8:			
A:	1.895000 GHz	21.81 dBm	A

GMSK Modulation Spec
Channel 736
f ~ 1895 MHz

REF 30.0 dBm

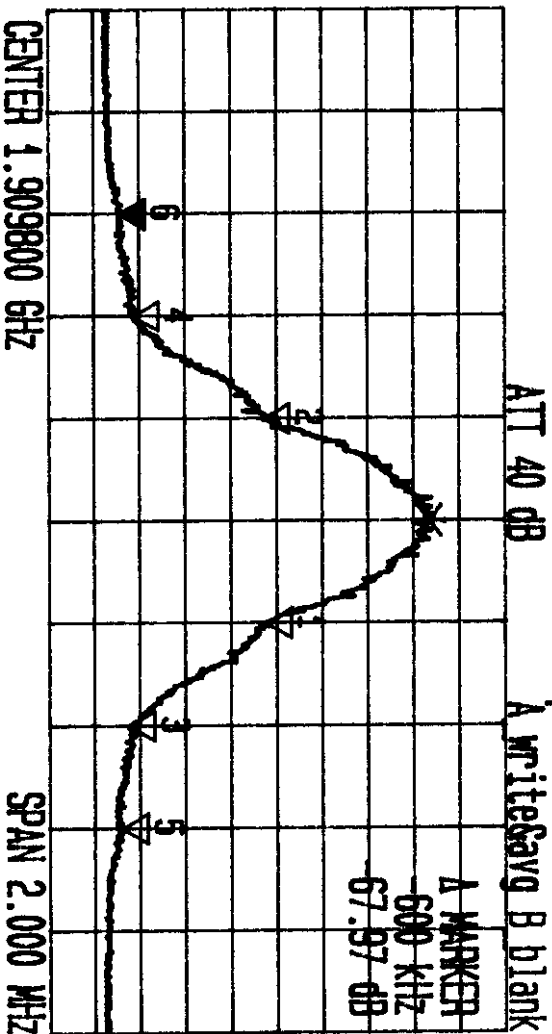
10dB/

AG 50/50

CENTER

1.909800 GHz

RBW 30 KHz
VBW 30 KHz
SMP 50 MS



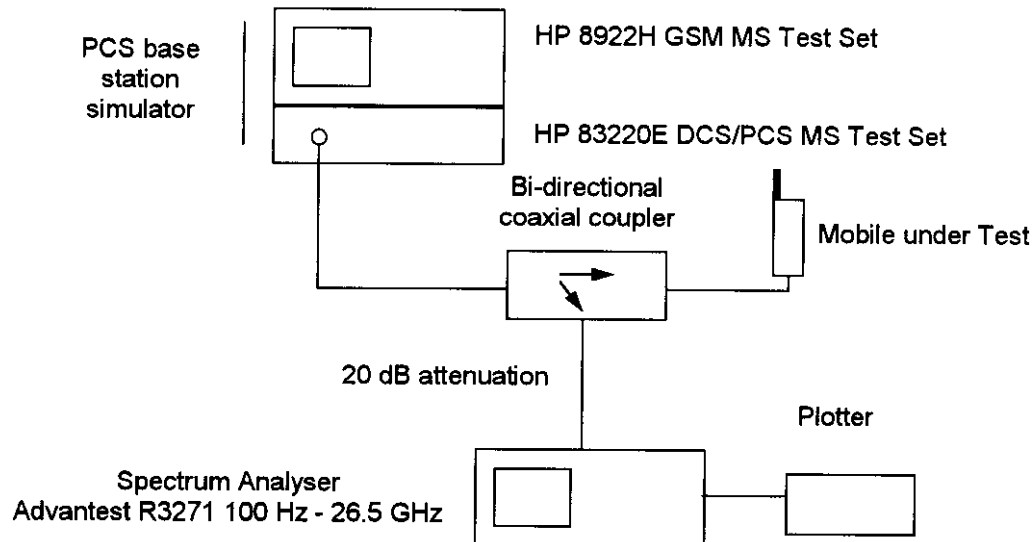
GMSK Modulation Spect
channel 810
 $f = 1909.8 \text{ MHz}$

*** Multi Marker List ***

NO.1:	200 KHz	-36.09 dB	A
NO.2:	-200 KHz	-36.84 dB	A
NO.3:	400 KHz	-66.09 dB	A
NO.4:	-400 KHz	-65.03 dB	A
NO.5:	600 KHz	-67.84 dB	A
NO.6:	-600 KHz	-67.97 dB	A
NO.7:			
NO.8:			
A:	1.909800 GHz	13.91 dBm	A

3.4. MEASUREMENTS REQUIRED. SPURIOUS EMISSIONS AT ANTENNA TERMINALS.

Spurious emissions are measured on the RF connector of the mobile. The radiotelephone is in communication mode. Spurious emissions are measured by a spectrum analyser connected to the mobile as shown on the figure.



The spectrum is measured in "Maxhold" mode on the analyser, between 100 MHz to 10 GHz and for the three following channels:

- Channel 512 corresponds to 1850.2 MHz in emission.
- Channel 661 corresponds to 1880.0 MHz in emission.
- Channel 810 corresponds to 1909.8 MHz in emission.

According to FCC part 24.238, the power of any emission shall be attenuated below the transmitted power (1 W) by at least $43 + 10 \log P = 43 + 10 \log 1 = 43$ dB.

So, the limit is 43 dB attenuated compared to 1 W.

$$1 \text{ W} = 30 \text{ dBm}$$

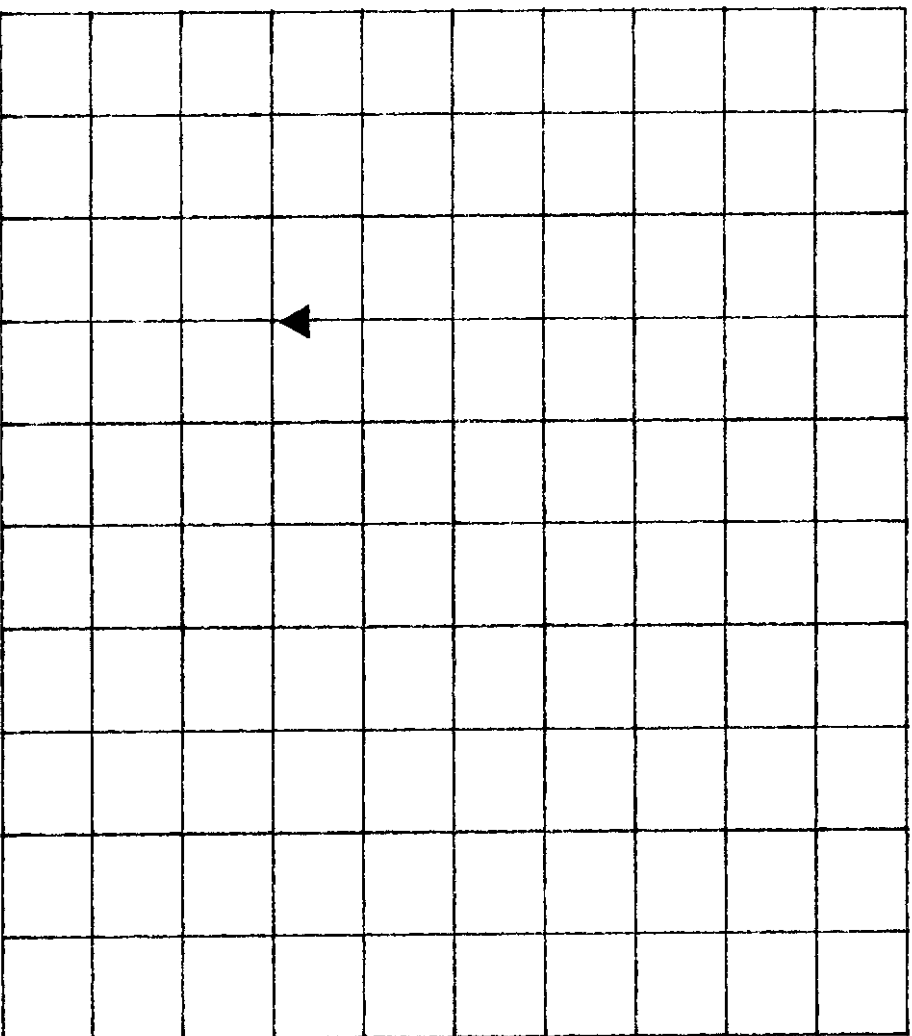
The maximum power level of the spurious are $30 \text{ dBm} - 43 \text{ dBm} = -13 \text{ dBm}$ or 0.05 mW.

This limit is reported on each graph by a dotted line.

3.5. MEASUREMENTS REQUIRED. FIELD STRENGTH OF SPURIOUS RADIATION.

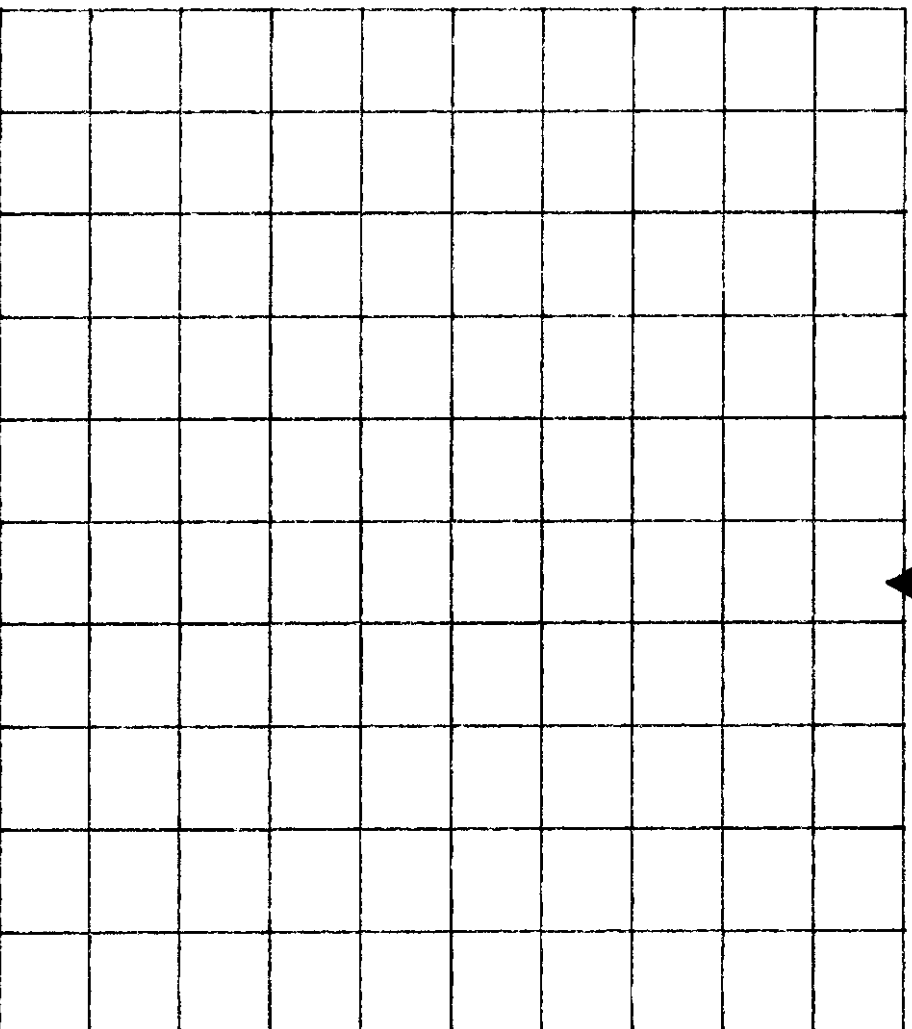
See measurement results in section 6.1.

B_blank



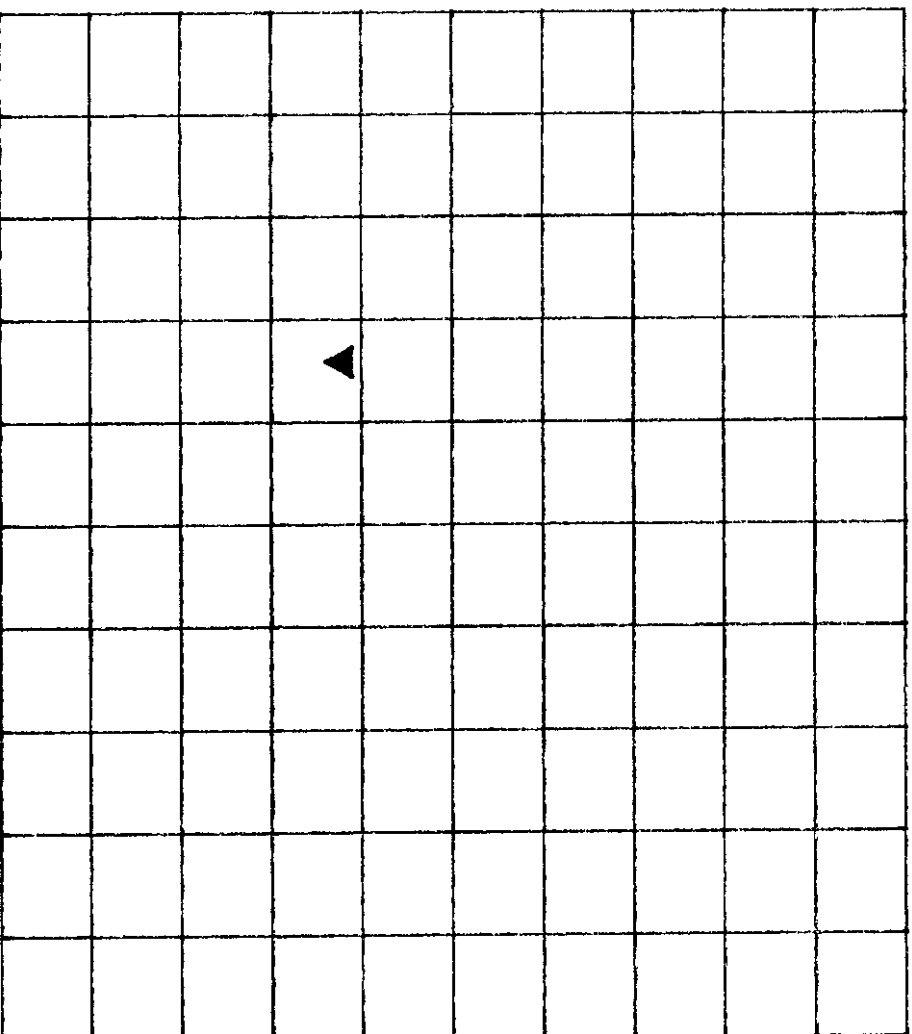
Channel 512

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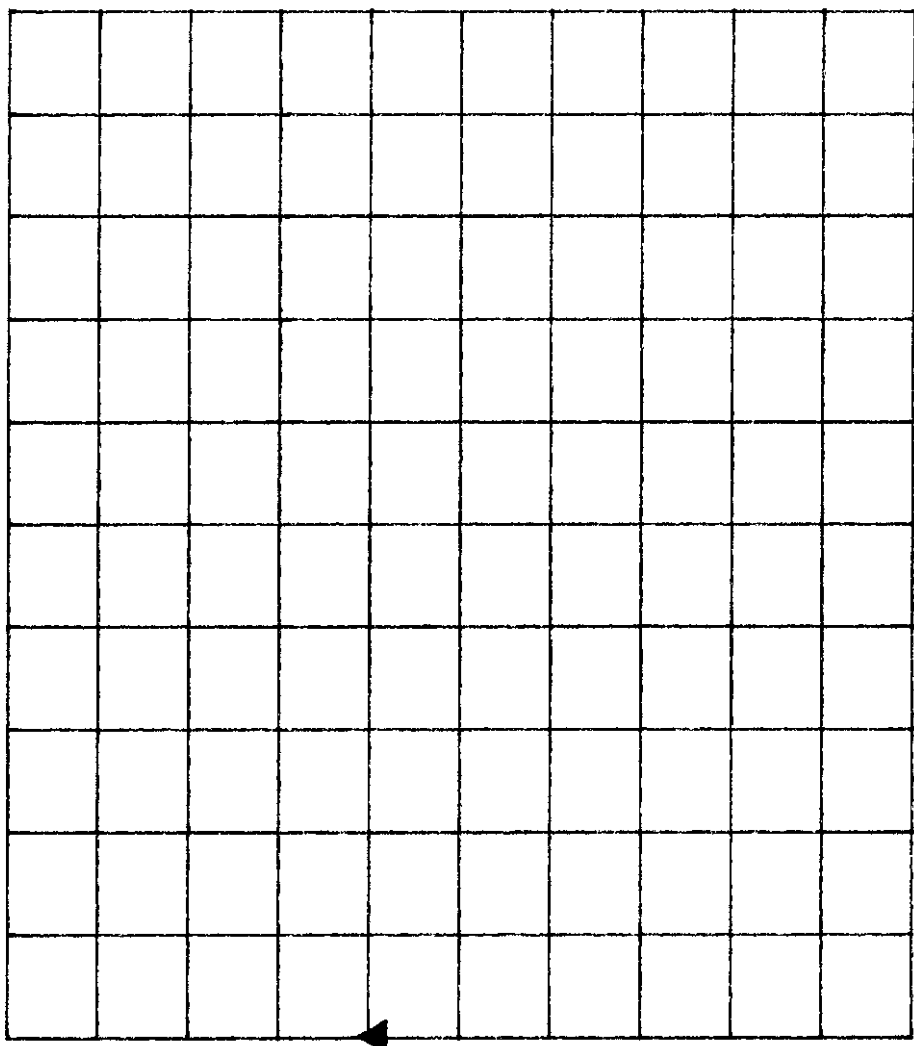
Channel 512

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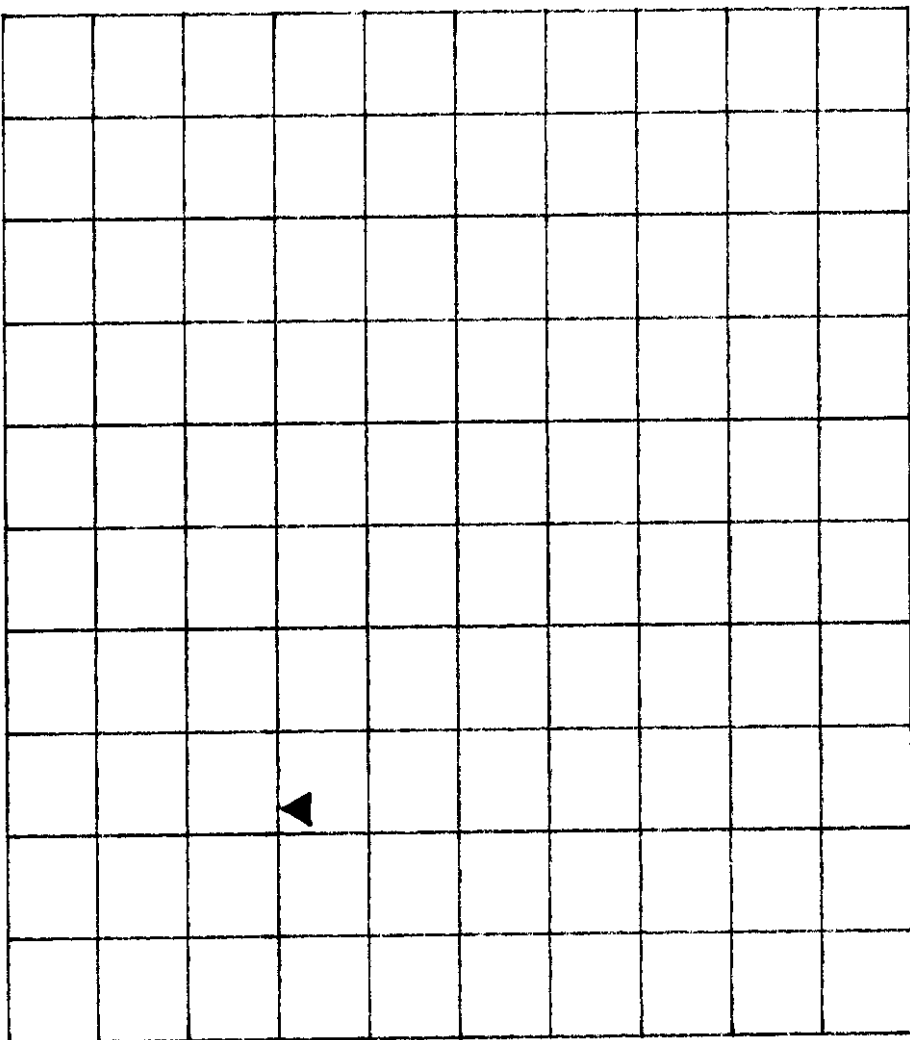
Channel 512

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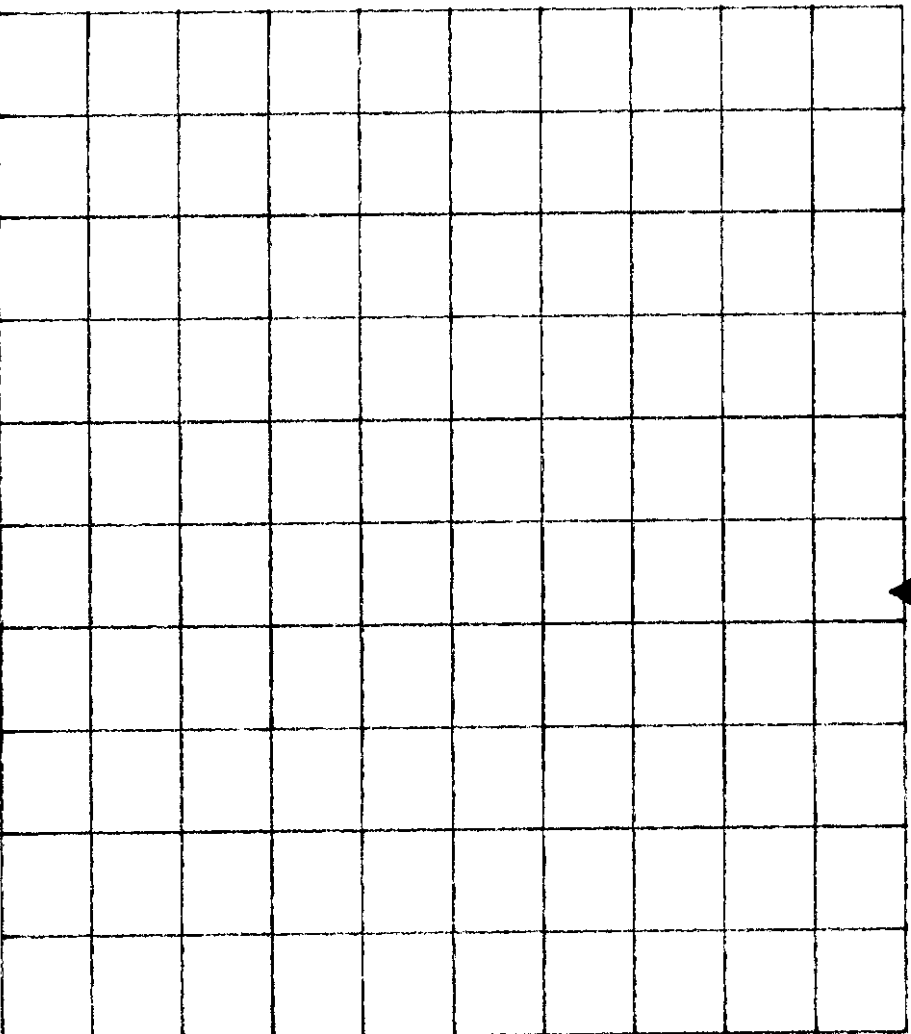
Channel S12

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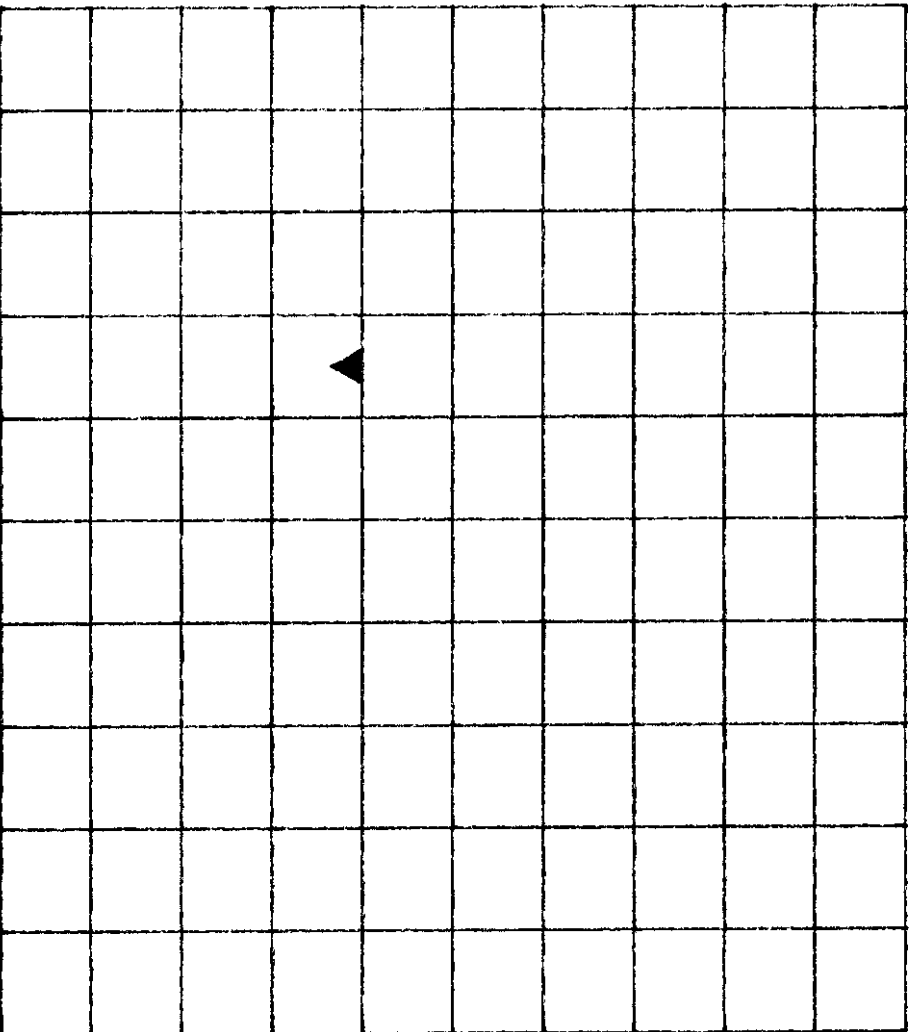
Channel 586

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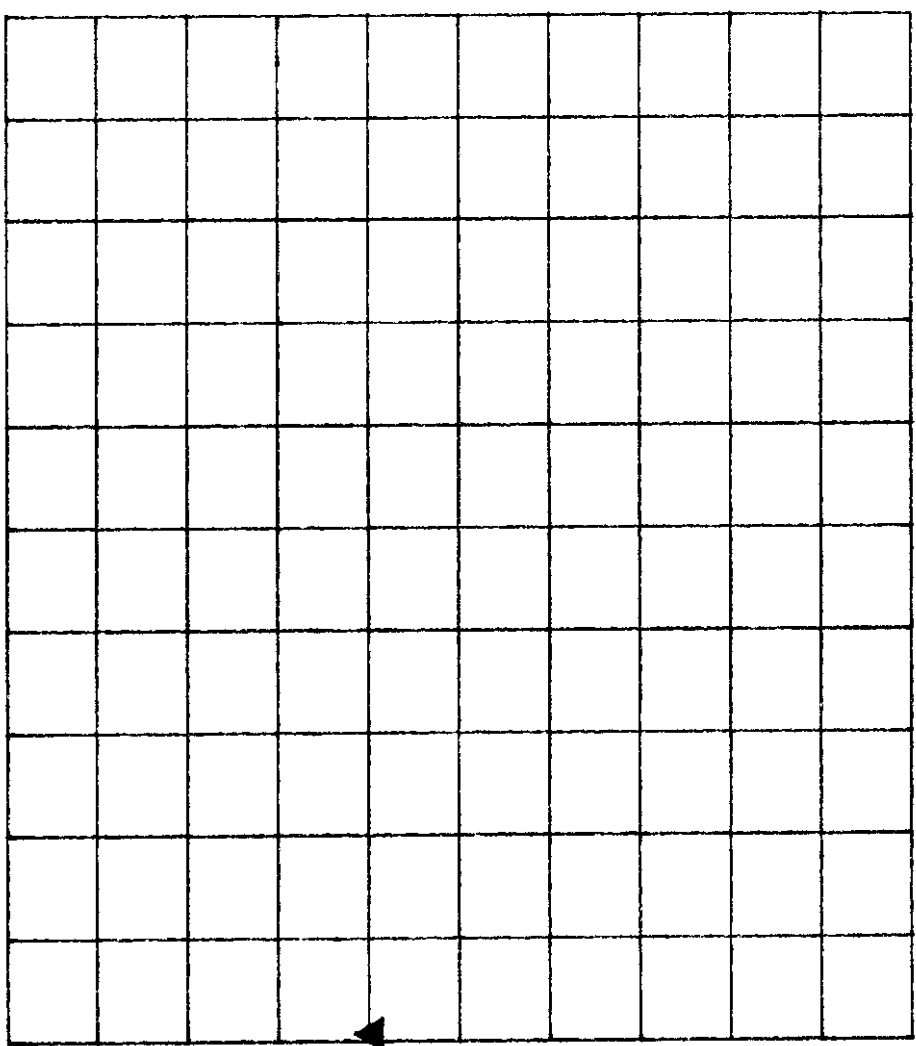
Channel 586

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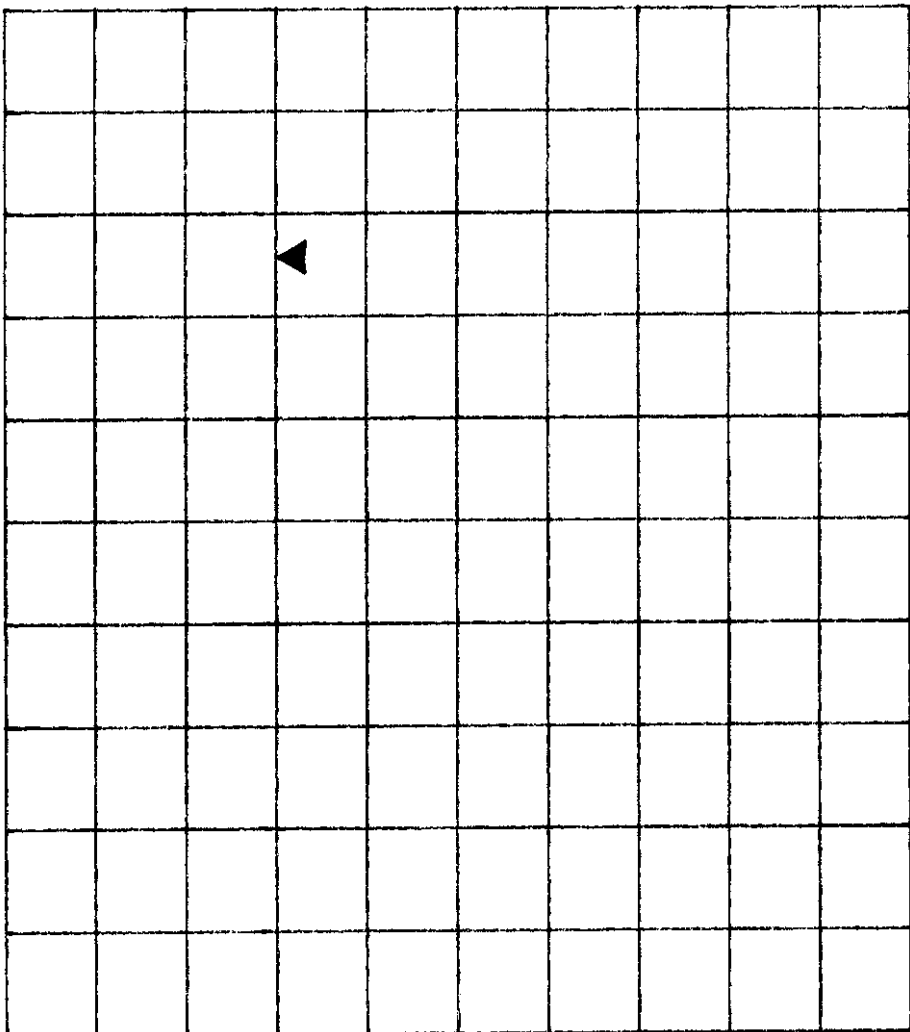
Channel 586

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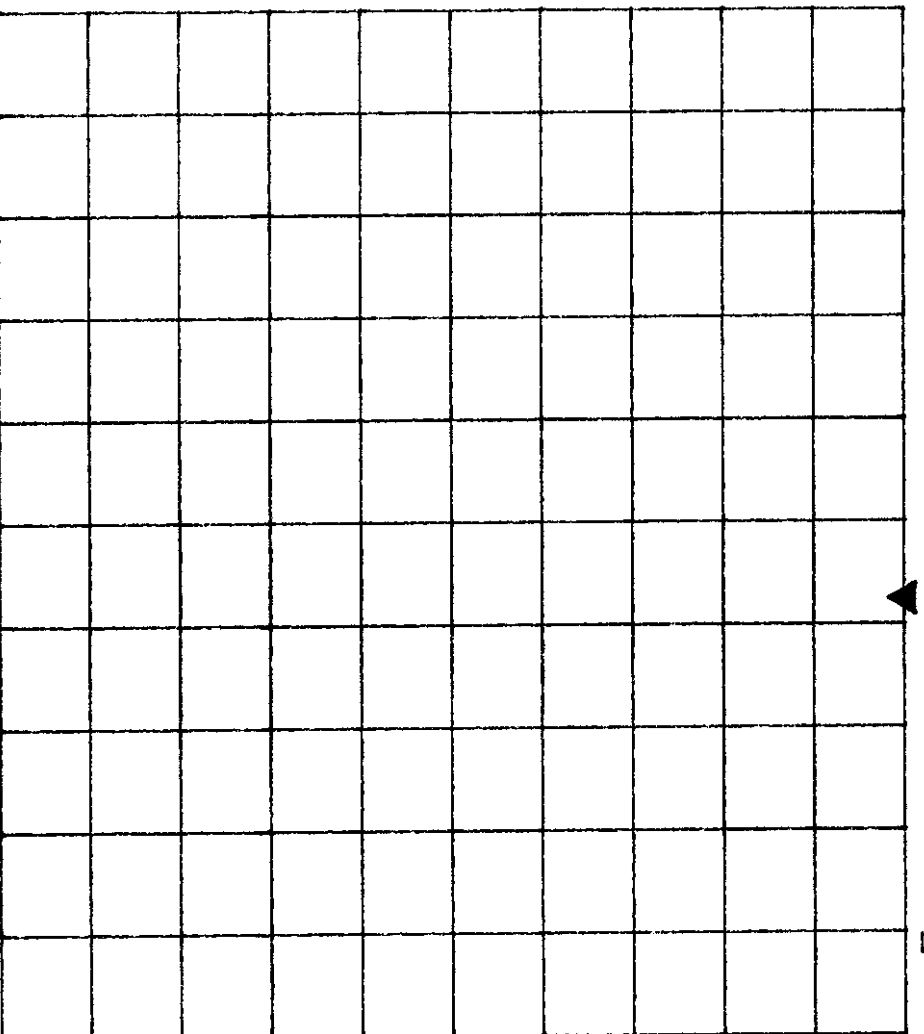
Channel 586

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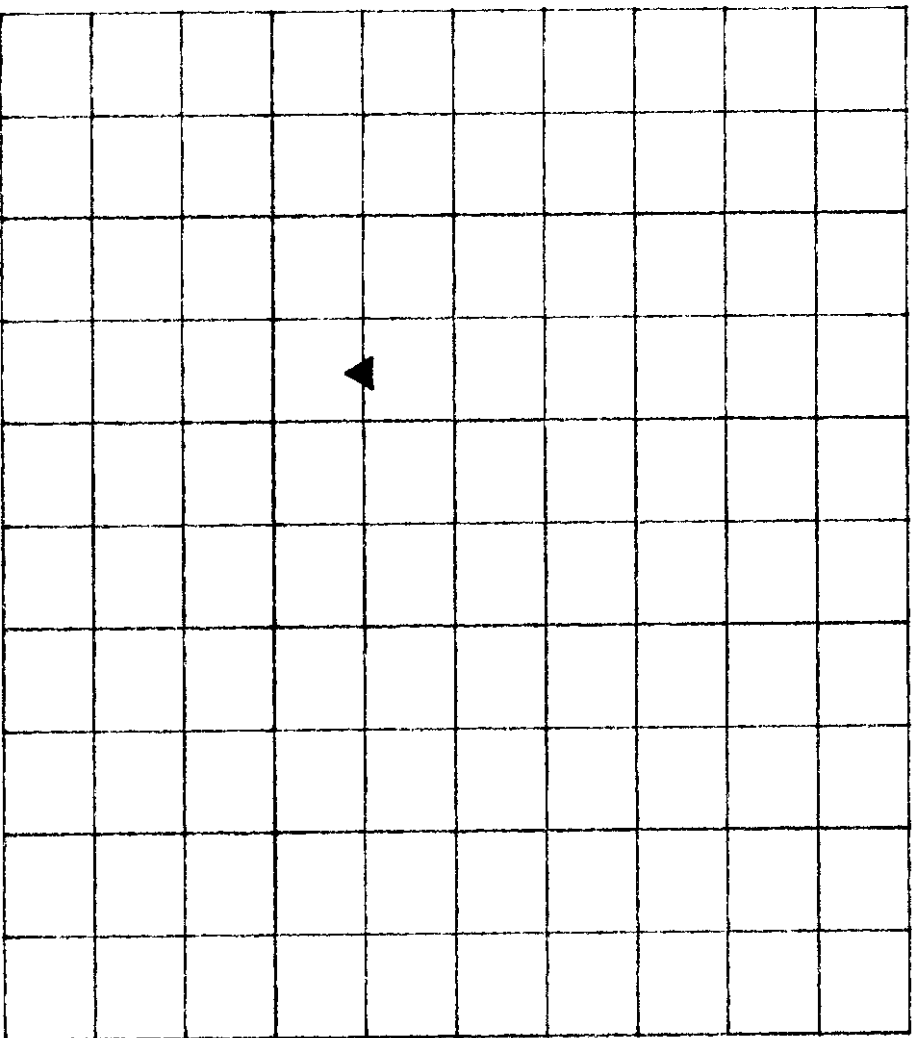
Channel 611

B blank



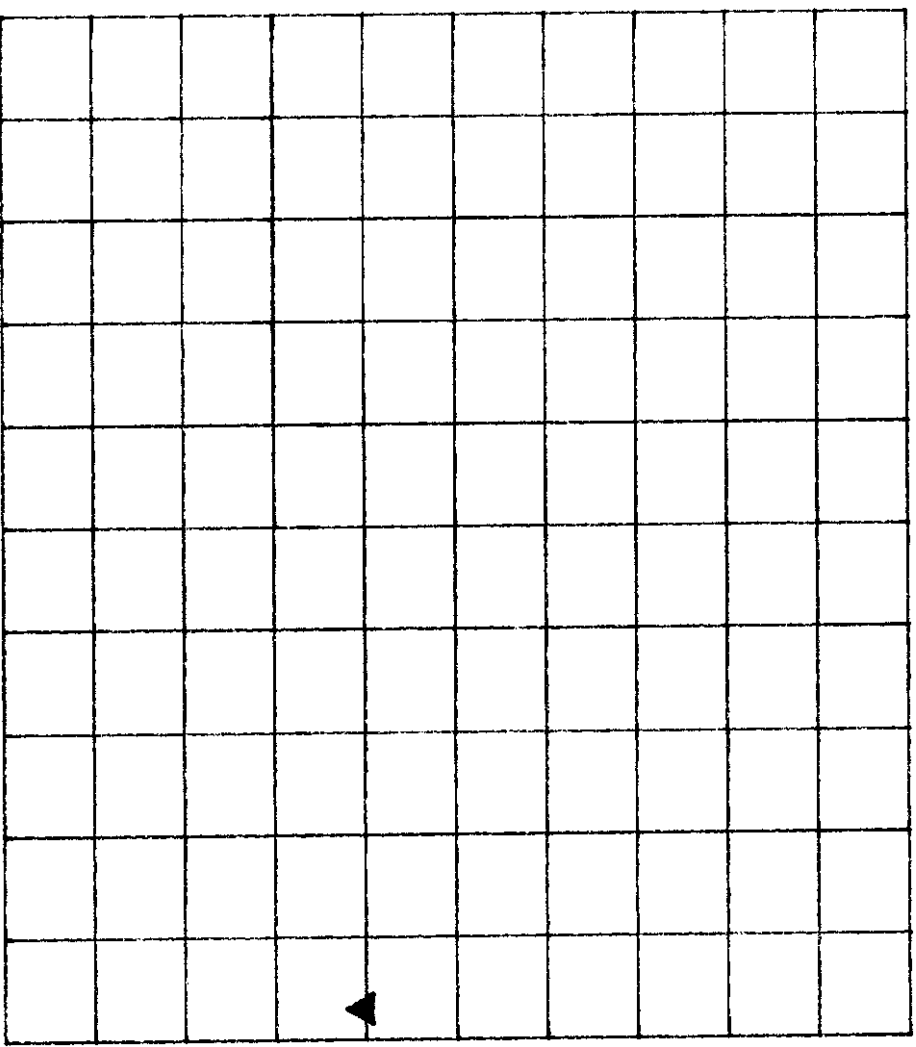
Channel 6/11

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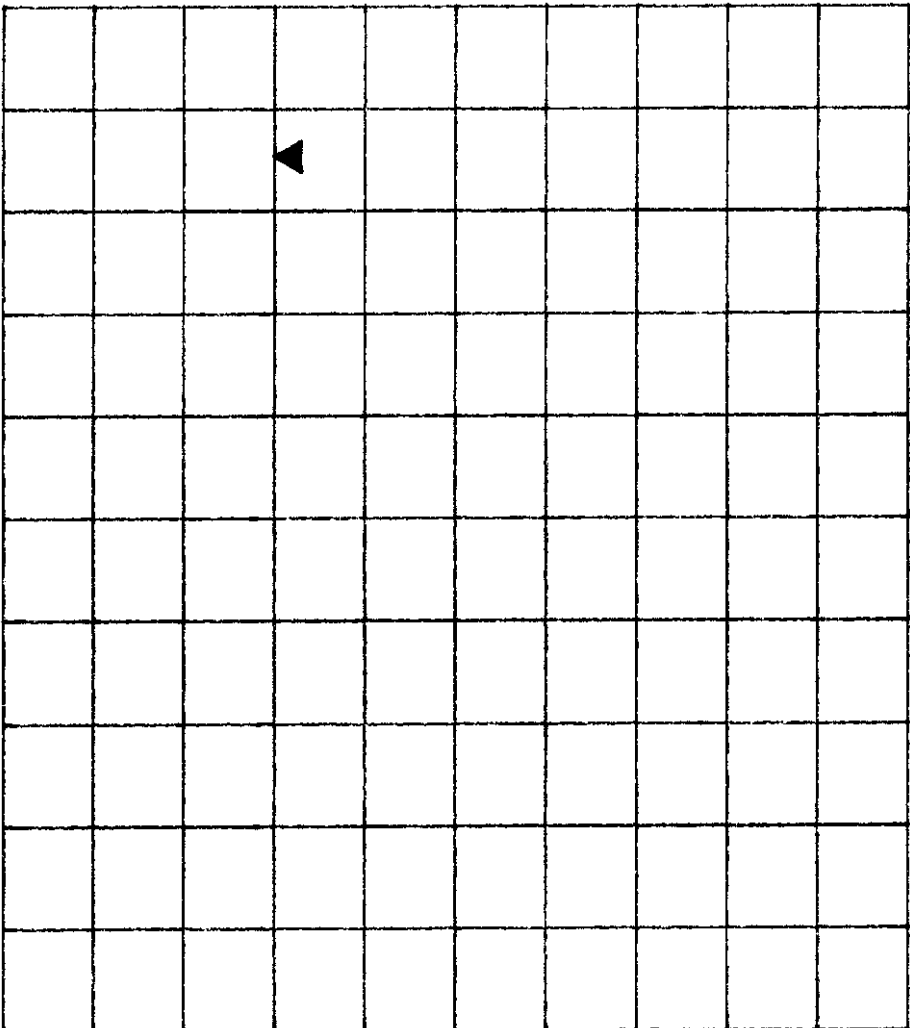
Channel 611

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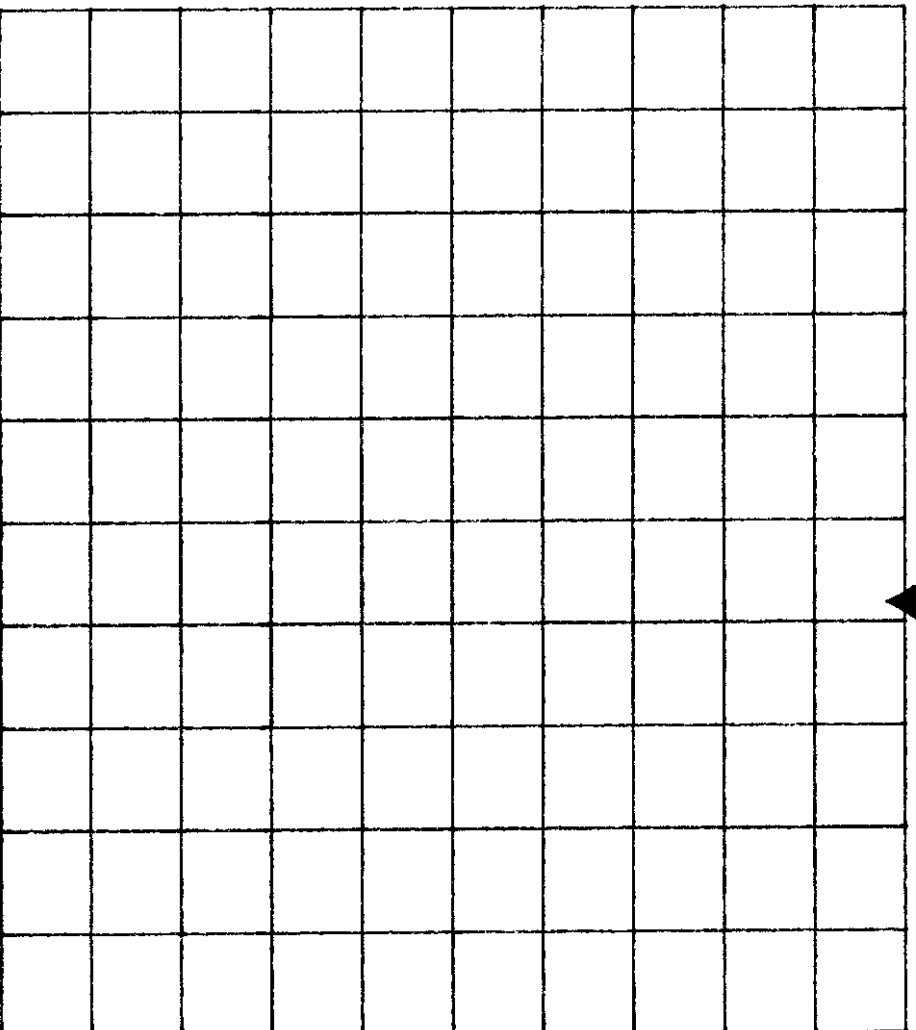
Channel 611

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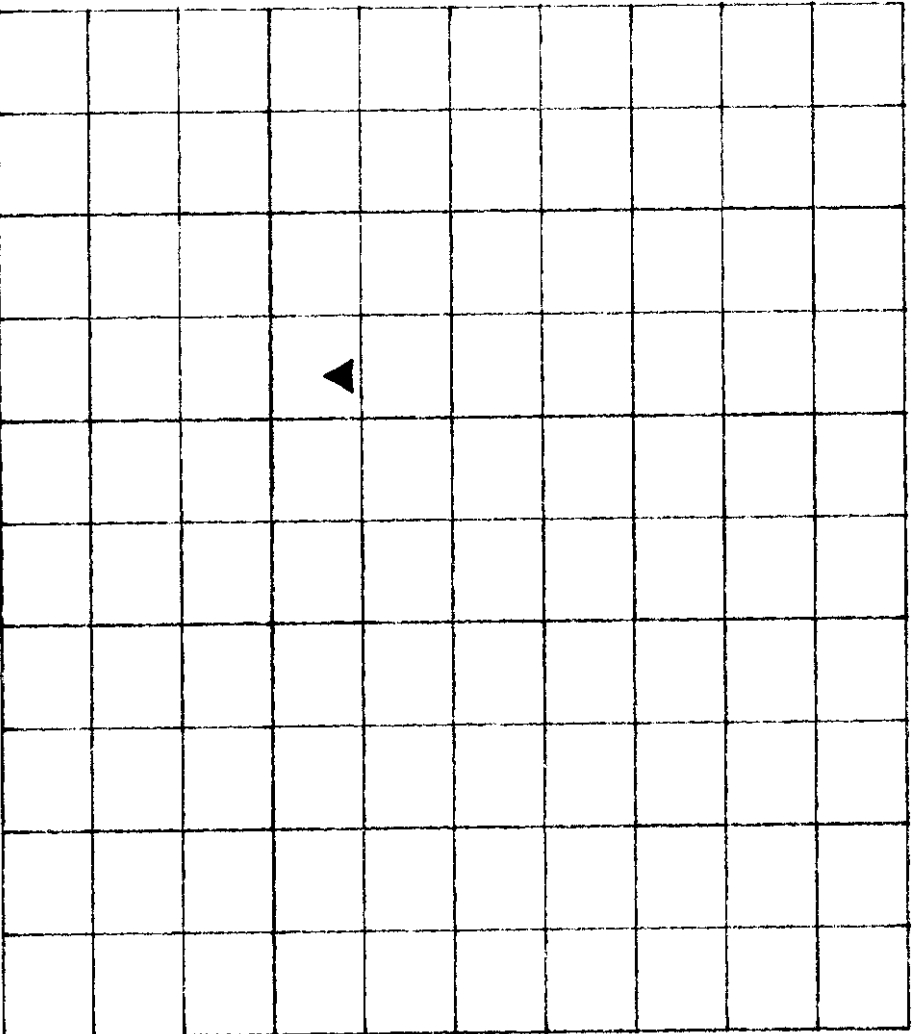
Channel 661

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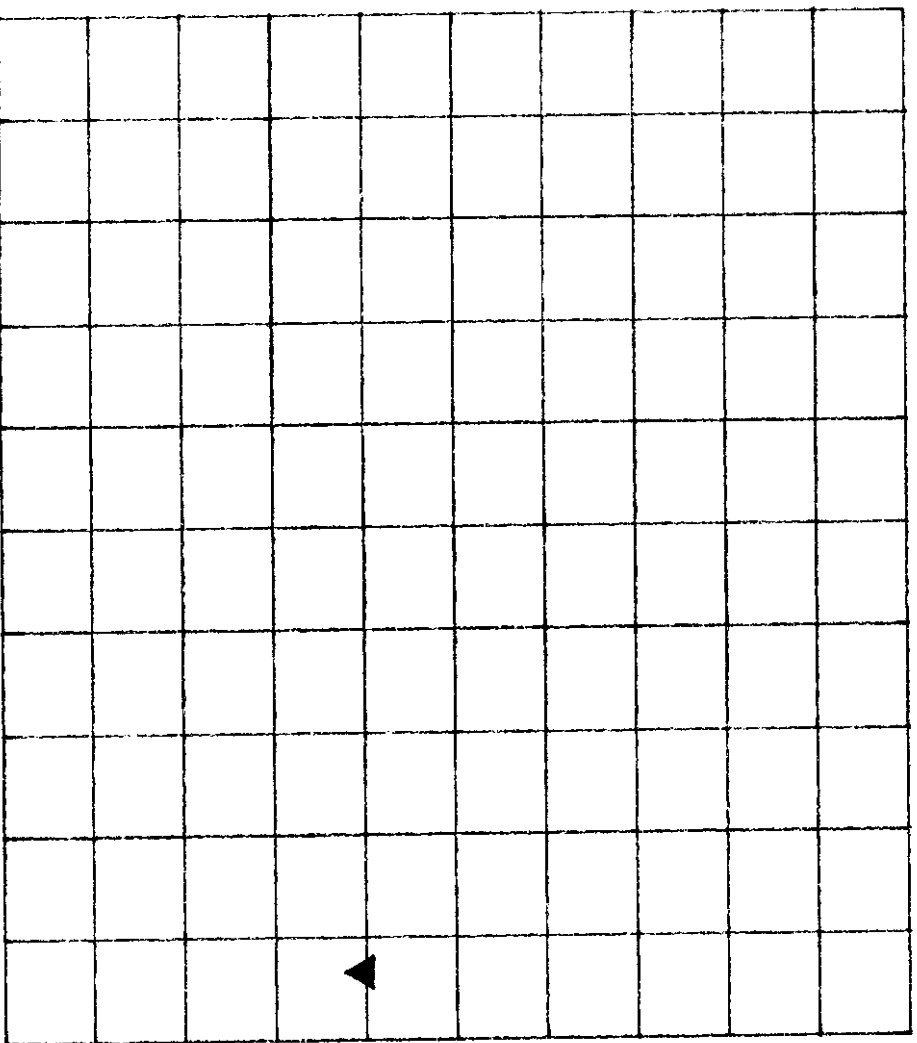
Channel 661

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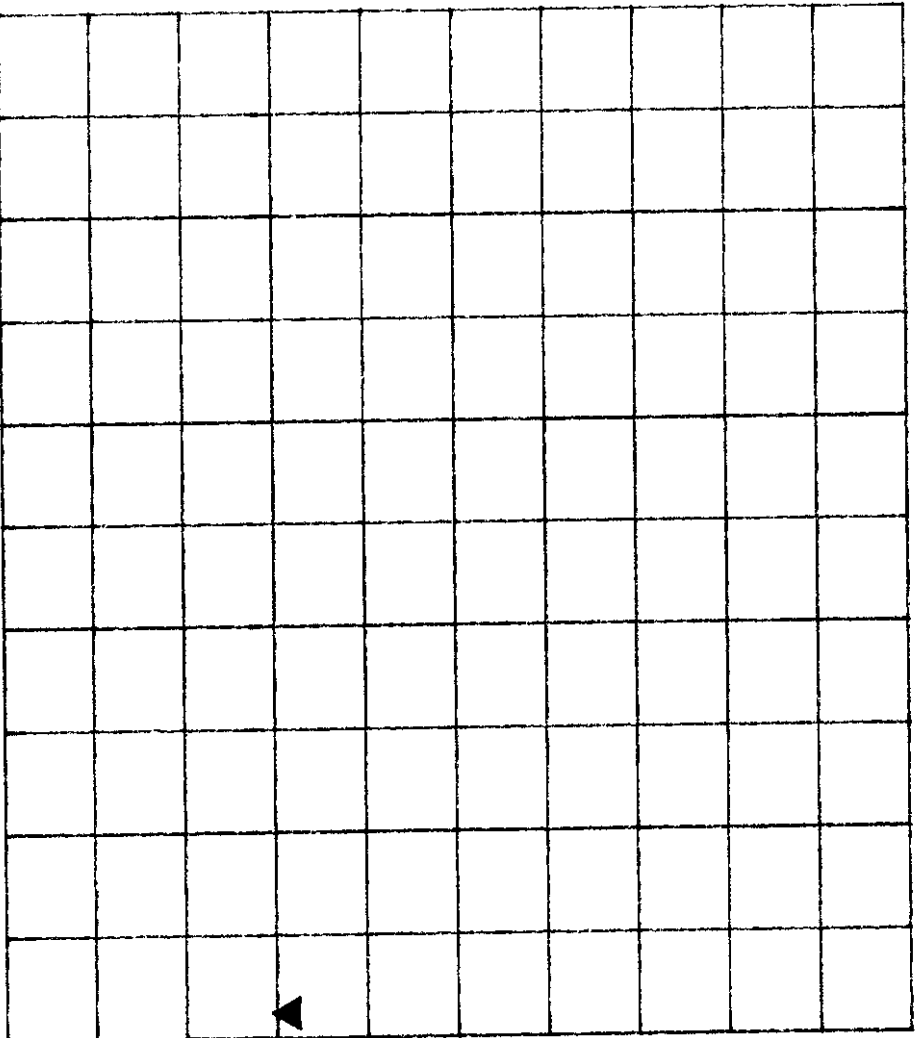
Channel 661

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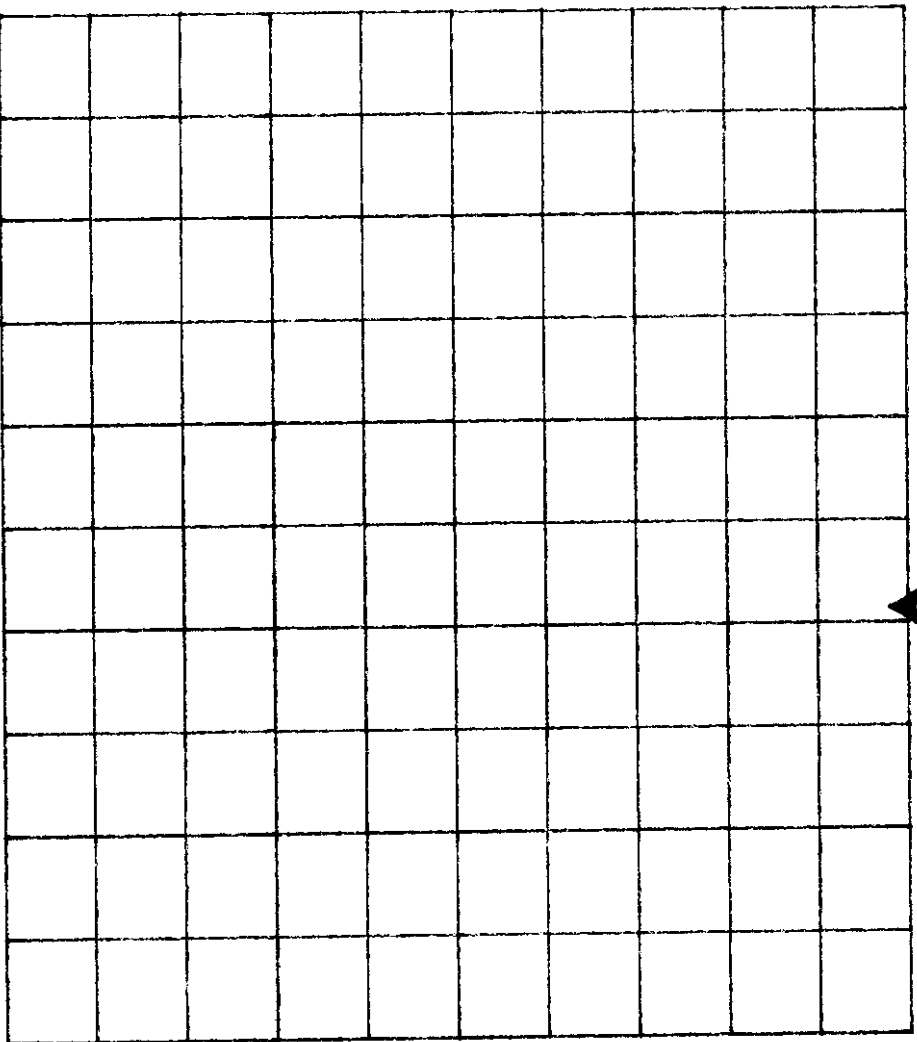
Channel 661

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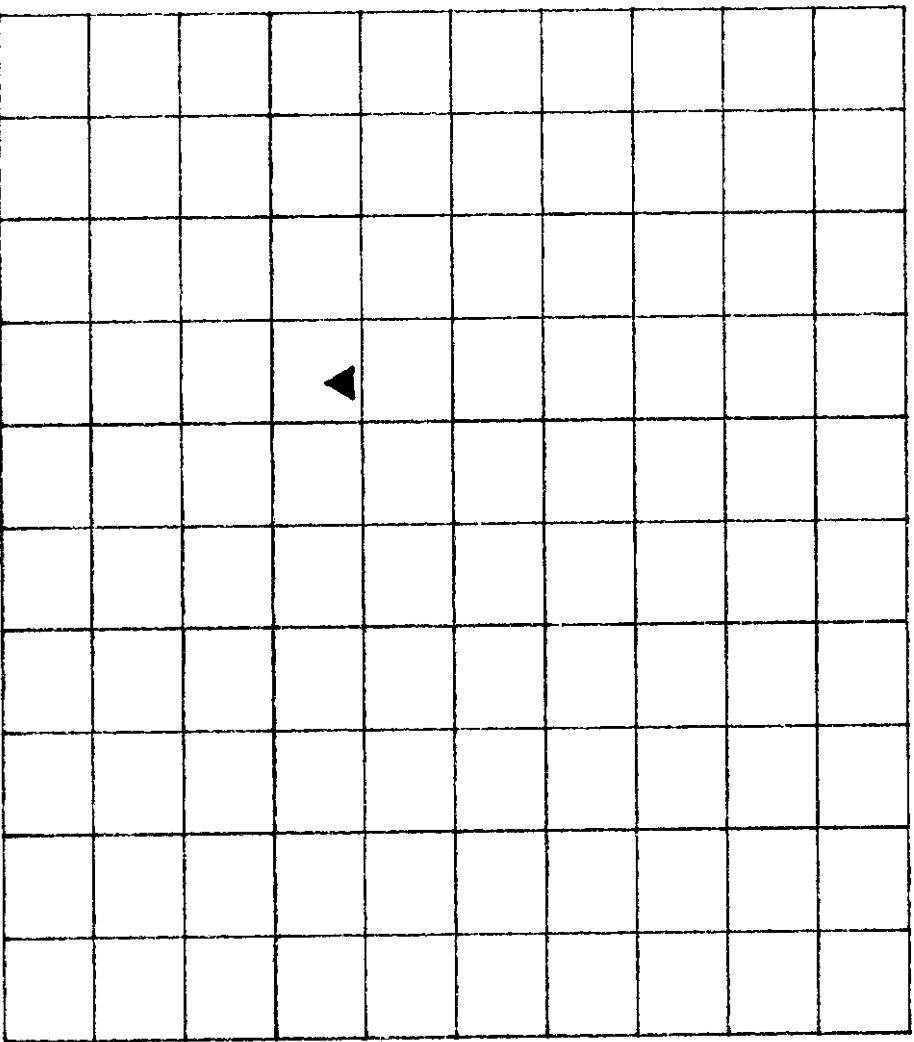
Channel 685

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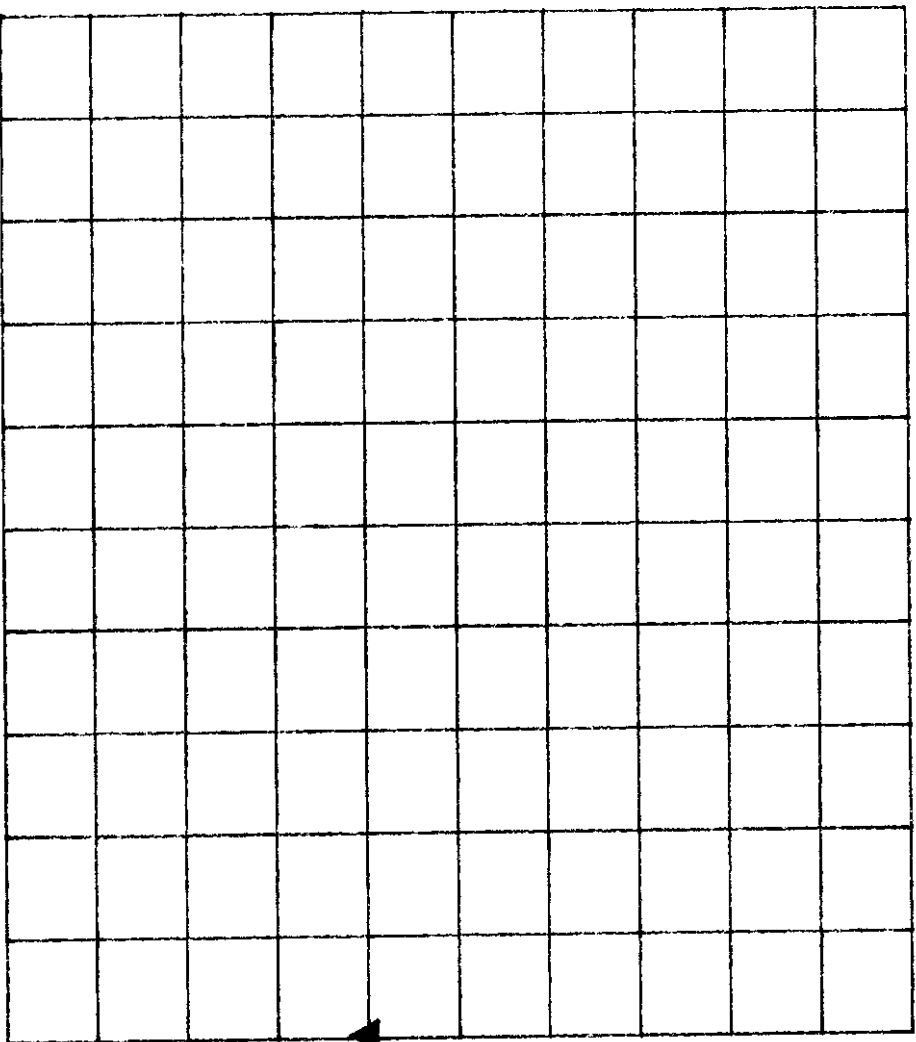
Channel 686

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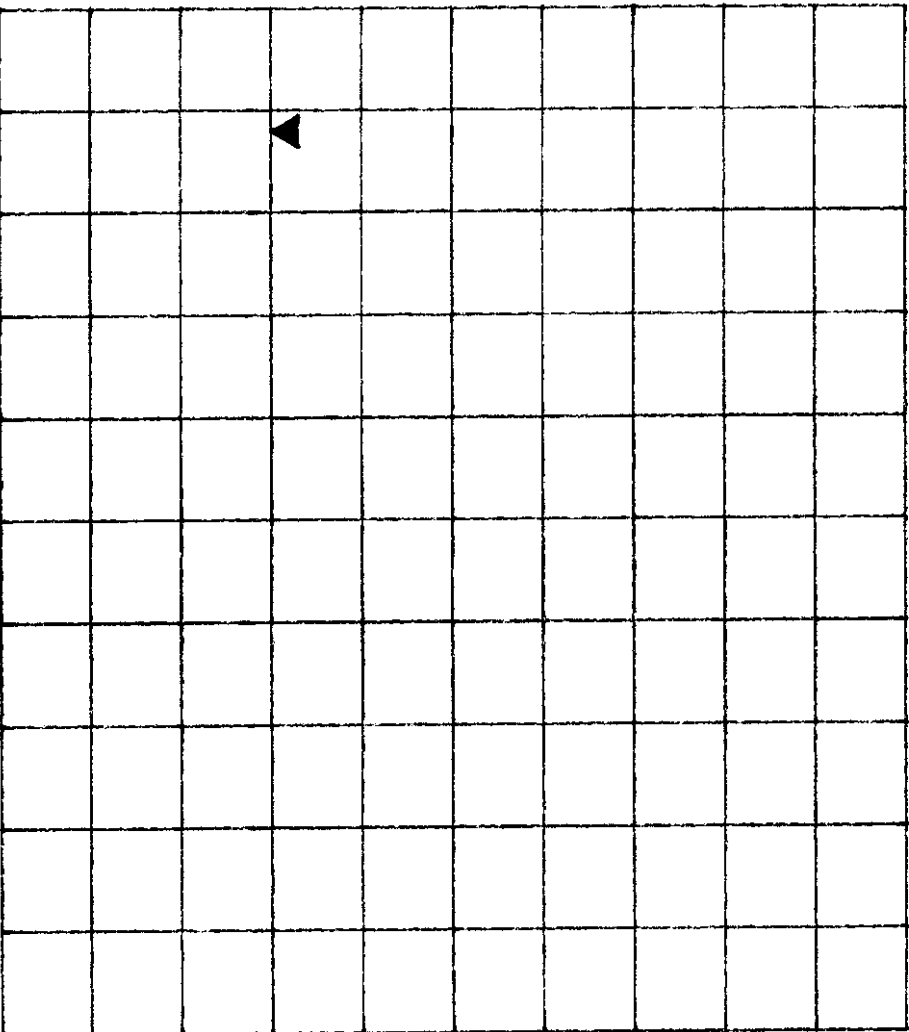
Channel 686

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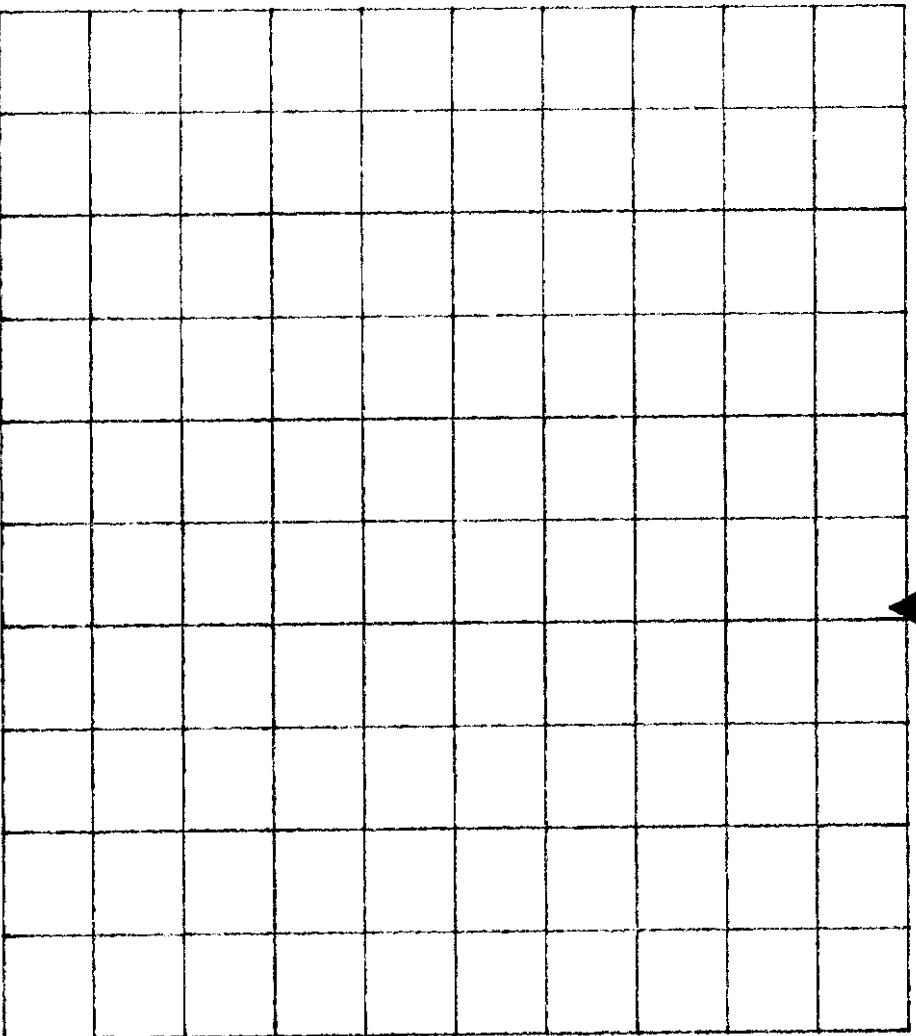
Channel 686

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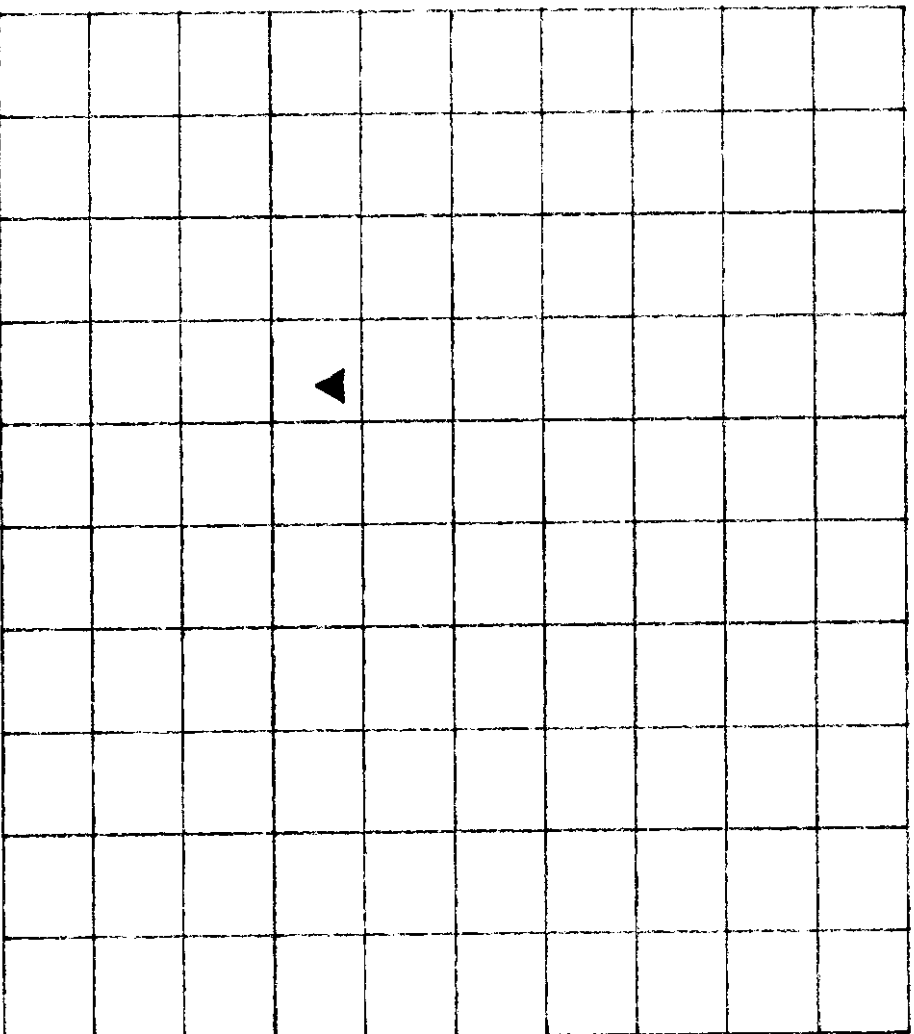
Channel 711

B_plank



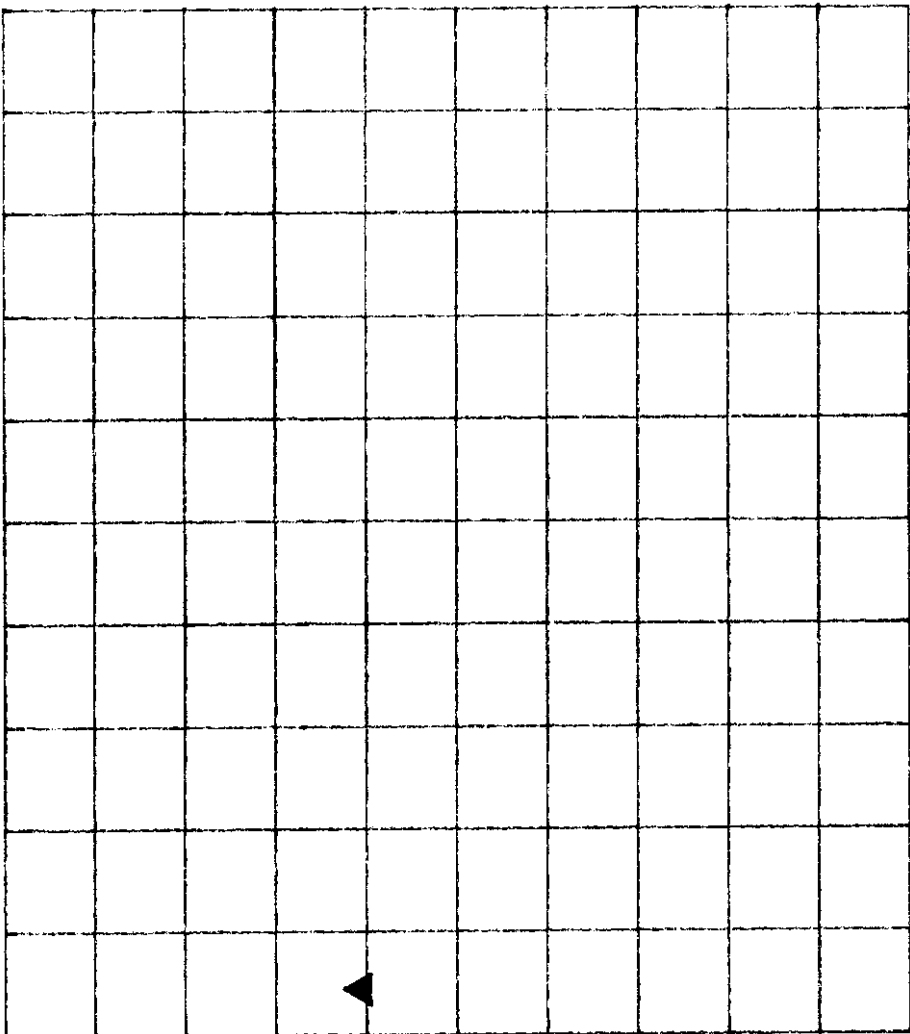
Channel 711

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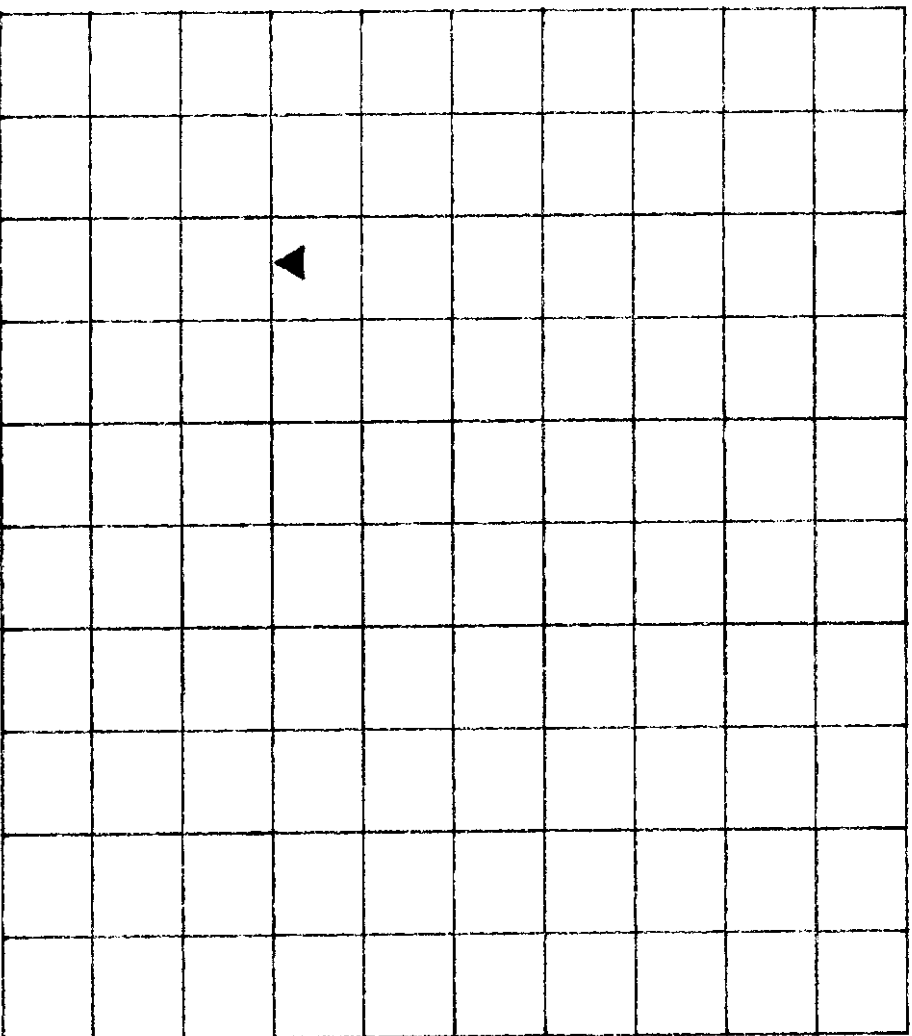
Channel 711

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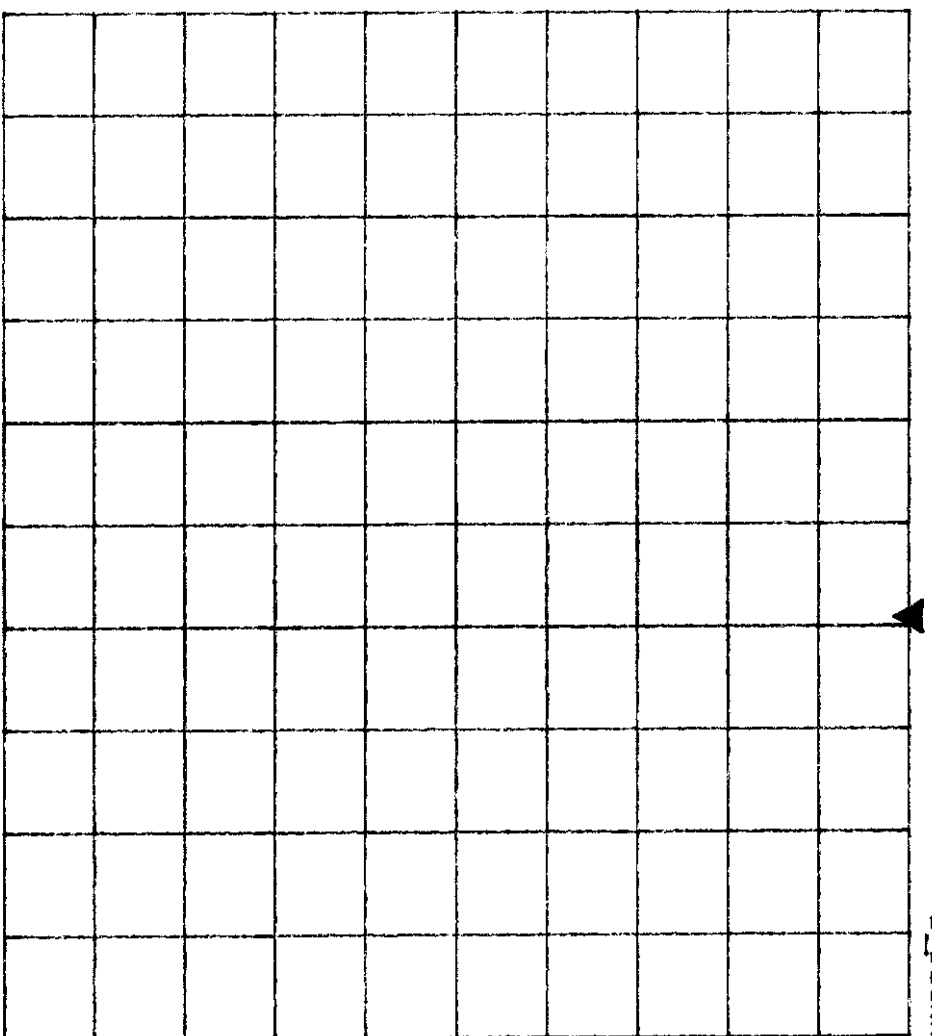
Channel 711

B_plank



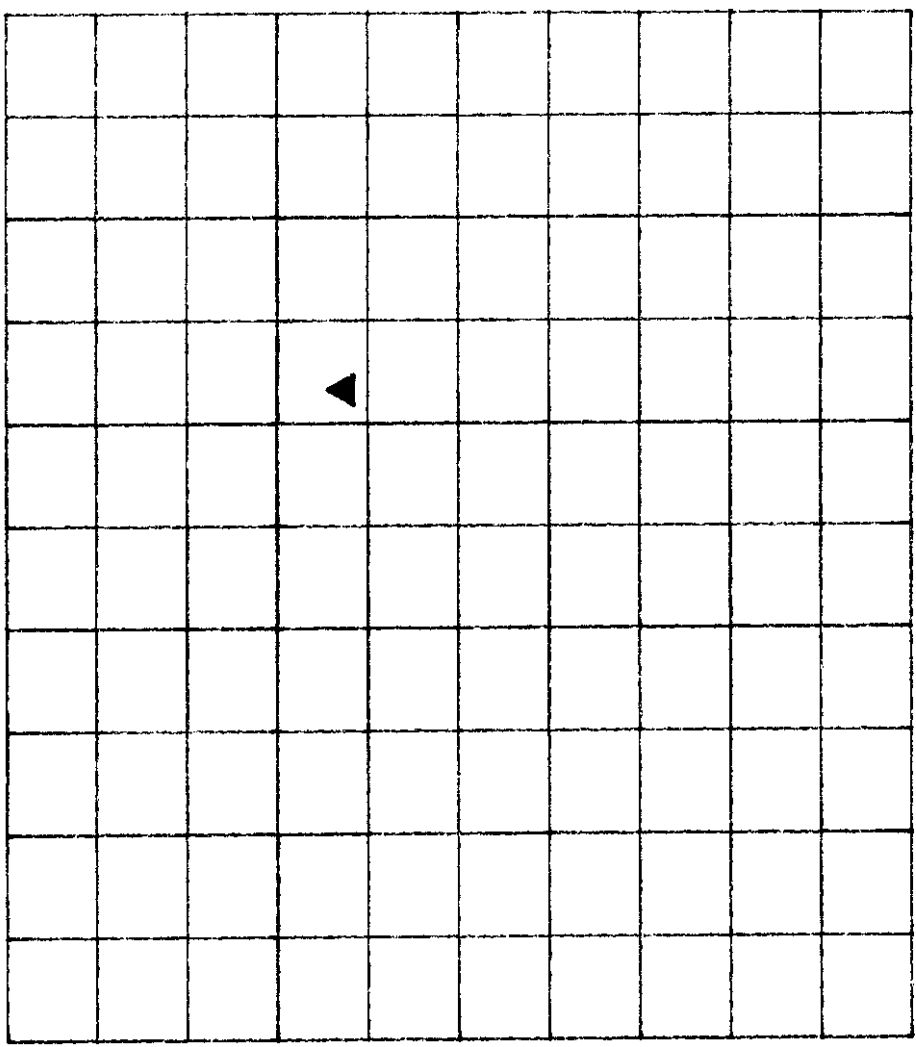
Channel 736

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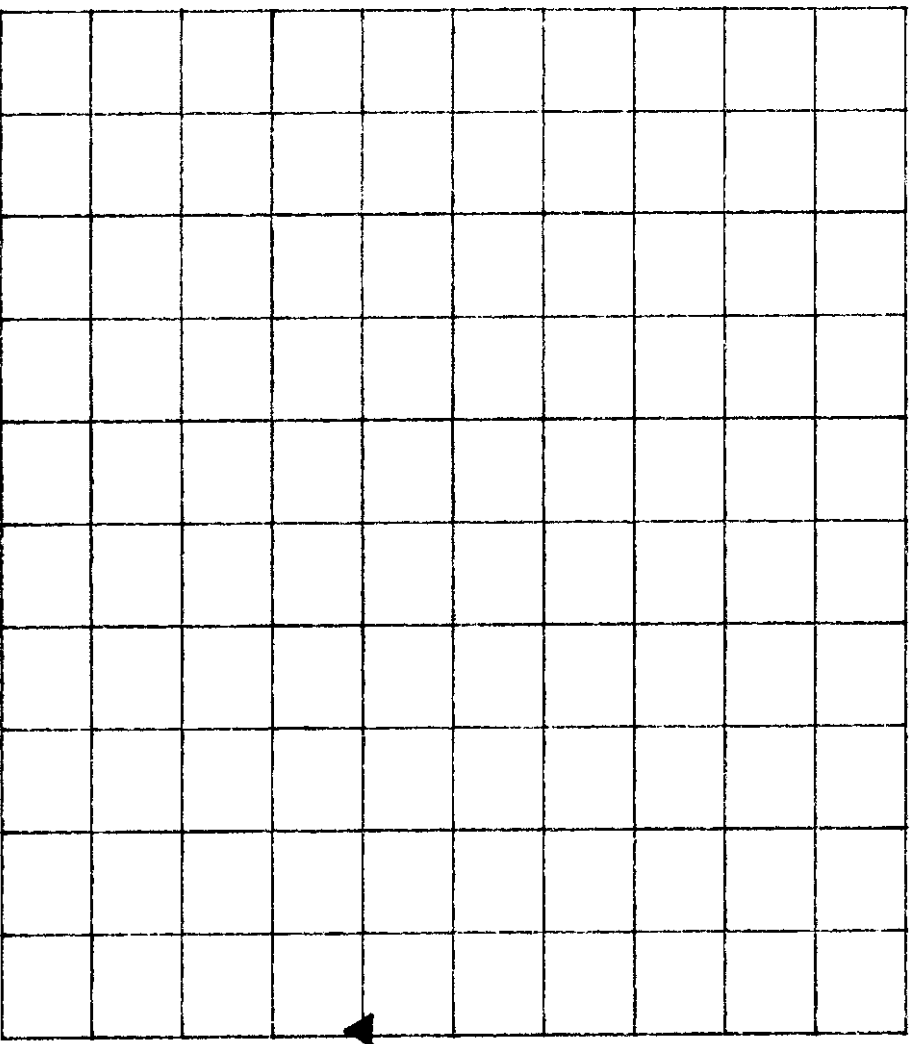
Channel 736

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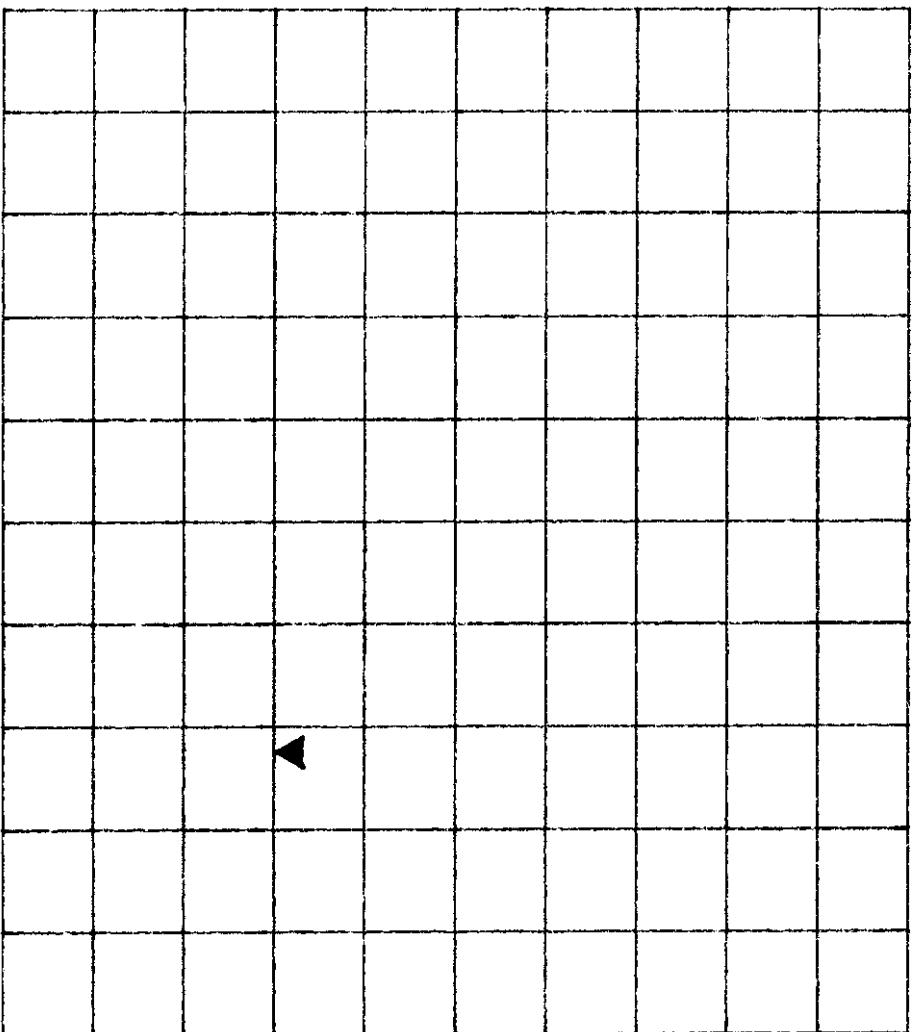
Channel 736

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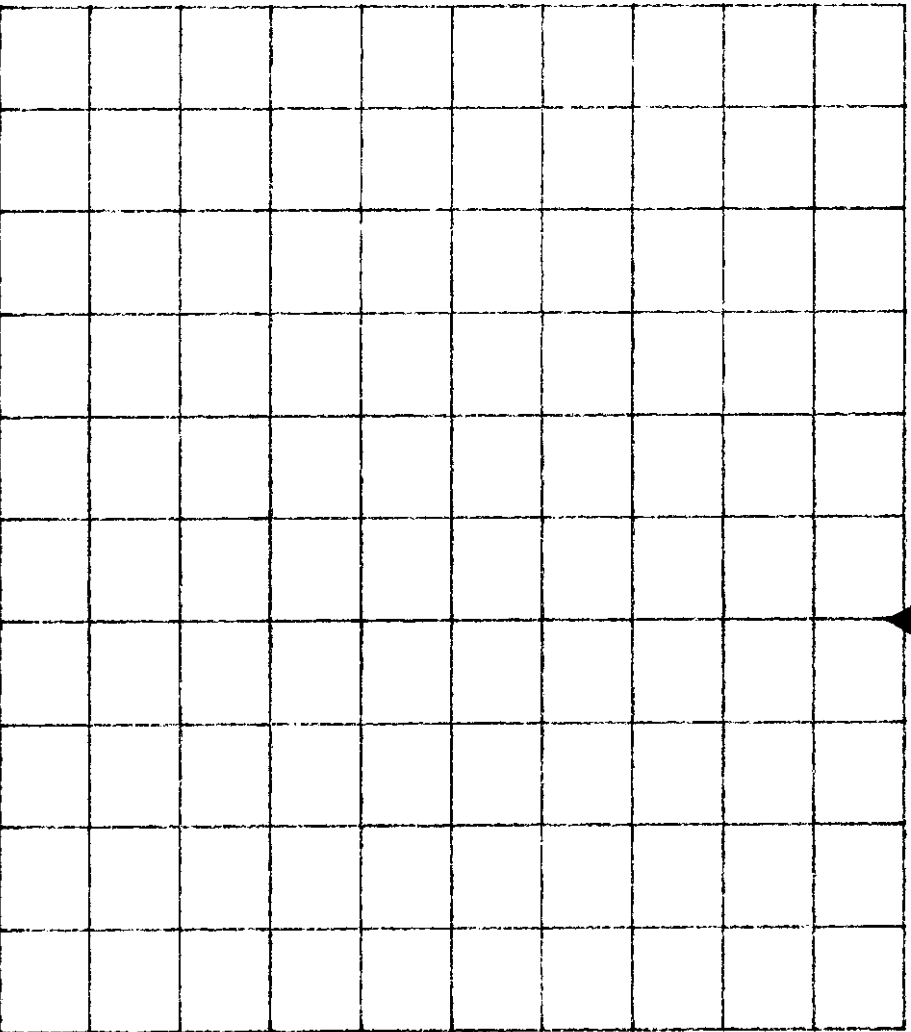
Channel 736

B_plank



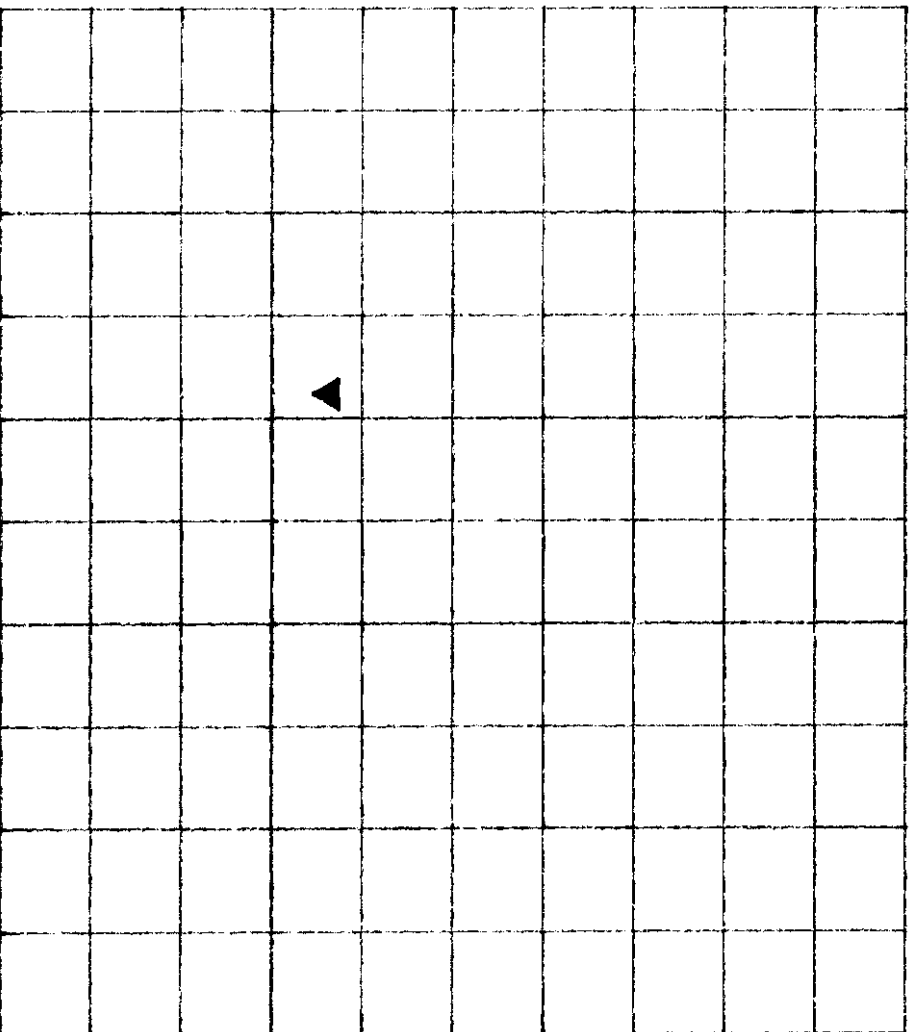
Channel 810

B blank



Channel 810

B_blank



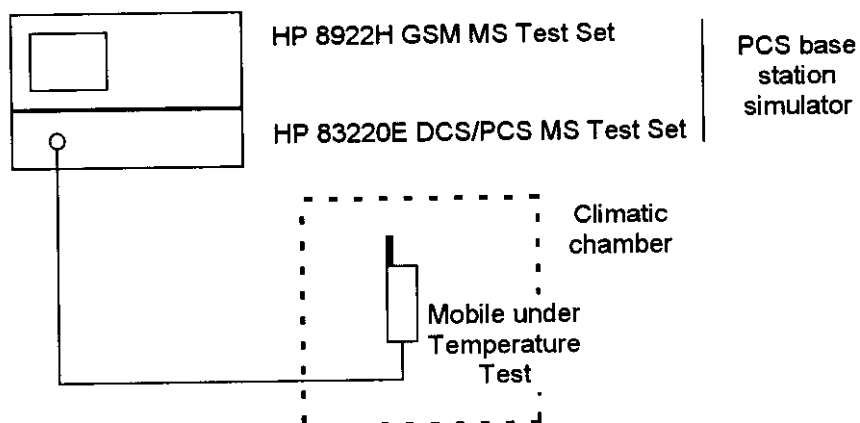
Channel 810

B_{blank}



Channel 840

3.6. MEASUREMENTS REQUIRED. FREQUENCY STABILITY.



The mobile is in a communication with the PCS base station simulator. The transmitted power is 1 Watt.

For each value of temperature reached and for both minimal and nominal supply voltage values, the frequency measurement is made after 10 minutes.

Minimal supply voltage is 3.4 V.

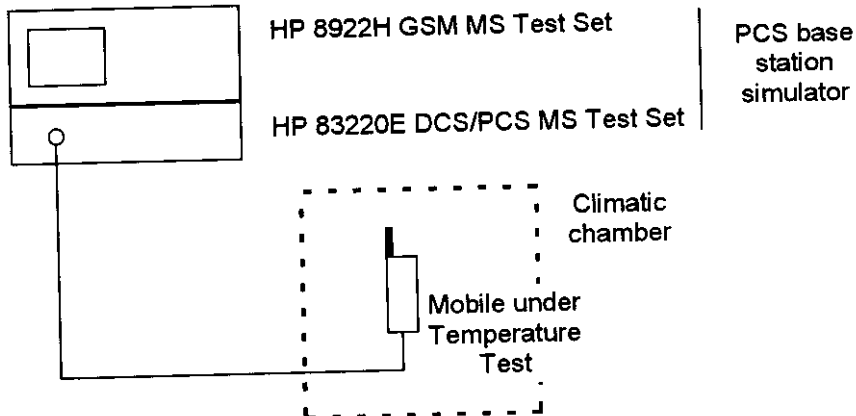
Nominal supply voltage is 3.8 V.

(The values are given in Hertz, compared to the theoretical value).

Temperature	T = -30°C		T = -20°C		T = -10°C		T = 0°C		T = +10°C		T = +20°C		T = +30°C		T = +40°C		T = +50°C	
Power supply voltage	3.4V	3.8V	3.4V	3.8V	3.4V	3.8V	3.4V	3.8V	3.4V	3.8V	3.4V	3.8V	3.4V	3.8V	3.4V	3.8V	3.4V	3.8V
Channel																		
512 f = 1850.2 MHz	+43	-16	-16	+40	+29	+34	+21	+30	+51	+46	+37	+41	+34	-18	+17	+50	+42	+31
586 f = 1865.0 MHz	+39	+19	+24	+36	+23	+55	+42	+45	+24	+48	+42	+41	+39	+50	+12	+57	+40	+40
611 f = 1870.0 MHz	-17	+48	+28	+34	+32	+16	+36	+49	+47	+38	+51	+41	+34	+41	+15	+55	+40	+59
686 f = 1885.0 MHz	+56	+52	+36	+55	+44	+35	+42	+50	+68	+65	+58	+42	+54	+44	+69	+68	+43	+71
711 f = 1890.0 MHz	+59	+50	+53	+45	+46	+35	+57	+59	+35	+66	+48	+45	+51	+34	+72	+58	+36	+29
736 f = 1895.0 MHz	+54	+39	+49	+42	+45	+42	+69	+62	+43	+39	+34	+61	+56	+39	+69	+61	+31	+44
810 f = 1909.8 MHz	+69	+91	+71	+49	+64	+60	+56	+65	+69	+74	+69	+91	+59	+88	+59	+69	-22	+52

FREQUENCY DIFFERENCE WITH THEORETICAL VALUE (IN Hz)

3.6. MEASUREMENTS REQUIRED. FREQUENCY STABILITY.



The mobile is on a communication with the PCS base station simulator. The transmitted power is 1 Watt.

For each value of temperature reached and for both minimal and nominal supply voltage values, the frequency measurement is made after 10 minutes.

Minimal supply voltage is 3.4 V.

Nominal supply voltage is 3.8 V.

(The values are given in Hertz, compared to the theoretical value).

Temperature	T = -30°C		T = -20°C		T = -10°C		T = 0°C		T = +10°C		T = +20°C		T = +30°C		T = +40°C		T = +50°C	
Power supply voltage	3.4V	3.8V	3.4V	3.8V	3.4V	3.8V	3.4V	3.8V	3.4V	3.8V	3.4V	3.8V	3.4V	3.8V	3.4V	3.8V	3.4V	3.8V
Channel																		
512 f = 1850.2 MHz	+43	-16	-16	+40	+29	+34	+21	+30	+51	+46	+37	+41	+34	-18	+17	+50	+42	+31
586 f = 1865.0 MHz	+39	+19	+24	+36	+23	+55	+42	+45	+24	+48	+42	+41	+39	+50	+12	+57	+40	+40
611 f = 1870.0 MHz	-17	+48	+28	+34	+32	+16	+36	+49	+47	+38	+51	+41	+34	+41	+15	+55	+40	+59
686 f = 1885.0 MHz	+56	+52	+36	+55	+44	+35	+42	+50	+68	+65	+58	+42	+54	+44	+69	+68	+43	+71
711 f = 1890.0 MHz	+59	+50	+53	+45	+46	+35	+57	+59	+35	+66	+48	+45	+51	+34	+72	+58	+36	+29
736 f = 1895.0 MHz	+54	+39	+49	+42	+45	+42	+69	+62	+43	+39	+34	+61	+56	+39	+69	+61	+31	+44
810 f = 1909.8 MHz	+69	+91	+71	+49	+64	+60	+56	+65	+69	+74	+69	+91	+59	+88	+59	+69	-22	+52

FREQUENCY DIFFERENCE WITH THEORETICAL VALUE (IN Hz)