

MMA CDL RECEIVER DEVELOPMENT EQUIPMENT -- Year 1

Draft 22 Oct 97

MMARxBud01.WB3

Qty	Cost for Qty	Basis	-----Sub-Totals-----
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Sideband source plates				\$43,145
YIG Oscillator	Omniyig		\$2,500 est	
Tripler	Pacific Millimeter		\$800 est	
Harmonic Genreator			\$10,000 guess	
Amplifiers	Lockheed-Martin	26-40 GHz, 20 dB, 20 dBm, low noise.	2 \$4,000 est	
Level-set attenuator	Aerowave		\$575 cat	
Horn	Aerowave		\$850 cat	
Power meter	HP	437B & 8487D, 50 MHz - 50 GHz	2 \$12,020 cat	
Source-locking counter	EIP		\$10,000 est	
Harm mixers for above	Pacific Millimeter		3 \$2,400 est	
IF plate				\$14,208
LP Filter			2 \$600 guess	
LN Amplifiers	Miteq	1-12 GHz, 23 dB, F = 2.5 dB	2 \$3,000 est	
Step Attenuator	HP	Programable	2 \$2,872 cat	
Transfer switch	HP		\$664 cat	
Power Divider			\$300 guess	
SPDT Switch	HP		\$602 cat	
Amplifiers	Miteq	1-12 GHz, 20 dB, F = 5.3 dB	2 \$1,800 est	
Pad			\$170 est	
YIG Filter	Omniyig	1-12 GHz, B = 60 MHz	\$2,500 est	
Tunnel Diode Detector			\$300 est	
Noise source			\$1,000 est	
Power Supplies			\$400 est	
Dewar instrumentation				\$18,984
Temperature Gauge	Lakeshore			
Temp Sensors	Lakeshore		6 \$1,380 cat	
LP feedthrough filters	Spectrum Control	SIS bias	12 \$480 guess	
LP feedthrough filters	Spectrum Control	All other lines	80 \$960 guess	
Connectors	Deutsch	Hermetic and cable connectors	24 \$840 est	
Superconducting Magnet		Superconducting wire in Cu sheath	\$1,000 guess	
Vacuum Valve		Solenoid controlled	\$850 est	
Vacuum accessories			\$1,200	
Turbo pump			\$8,000 est	
4K IF Plate 4-12 GHz				\$4,274
SP4T Coax Switch	Novak Corp.	Anti-static design.	\$2,000 est	
Loads	EMC	Hot & Cold. Nichrome for 4K operation.	\$230 est	
Pad	HP	Nichrome. Modify for 4K operation	\$303 cat	
Directional Coupler			\$500 est	
Amplifier	NRAO	4-12 GHz	--	
Quad Hybrid	HP or Merrimac	HP nominally 1-18 GHz.	\$1,241 cat	
Mixers				
Mask sets	Diamon		5 \$50,000 est	
LO plates				\$120,125
60-90 GHz				\$26,515 - ?
Gunn Oscillator	Carlstrom	60-90 GHz	\$8,000 est	
Isolator	Millitech		\$2,000 est	
Level-set attenuator	Aerowave		\$650 cat	
W/G switch	Aerowave		\$2,300 cat	
Wavemeter	Millitech		\$3,000 est	
Power Meter	Anritsu ML83A & MP 717A	Meter & 60-90 GHz Head	\$9,000 est	
E-plane bends	Aerowave		2 \$270 cat	
GDO power supply	Lambda LQ521		\$800 est	
H-plane bends	Aerowave		2 \$270 cat	
Lab-Jack	Cole-Parmer		\$225 cat	
90-140 GHz				\$30,725 - 99
Gunn Oscillator	Carlstrom		\$8,000 est	
Isolator	Millitech		\$2,000 est	
Level-set attenuator	Aerowave		\$900 cat	
W/G switch	Aerowave		\$3,000 cat	
Wavemeter	Millitech		\$4,000 est	
Power Meter	Anritsu ML83A & MP 82B	Meter & 90-140 GHz Head	\$11,000 est	
E-plane bends	Aerowave		2 \$400 cat	
H-plane bends	Aerowave		2 \$400 cat	
GDO power supply	Lambda LQ521		\$800 est	
Lab-Jack	Cole-Parmer		\$225 cat	
170-260 GHz				\$38,085
Gunn Oscillator	Carlstrom	60-90 GHz	\$8,000 est	
Isolator	Millitech		\$2,000 est	
Level-set attenuator	Aerowave		\$650 cat	
W/G switch	Aerowave		\$2,300 cat	
Wavemeter	Millitech		\$3,000 est	
Power Meter	Anritsu ML83A & MP 717A	Meter & 60-90 GHz Head	\$9,000 est	
H-plane bends	Aerowave	WR-12	2 \$270 cat	
Tripler	Millitech		\$10,000 est	
E-plane bends	Aerowave	WR-4	2 \$720 cat	
H-plane bends	Aerowave	WR-4	2 \$720 cat	
GDO power supply	Lambda LQ521		\$800 est	
Tripler bias supply	NRAO		\$400 est	
Lab-Jack	Cole-Parmer		\$225 cat	
Common LO components to support two mixer test stations				\$24,800
Source-locking counter	EIP		21 \$20,000 est	
Harm mixers for above	Pacific Millimeter		83 \$4,800 est	

130-170-90-120 GHz

170-260 GHz

SIS equipment rack					\$145,200
SIS bias supplies (need 2)				\$300	guess
IF Bias supply				\$300	guess
Magnet Bias supply				\$300	guess
LO Bias supply				\$300	guess
LO Phase-Lock				\$300	guess
IF Switching				\$300	guess
Heater controller				\$300	guess
Temperature Monitors				\$300	guess
Graphics printer				2 \$4,000	est - need
RF Spectrum Analyzer	Tektronix 2784	With harmonic mixers		\$70,000	est
IF Spectrum Analyze	Tektronix R3272	For 4-12 GHz IF	2	\$58,000	quote - at least 1 \$29k
Storage scope	Tektronix 7633	SIS junction monitoring. With plug-ins. (used)		\$4,000	est
Power supplies	Acopian VA20MT400	For SIS mixer test set. Overvoltage protected.	2	\$600	est
Line filter				\$300	est
Distribution strips			3	\$100	guess
Rack		With equipment shelves.		\$300	est
Control PC	Pentium	Controls mixer test set		\$3,000	est
PC interface cards				\$2,500	guess
Wafer Evaluation Teast Set					\$33,750
Capacitance bridge	HP4278A			\$11,550	cat
Network Analyzer	HP8714C 0.3 MHz - 3 GHz	Contains integral source and S-parameter test set		\$18,000	cat
SIS bias supply					
Control PC	Pentium	Controls wafer evaluation test set		\$3,000	est
PC interface cards				\$600	guess
Power supplies	Acopian VA20MT400	For Wafer evaluation test set. Overvoltage protected.	2	\$600	est
Photomixer test set					\$800
Harmonic mixer	Pacific Millimeter	For testing 100 GHz prototype photomixer.		\$400	guess
Power Meter		* In first year, borrow existing lab equipment.		*	
mm Spectrum Analyzer		* In first year, borrow existing lab equipment.		*	
Bias supply				\$400	guess
Lasers		JMP			
Fiberoptic components		JMP			
AM noise measurements		RFB			
PM noise measurements		RFB			
170-260 GHz extension to HP8510					\$46,704 - 99
Harmonic generator				\$10,000	guess
Harmonic mixer			3	\$24,000	est
Directional couplers	Aerowave		3	\$10,500	cat
Step Attenuator	HP DC-18 GHz		2	\$2,204	cat
In-block IF development		* In first year, borrow existing lab equipment.		*	\$0
Microfabrication (SIS mixers)					\$57,000
Dicing saw		Present 18-year-old saw is overloaded and ailing.		\$57,000	est
Vacuum window development					\$6,000
Xtal-Quartz Plates	Boston Piezo Optics			\$6,000	est
Antenna Range instrumentation					\$230,000 - 99
Transmitter/Receiver	AB Millimeter			\$150,000	est
Harmonic generators	AB Millimeter	60-90 GHz, 90-140 GHz, 170-260 GHz	3	\$30,000	est
Harmonic mixers	AB Millimeter	60-90 GHz, 90-140 GHz, 170-260 GHz	3	\$30,000	est
Positioners & servos				\$20,000	guess
Miscellaneous					\$58,700
Oven	ATL	Curing epoxy (to replace worn out oven in Dan's lab)		\$4,000	guess
Measuring Microscope	Olympus or Nikon			\$26,000	quote - MAP
Lab scope	Tektronix TDS 460A	4 channel, 400 MHz		\$7,700	cat
Additional 1020 compressor				\$5,000	guess
Low-loss cables	Gore	For 4-12 GHz Spectrum analyzers		\$2,000	guess
Misc. hardware				\$6,000	
Dedicated fast PC for QuickWave				\$5,000	
Software					\$21,100
EM simulator	QuickWave	Full 3-D FDTD		\$15,000	quote
Software maintenance	Sonnet, HP	License, customer support, & upgrades		\$6,100	est
Contracts					\$630,000
Photomixer Development	UCLA			\$130,000.00	
Superconducting Circuit s	JPL			\$250,000.00	
Superconducting Circuit s	UVA			\$250,000.00	

GRAND TOTAL **\$1,472,716**

-277
-60
-346

\$1,126,000
-110
\$1,016