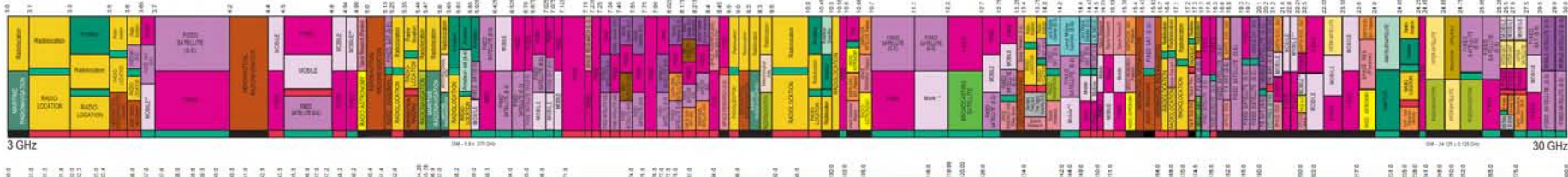
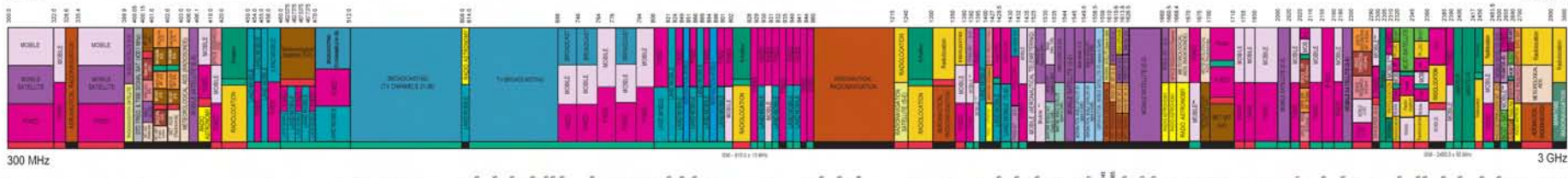
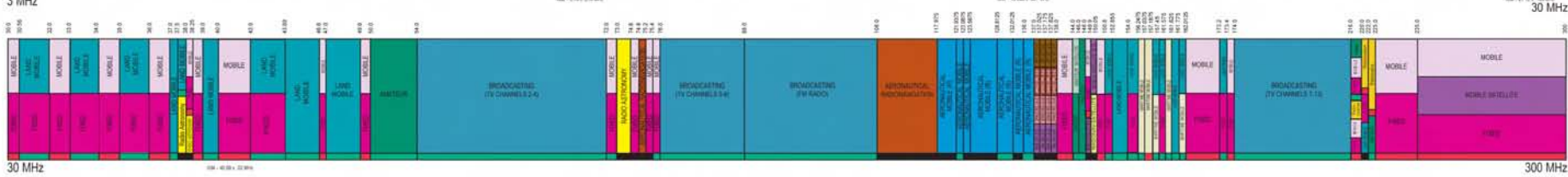
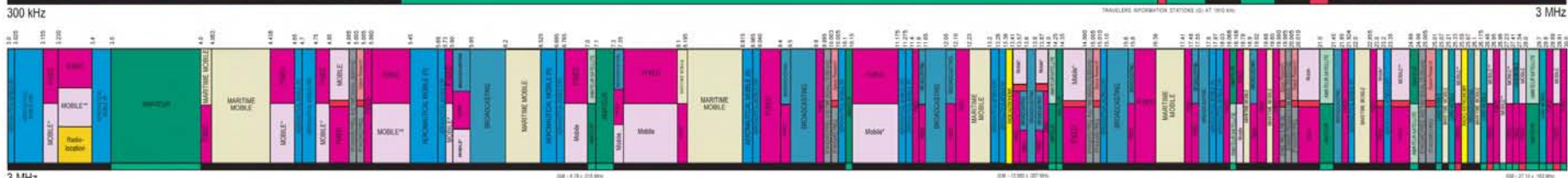
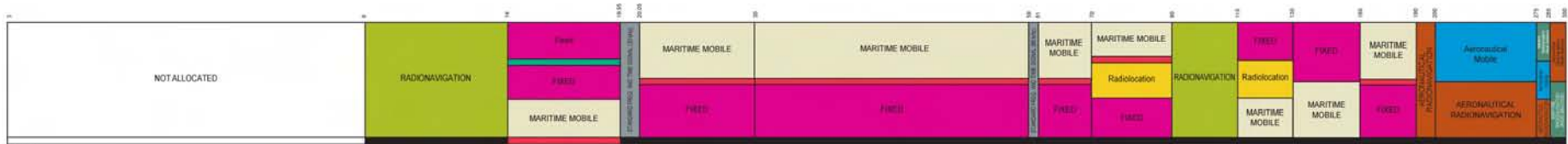




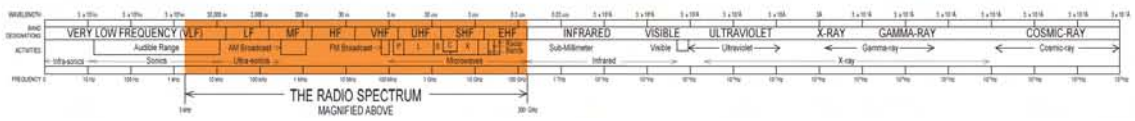
GNSS In-Band Interference

Javad Ashjaee

CGSIC, September 20, 2010



EXCEPT AERO MOBILE (A)
EXCEPT AERO MOBILE (A)



PLEASE NOTE: THE SPACES ALLOTTED THE SERVICES IN THE SPECIFIC FREQUENCY BANDS ARE PROPORTIONAL TO THE ACTUAL AMOUNT OF SPECTRUM OCCUPIED.

10.5	MOBILE SATELLITE (E-S)	AERONAUTICAL RADIONAVIGATION	1215	
10.55	FIXED	RADIONAVIGATION SATELLITE (S-E)	1240	
10.6	FIXED	RADIOLOCATION	1300	
10.68	FIXED	RADIOLOCATION	1350	
10.7	FIXED	RADIOLOCATION	1390	
11.7	FIXED	RADIOLOCATION	1392	
12.2	FIXED	RADIOLOCATION	1395	
12.7	FIXED	RADIOLOCATION	1400	
12.75	FIXED	RADIOLOCATION	1427	
13.25	FIXED	RADIOLOCATION	1429.5	
13.4	FIXED	RADIOLOCATION	1430	
13.75	FIXED	RADIOLOCATION	1432	
14.0	FIXED	RADIOLOCATION	1435	
14.2	FIXED	RADIOLOCATION	1525	
14.4	FIXED	RADIOLOCATION	1530	
14.47	FIXED	RADIOLOCATION	1535	
14.5	FIXED	RADIOLOCATION	1544	
14.7145	FIXED	RADIOLOCATION	1545	
15.1365	FIXED	RADIOLOCATION	1549.5	
15.35	FIXED	RADIOLOCATION	1558.5	
15.4	FIXED	RADIOLOCATION	1559	
15.43	FIXED	RADIOLOCATION	1610	
15.63	FIXED	RADIOLOCATION	1610.6	
			1613.8	
			1626.5	

1400
 1427
 1429.5

 1430
 1432
 1435
 1525

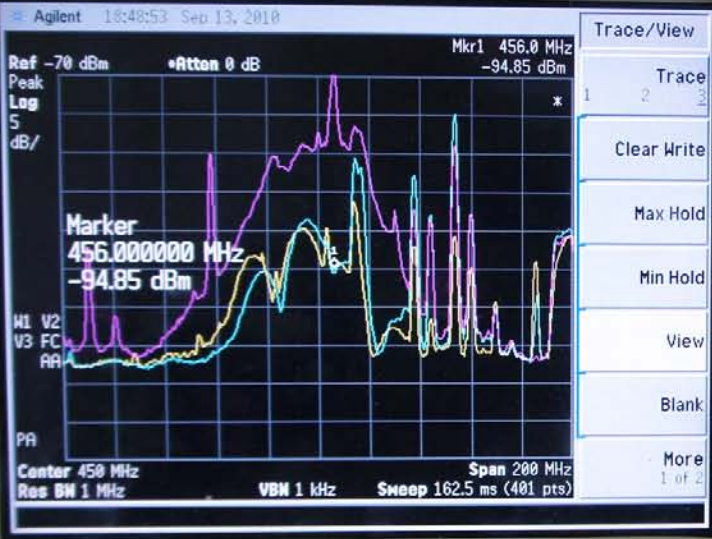
 1530
 1535

 1544
 1545
 1549.5
 1558.5
 1559
 1610
 1610.6
 1613.8
 1626.5

 1660
 1660.5
 1668.4

RADIO ASTRONOMY	EARTH EXPL SAT (Passive)	SPA CE RESEARCH (Passive)
LAND MOBILE		Fixed (TLM)
LAND MOBILE (TLM)		FIXED (TLM)
FIXED-SAT (S-E)	FIXED (TLM)	LAND MOBILE (TLM)
FIXED**		MOBILE
MOBILE (AERONAUTICAL TELEMETERING)		
Mobile **		MOBILE SAT. (Space to Earth)
MARITIME MOBILE SAT. (Space to Earth)	MOBILE SAT. (Space to Earth)	Mobile (Aero. TLM)
MARITIME MOBILE SATELLITE (space to Earth)		MOBILE SATELLITE (S-E)
MOBILE SATELLITE (S-E)		
AERONAUTICAL MOBILE SATELLITE (R) (space to Earth)		Mobile Satellite (S-E)
AERONAUTICAL MOBILE SATELLITE (R) (space to Earth)		MOBILE SATELLITE (Space to Earth)
AERONAUTICAL MOBILE SATELLITE (R) (space to Earth)		MOBILE SATELLITE (R) (space to Earth)
GPS L1 ▶		
AERONAUTICAL RADIONAVIGATION		RADIONAV. SATELLITE (Space to Earth)
AFRO RADIONAVIGATION	RADIO DET. SAT. (E-S)	MOBILE SAT. (E-S)
AERO. RADIONAV.	RADIO DET. SAT. (E-S)	RADIO ASTRONOMY
AERO. RADIONAV.	RADIO DET. SAT. (E-S)	MOBILE SAT. (E-S) Mobile Sat. (S-E)
◀ GLN L1		
MOBILE SATELLITE (E-S)		
RADIO ASTRONOMY		MOBILE SAT. (E-S)
RADIO ASTRONOMY		SPACE RESEARCH (Passive)

Agilent E4407B 9kHz - 26.5GHz
ESA-E SERIES SPECTRUM ANALYZER



Trace/View
Trace 1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
More 1 of 2

CONTROL SYSTEM

FREQUENCY Channel Input/Output MODE Mode Setup System Preset

SPAN X Scale View/Trace Det/Demod Auto Couple File Print Setup

AMPLITUDE Y Scale Display BW/Avg Trig Save Print

MEASURE Meas Setup Single Sweep Marker Peak Search

MEASURE MEASURE MARKER

Restart Meas Control Source Freq Count Marker

7 8 9 Bk Sp ↓ ↑

4 5 6

1 2 3

0 . +/- Enter

Help Next Window Zoom

RF OUT 50Ω
9 kHz - 3 GHz
50 VDC MAX
30 dBm (1W) MAX

INPUT 50Ω
9 kHz - 26.5 GHz
0 VDC MAX
50 dBm (1W) MAX

AMPTD REF OUT
50 MHz - 20 dBm

PROBE POWER

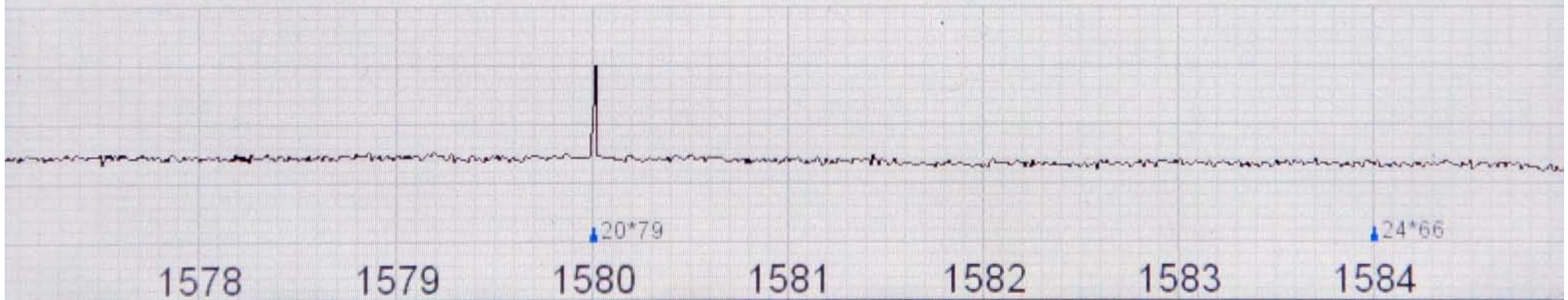
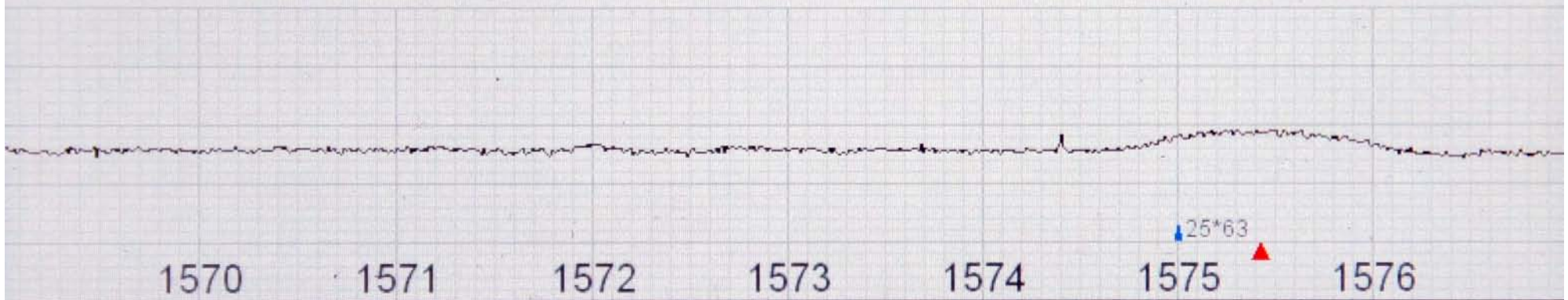
EXT KEYBOARD

VOLUME

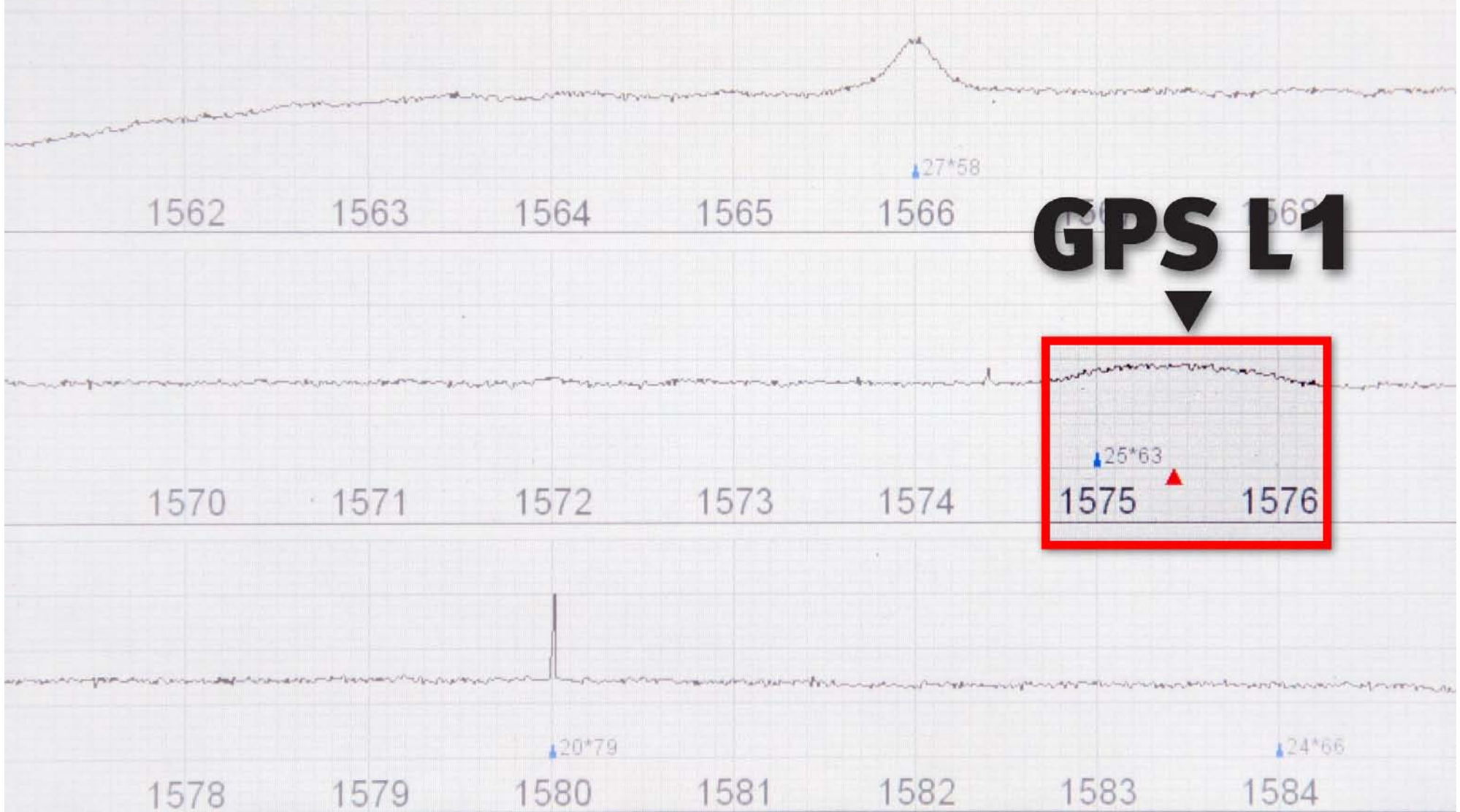
MENUS

EXT 1 INPUT

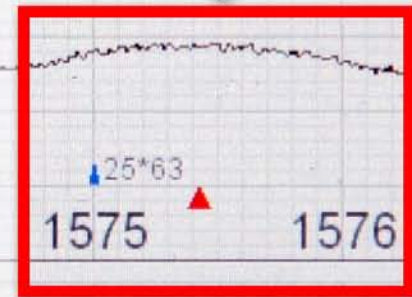
GPS L1 (44.0;0.2;30) INT, 60, I- U- C+ B+ W+ G-, 09-11 13:46, L dacha



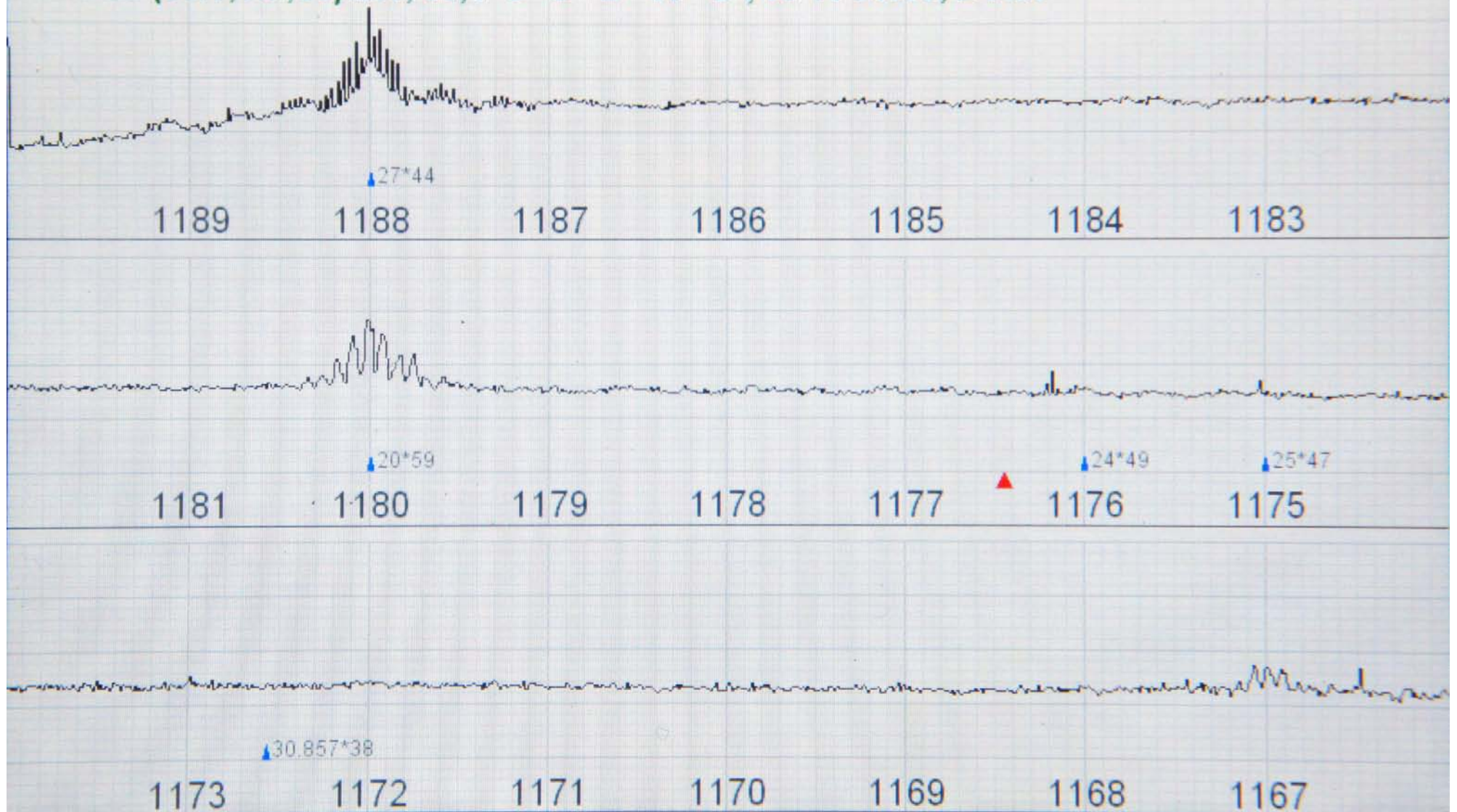
GPS L1 (44.0;0.2;30) INT, 60, I- U- C+ B+ W+ G-, 09-11 13:46, L dacha



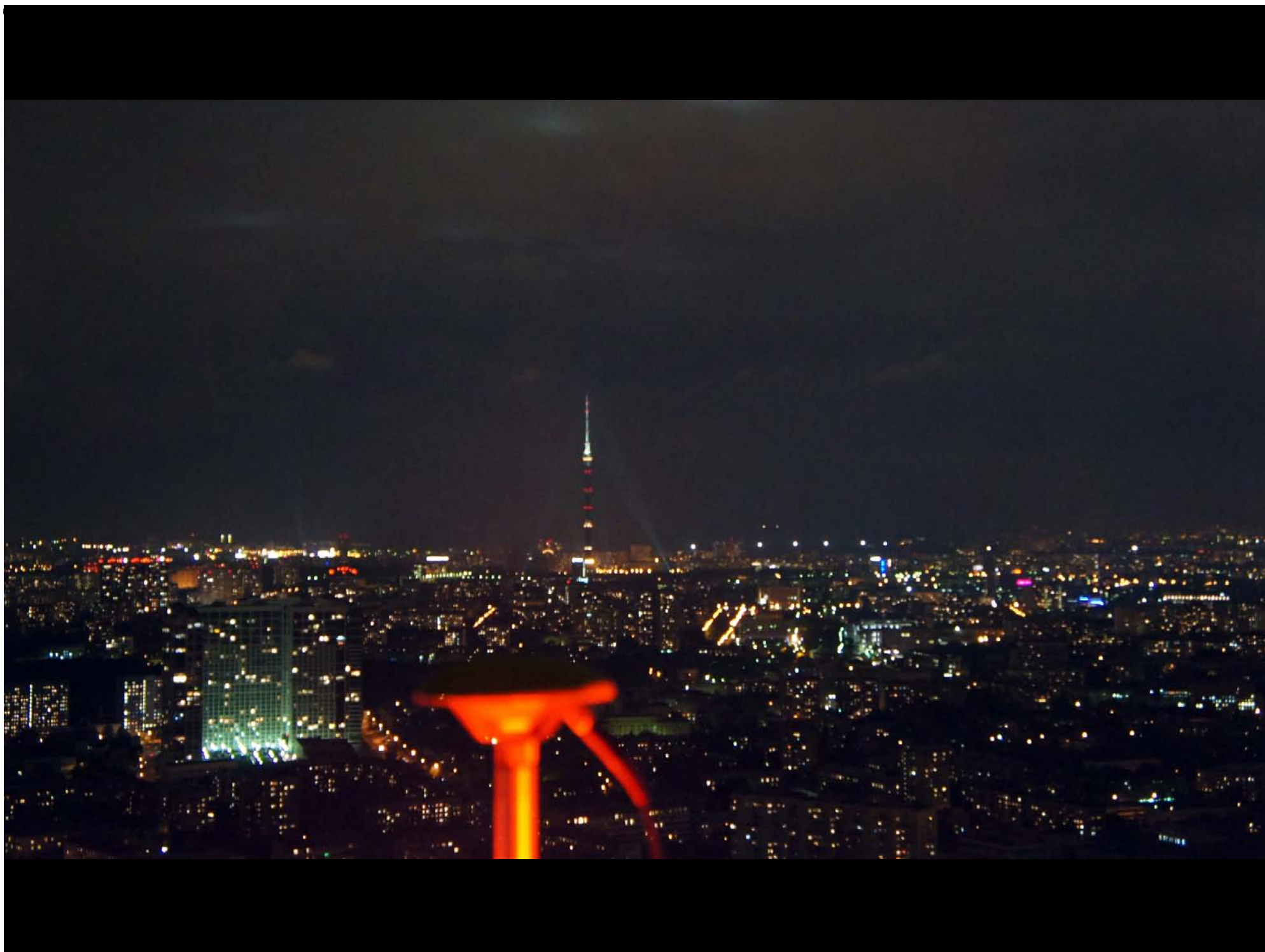
GPS L1

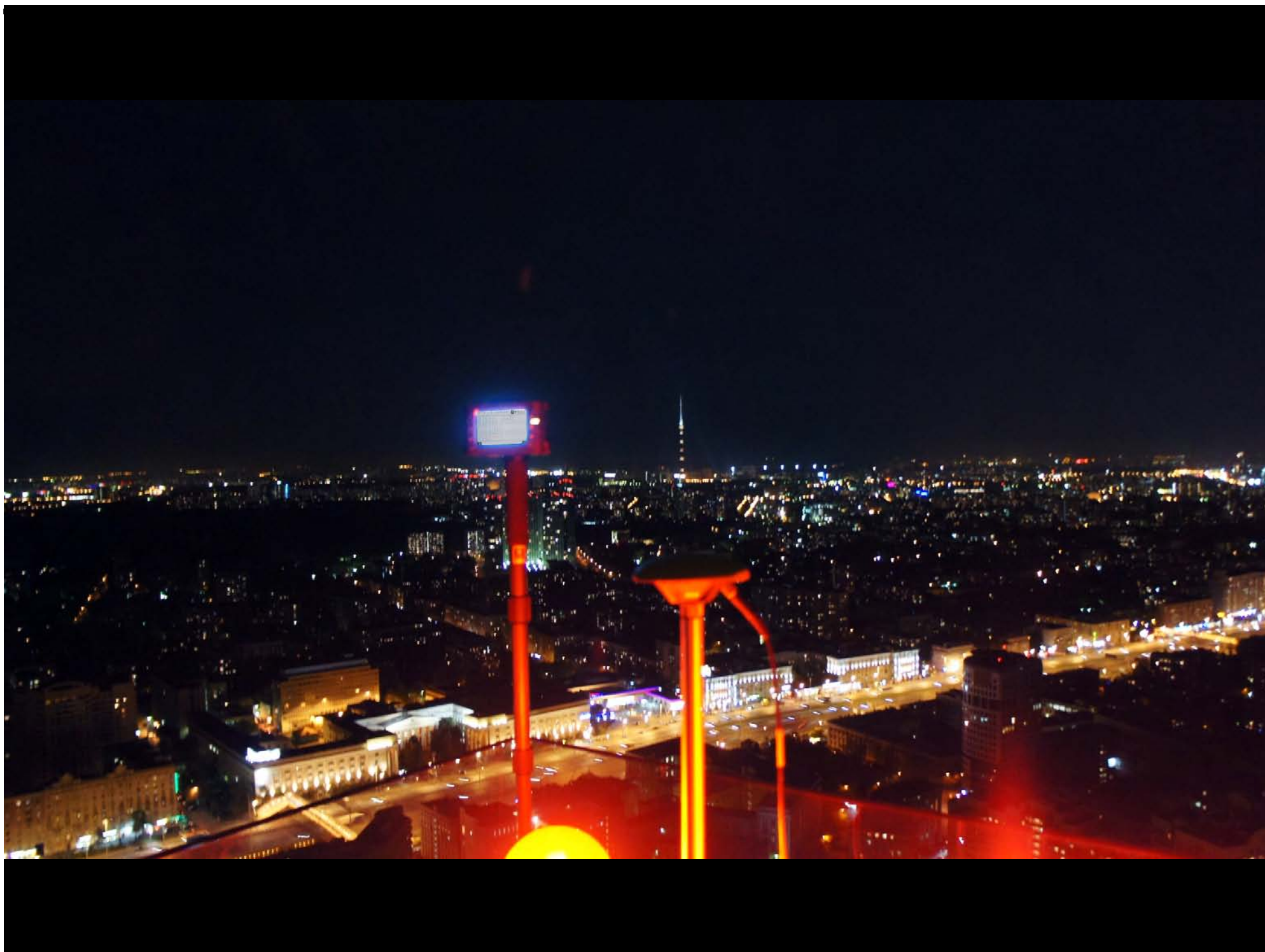


GPS L5 (36.1;1.7;30) INT, 60, I- U- C+ B+ W+ G-, 09-10 21:16, L balc









GLN L2 (36.8;5.2;30) INT, 60, I- U- C+ B+ W+ G-, 09-10 21:16, L balc

20*63

1259 1258 1257 1256 1255 1254 1253

25*50

24*52

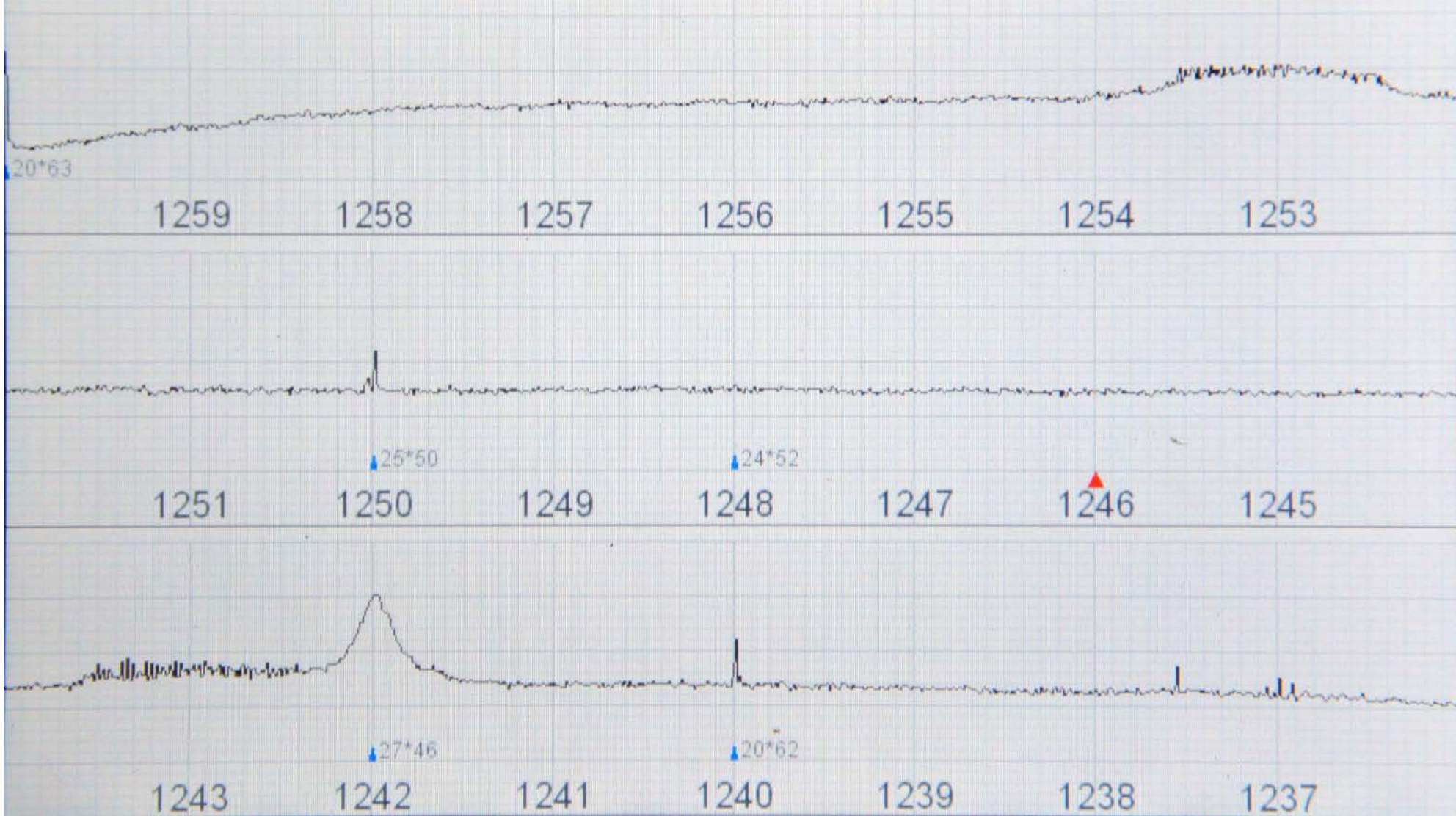
1251 1250 1249 1248 1247 1246 1245

27*46

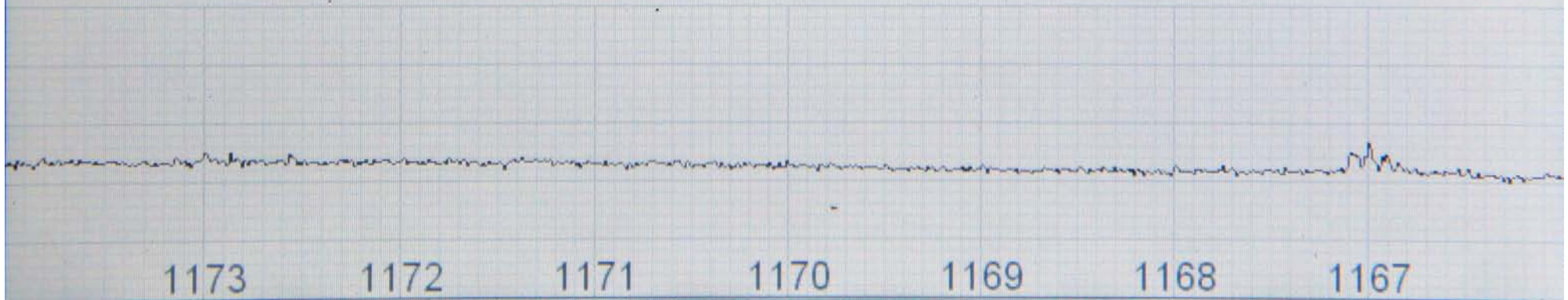
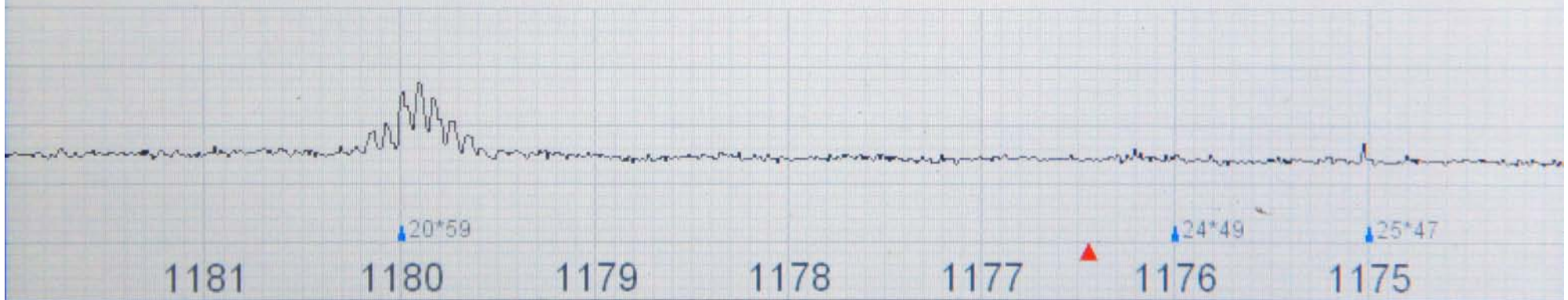
20*62

1243 1242 1241 1240 1239 1238 1237

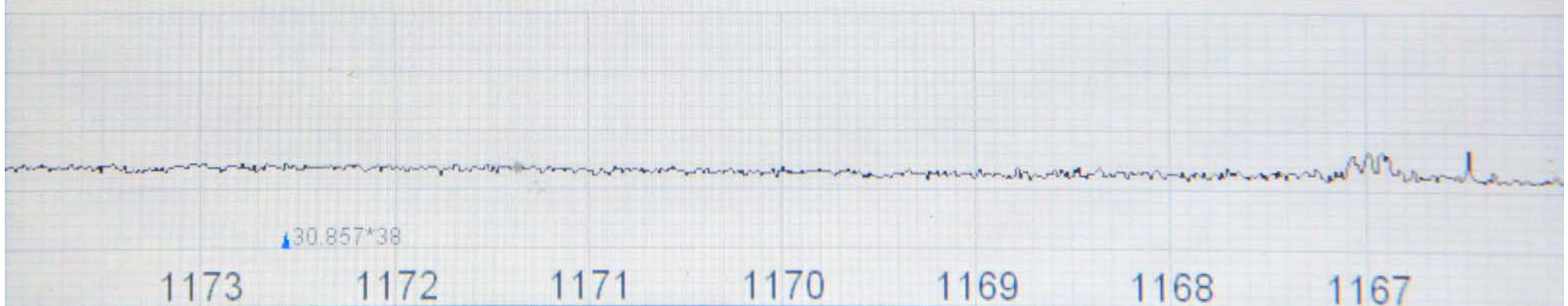
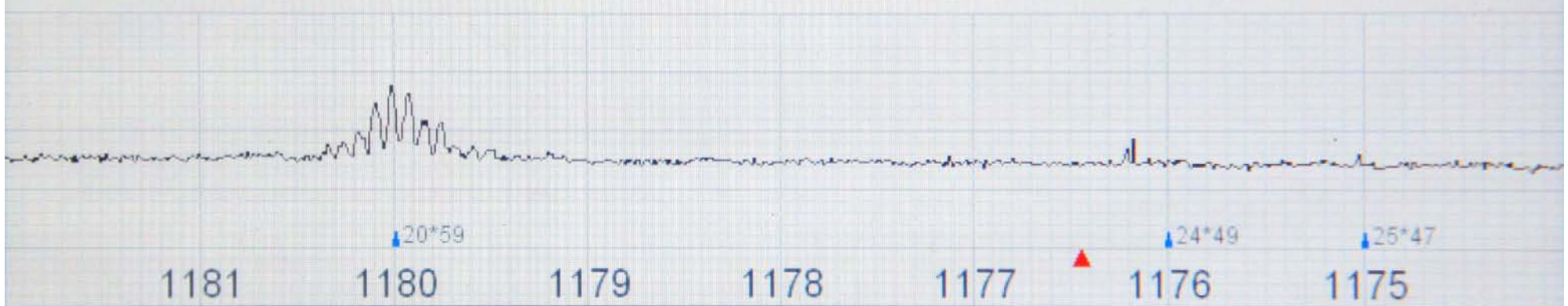
GLN L2 (38.0;6.6;30) EXT, 60, I- U- C+ B+ W+ G-, 09-15 19:16, j balc int



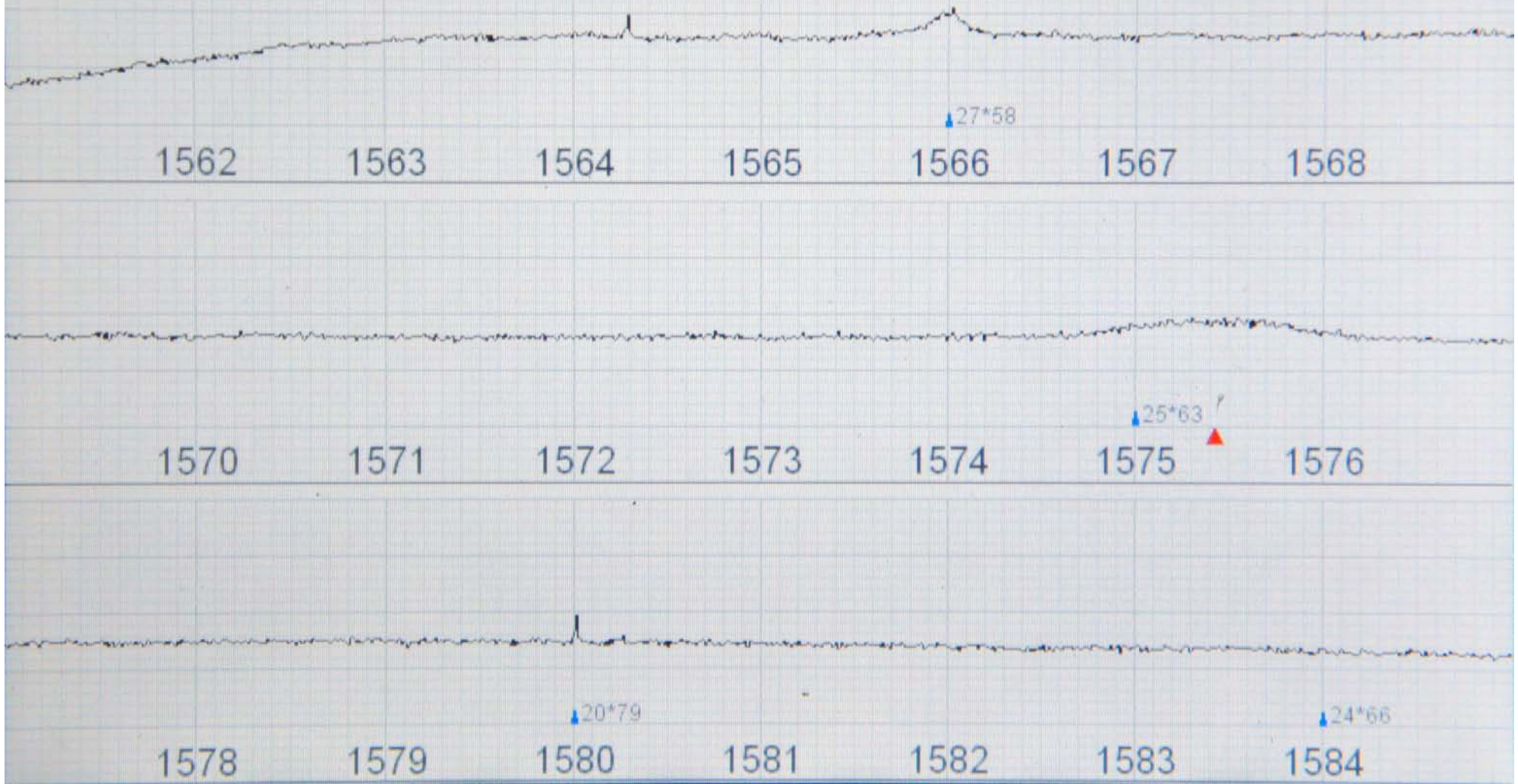
GPS L5 (36.6;1.5;30) EXT, 60, I- U- C+ B+ W+ G-, 09-15 19:16, j balc int



GPS L5 (37.0;1.7;30) INT, 60, I- U- C+ B+ W+ G-, 09-10 21:10, J balc



GPS L1 (44.0;0.0;30) EXT, 60, I- U- C+ B+ W+ G-, 09-15 19:16, j balc int







29%



201M



404M

Satellites (hold)



Map



SUR



19:33



53°C

SAT	EL	AZ	H	L1	P1	P2	L2C	L5	SAT	EL	AZ	H	L1	P1	P2	L2C	L5
GPS6	34↓	192	H	49	34	34	--	--	GLN20	26↑	324	H	49	48	45	46	--
GPS9	16↑	58	H	44	31	31	--	--	GAL1	10↑	324	H	43	--	--	--	--
GPS11	11↑	296	H	44	29	29	--	--	SB126	24~	194	H	39	--	--	--	--
GPS14	38↑	154	H	46	33	33	--	--	GPS3	40	210	H	--	--	--	--	--
GPS18	32↓	70	H	50	35	35	--	--	GLN3	61	50	H	--	--	--	--	--
GPS19	57↓	260	H	40	23	23	--	--	GLN4	61	237	H	--	--	--	--	--
GPS21	6↓	112	H	41	24	24	--	--	GLN5	8	234	H	--	--	--	--	--
GPS22	67↓	86	H	53	43	43	--	--									
GPS24	77↑	268	H	53	45	45	--	--									
GPS27	16~	40	H	46	31	31	--	--									
GPS28	13↑	334	H	46	25	25	--	--									
GLN2	9↓	52	H	46	46	41	43	--									
GLN11	12↓	348	H	44	44	36	39	--									
GLN13	5↑	90	H	45	44	40	42	--									
GLN18	35↓	172	H	51	50	43	45	--									
GLN19	71~	260	H	54	53	45	46	--									

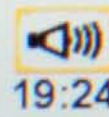




Satellites (hold)



F2
SUR



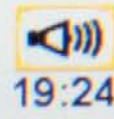
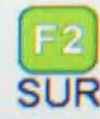
19:24 47°C

SAT	EL	AZ	H	L1	P1	P2	L2C	L5	SAT	EL	AZ	H	L1	P1	P2	L2C	L5
GPS6	26↓	190	H	46	26	26	--	--	SB126	25^	194	H	39	--	--	--	--
GPS9	18↑	50	H	49	31	31	--	--	GPS3	33	205	H	--	--	--	--	--
GPS11	18↑	296	H	40	27	27	--	--	GPS19	55	245	H	--	--	--	--	--
GPS14	46↑	150	H	50	36	36	--	--									
GPS18	25↓	70	H	48	32	32	--	--									
GPS22	60↓	80	H	54	44	44	--	--									
GPS24	82↑	248	H	54	41	41	--	--									
GPS27	16↓	34	H	42	28	28	--	--									
GLN1	70↑	248	H	52	51	37	39	--									
GLN8	51↓	52	H	54	53	46	48	--									
GLN9	22↑	32	H	47	46	--	--	--									
GLN17	35↑	322	H	50	50	40	42	--									
GLN23	25↓	174	H	47	45	41	43	--									
GLN24	67↓	232	H	38	36	28	29	--									
GAL2	63↑	284	H	51	--	--	--	--									
SB124	25↓	200	H	36	--	--	--	--									



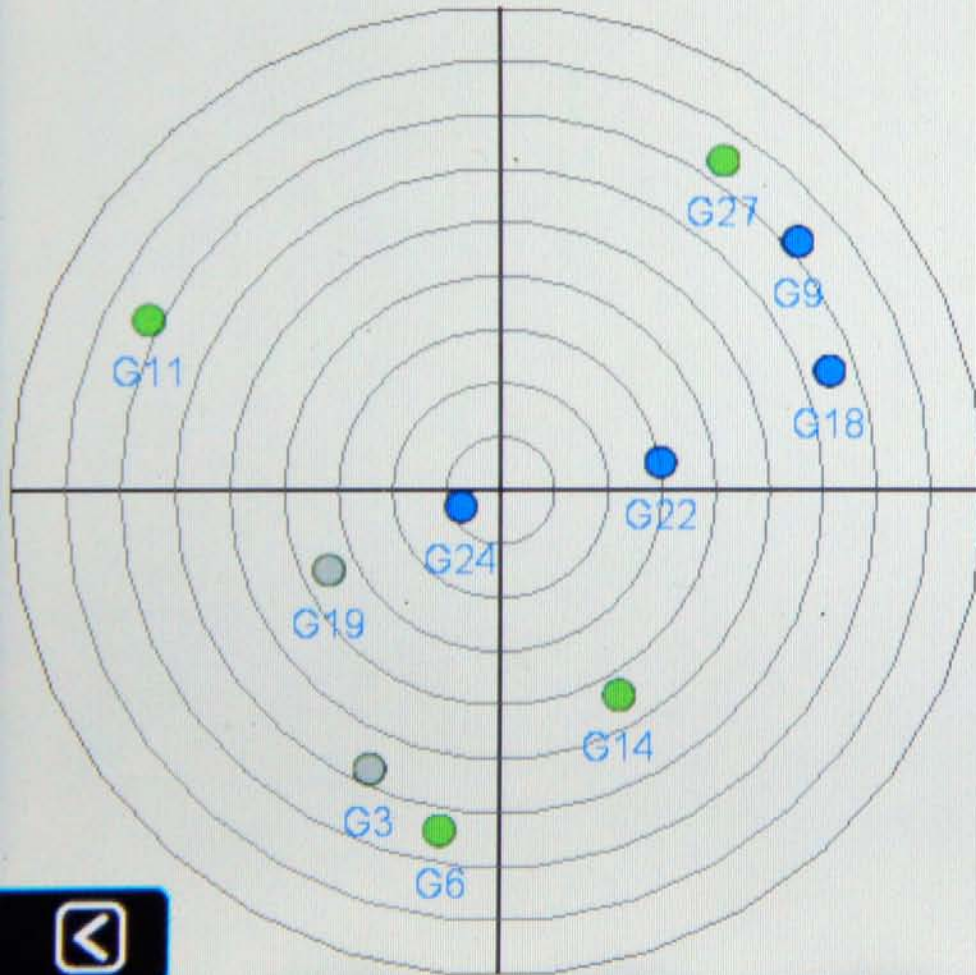


Sky Plot (hold)

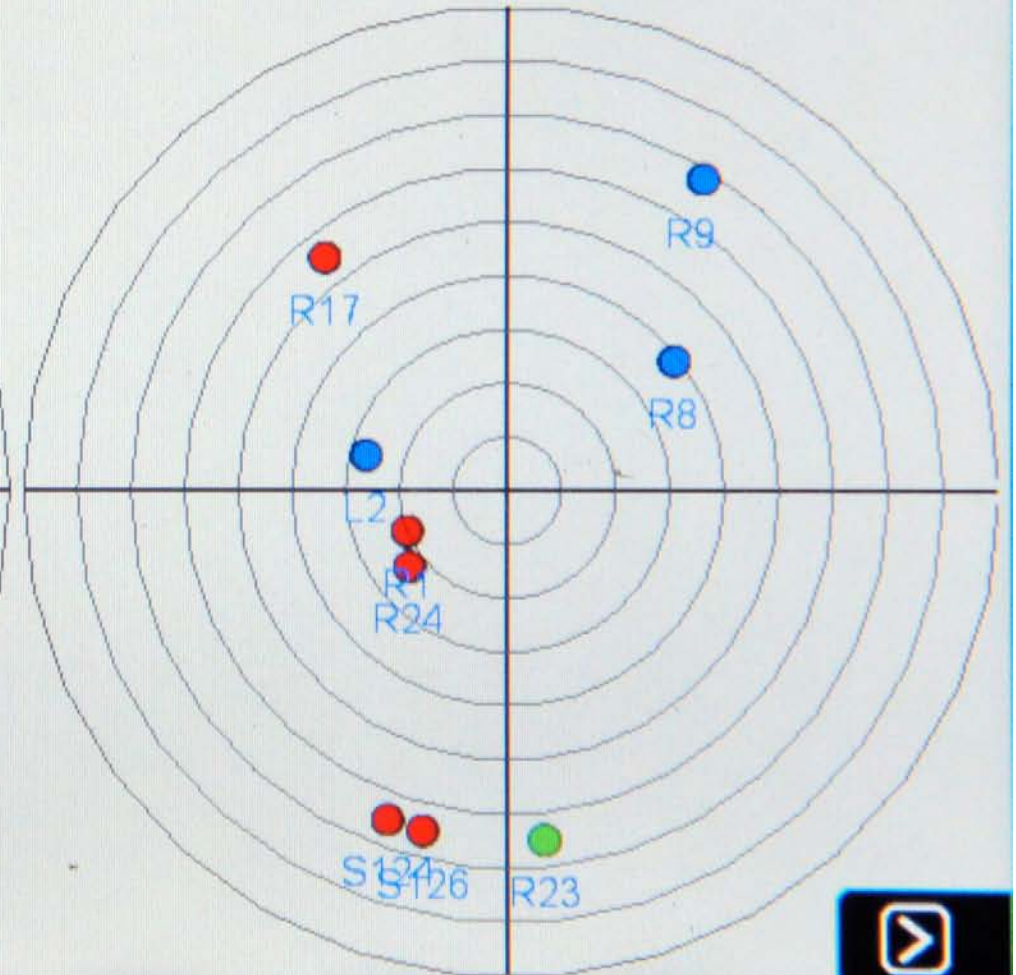


19:24 49°C

GPS



GLN+GAL+SBAS





28%



203M



76M

Gnss Analyzer



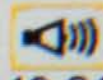
0



Map



SUR



19:34



0°C

Capture GNSS Data

Go to Satellites

Go to Spectrum

30, EXT, 60, I- U- C+ B+ W+ G-, 09-10 19:25, L balc

Bands	AGC Average	AGC Sigma	C/A Dif.Aver	P Dif.Aver	Num Sat
GPS L1	58.0	0.0	-0.9	-3.5	9 / 9
GPS L2	52.3	0.5	---	-3.5	0 / 9
GPS L5	50.1	1.7	---	---	0 / 0
GLN L1	57.0	0.2	-0.7	-1.1	6 / 6
GLN L2	49.0	7.0	-1.8	-3.7	6 / 6

Averaging quantity 30

Title of capture L balc

Frequency Harmonics >

Cancel

Capture GNSS Data_Hint

Apply +



