

This guide will step you through converting xB0 to Common Measures.

Definition of Terms

- ✓ Speed of light $c = 299792458$ M/s
- ✓ L1 frequency $f_{L1} = 1575420000$ Hz
- ✓ L2 frequency $f_{L2} = 1227600000$ Hz
- ✓ Wavelength $\lambda = c/f$ (M/s) meters per seconds
- ✓ L1 wavelength $\lambda_{L1} = 0.190293672798$ meters
- ✓ L2 wavelength $\lambda_{L2} = 0.244210213425$ meters

Message Format

This is the measurement part of the xB0 message, which this paper is addressing.

- ✓ Wn1 U08 SV ID Status
 - B7: CA, & L1; 1 = Valid
 - B6: P1; 1 = Valid
 - B5: P2 & L2; 1 = Valid
 - B4-B0: SV id (PRN); range 1-32
- ✓ Wn2 U08 Channel Status
 - B3-B0: Logical Channel; range = 1-15
 - B7-B4: CA C/No; range = 35+ X dB Hz
- ✓ Wn3 U32 CA pseudorange (1/16 L1 cycle; see examples below)
- ✓ Wn4 S24 L1 phase (1/256 L1 cycle; see examples below)
 - B23-B4: carrier phase
L1 Carrier phase = CA + L1 phase
 - B3-B0: cycle slip counter
- ✓ Wn5 S16 P1-CA pseudorange (1/16 L1 cycle; see examples below)
- ✓ Wn6 S16 P2-CA pseudorange (1/16 L1 cycle; see examples below)
- ✓ Wn7 S24 L2 phase (1/256 L2 cycle; see examples below)
 - B23-B4: carrier phase
L2 Carrier phase = (CA + P2)*(120/154) + L2 phase (see examples below)
 - B3-B0: cycle slip counter (Use with L1 slip counter)

Building Measurements

The native units are carrier cycles L1 or L2. The code measurements are scaled by 2^4 to capture 1/16 cycle resolution. The phase has been scaled to 2^8 to capture 1/256 cycle resolution.

Wn3 - U32 CA pseudorange (1/16 L1 cycle)

- ✓ Take the Wn3 and divide it by 16 to convert it to L1 cycles.
- ✓ Then multiply the CA cycles by L1 wavelength to get the CA Pseudorange.

	Cell	A	B	C
Label	1	CA	CA Cycles	CA Range
Value or Calculation	2	1907198094	119199880.875	22682983.129
Formula	3	=Wn3	=A2/16	=B2*0.190293672798

Wn4 - L1 phase (1/256 L1 cycle)

- ✓ Add Wn4 divided by 16 to Wn3 and divided by 256 to get the L1 cycles.
- ✓ Then multiply by L1 wavelength to get the L1 Phase Pseudorange.

	Cell	A	B	C	D
Label	1	CA Cycles	L1	L1 Cycles	L1 Range
Value or Calculation	2	119199880.875	35	119199881.012	22682983.155
Formula	3	=Wn3(CA Cycles)	=Wn4	=A2+B2/256	=C2*0.190293672798

Wn5 - S16 P1-CA pseudorange (1/16 L1 cycle)

- ✓ Add Wn5 to Wn3 and divide the sum by 16 to get P1 cycles.
- ✓ Then multiply by L1 wavelength to get the P1 Pseudorange.

	Cell	A	B	C	D
Label	1	CA Cycles	P1	P1 Cycles	P1 Range
Value or Calculation	2	119199880.875	-101	119199874.563	22682981.928
Formula	3	=Wn3(CA Cycles)	=Wn5	=A2+B2/16	=C2*0.190293672798

Wn6 S16 P2-CA pseudorange (1/16 L1 cycle)

- ✓ Add Wn6 to Wn3 and divide the sum by 16 to get P2 cycles.
- ✓ Then multiply by L1 wavelength to get the P2 Pseudorange.

	Cell	A	B	C	D
Label	1	CA Cycles	P2	P2 Cycles	P2 Range
Value or Calculation	2	119199880.875	91	119199886.563	22682984.211
Formula	3	=Wn3(CA Cycles)	=Wn6	=A2+B2/16	=C2*0.190293672798

Wn7 S24 L2 phase (1/256 L2 cycle)

- ✓ Add Wn3 to Wn6 and divided by 16
- ✓ Then multiply by 120/154 and add Wn7 divided by 256 to get the L2 cycles.
- ✓ To get the L2 phase range add Wn3 and Wn6 divide by 16 and multiply by L1 wavelength add Wn7 divided by 16 and multiply by L2 wavelength to get the L2 Phase Pseudorange.

	Cell	A	B	C	D
Label	1	CA	L2	L2 Cycles	L2 Range
Value or Calculation	2	1907198094	1048188	92887122.9746	22683984.1260
Formula	3	=Wn3	=Wn7	=(A2+(=Wn6))*(120/154)/16+B2/256	=(A2+(=Wn6))*(0.190293672798/16)+ B2*(0.244210213425/256)