

Cost Estimate for ALMA LO Development: May 2000 through December 2001*R. F. Bradley (04-12-00)****Phase-Locked Source*** (Thacker)

Phase drift measurements

Harmonic mixers	\$ 10 k
Commercial mixer for 220 GHz	\$ 15 k
Machining	\$ 2 k
Parts to measure (YTF, Switches, etc.)	\$ 8 k

Lab View software based controller

Lab View and maintenance	\$ 3 k — to SW
PC	\$ 3 k — to comp
Interface Cards	\$ 5 k
Cables and terminal blocks	\$ 1 k
Machining	\$ 1 k
Microprocessor Development Tools	\$ 1 k — to SW

Level One pre-production source

Components	\$ 23 k
Machining	\$ 4 k

Level Two pre-production source

Components	\$ 23 k
Machining (developing assembly concepts, jigs, etc.)	\$ 8 k

Photomixer compatibility tests in Tucson

Components	\$ 5 k
Machining	\$ 2 k
Shipping (equipment)	\$ 1 k

TOTAL FOR PHASE-LOCKED SOURCE**\$ 115 k*****Power Amplifiers*** (Bryerton)-7
108k

TRW wafer run

Purchase MMIC amplifier chips from JPL (current design)

Miscellaneous components for amplifiers

Block Machining

Commercial multipliers and assorted RF components

Bias supply development

\$ 100 k — separate
\$ 25 k
\$ 10 k
\$ 15 k
\$ 30 k
\$ 15 k

TOTAL FOR POWER AMPLIFIERS**\$ 195 k**

Frequency Multipliers (Bradley)

Drawing package and support	\$ 10 k
UVA diode development contract	\$ 140 k — <i>separate</i>
Machining	\$ 25 k
80 K Dewar #2	\$ 10 k
Bias supply development	\$ 10 k
Tunable sources (2)	\$ 60 k
PC and control software	\$ 11 k — <i>7k comp 4k SW</i>
Miscellaneous lab supplies	\$ 10 k
PUR development	\$ 10 k
Millimeter wave isolator development	\$ 25 k

TOTAL FOR FREQUENCY MULTIPLIERS

\$ 311 k
— 15 /
\$ 160

TOTAL

\$ 621 k

First LO Development Plan - May 2000 through December 2001

Phase-Locked Source Tasks	2000								2001											
	M a y	J u n	J u l	A u g	S e p	O c t	N o v	D e c	J a n	F e b	M a r	A p r	M a y	J u n	J u l	A u g	S e p	O c t	N o v	D e c
Measure phase drift of components	●	●	●	●	●	●														
Develop LabView software based controller for prototype	●	●	●	●	●	●														
Source frequency multiplier development	●	●	●	●	●	●	●	●												
Expect delivery of MMIC amplifier chips from HRL								●												
Amplifier block fabrication	●	●	●																	
Amplifier packaging (including JPL visit)			●	●	●															
Conduct <i>Level One</i> component integration experiments						●	●	●	●	●	●									
➤ Conduct <i>Level Two</i> component integration experiments								●	●	●	●	●	●	●	●	●				
Develop <i>Level One</i> pre-production phase-locked source					●	●	●													
➤ Fabricate <i>Level One</i> sources for SIS and multiplier development							●	●	●	●										
➤ Develop <i>Level Two</i> pre-production phase-locked source															●	●	●	●	●	●
Conduct photo-mixer compatibility tests in Tucson							●	●	●											
Expect delivery of MMIC amplifier chips from TRW											●									
Amplifier bias supply development		●	●	●																

R. F. Bradley (04-12-00)

First LO Development Plan - May 2000 through December 2001

Frequency Multipliers Tasks	2000								2001											
	M a y	J u n	J u l	A u g	S e p	O c t	N o v	D e c	J a n	F e b	M a r	A p r	M a y	J u n	J u l	A u g	S e p	O c t	N o v	D e c
Doubler D-3A <i>Level One</i> development	●																			
➤ Doubler D-3A <i>Level Two</i> development									●	●	●	●	●	●						
➤ Doubler D-3A <i>Level Three</i> development															●	●	●	●	●	●
80 K Dewar Development	●	●																		
➤ Fabricate second 80 K Dewar									●	●	●									
Multiplier evaluation at cryogenic temperatures			●	●	●	●	●	●												
Multiplier lifetime tests		●	●	●																
Multiplier batch run test									●	●	●	●	●	●						
Tripler T-1A <i>Level One</i> development	●	●	●	●	●	●														
➤ Tripler T-1A <i>Level Two</i> development						●	●	●	●	●	●									
Tripler T-1B <i>Level One</i> development											●	●	●	●	●	●				
Fabrication of T-1A for Test Interferometer						●	●	●												
Tripler T-2A <i>Level One</i> development	●	●	●	●	●	●	●	●	●											
➤ Tripler T-2A <i>Level Two</i> development									●	●	●	●	●	●						
PUR molding development	●	●	●	●	●	●	●	●												
Bias supply development					●	●	●	●												
Millimeter wave isolator development															●	●	●	●	●	●

R. F. Bradley (04-12-00)