

May 7, 1984

To: VLBA Operations Group
From: C. Bignell
Subject: Summary of the May 3, 1984 Meeting

I will attempt to summarize the main points made during our last meeting.

Currently the most important task facing our group is the Array Operations Center building requirements. We have established that the building space required is about 38,500 sq. ft. for the stand alone operations and about 56,000 for the combined VLA/VLBA operations. The space estimate for the stand alone AOC translates into about 438 sq. ft. per employee. This seems to be a reasonable figure since the Charlottesville operations (both Edgemont Rd. and Ivy Rd.) have about 428 sq. ft. per employee, the Jansky Lab. in Green Bank has about 500 sq. ft. per employee and the VLA site has (excluding the Antenna Assembly Building) about 416 sq. ft. per employee.

There are several concerns related to the financing the building and the timing of the construction:

(a) The monies (1.8M) allocated in the construction budget is (probably) insufficient to build the stand alone AOC. The precise cost of the building will have to wait for the architectural study and the decision of what to do about it will obviously depend on several factors.

(b) The integration of the VLA and VLBA operations would be best accomplished if the AOC were designed and built to handle the combined operations from the start. Unfortunately, the money to accommodate the VLA operations in the AOC is not available and exists only as part of NRAO's long range plan (I believe in the 1986 budget). There are two concerns. First, this funding has not been approved by NSF and secondly, should the funding be approved it would not be available before 1986. Since the current VLBA construction plans call for starting the AOC in 1985 it would be very difficult to build the full AOC at once. Although the construction of the AOC could be delayed a year there is still the uncertainty of NSF approval and its timing.

(c) There is as yet no formal agreement with New Mexico Tech for the construction and operation of the AOC. The opportunity (in principle) yet exists to consider some financing arrangement with Tech that might assist NRAO in paying for the construction of the AOC.

The immediate goals of the Operations Group is to help Buck Peery with propoals for the layout of the AOC as well as help specify any special building requirements.

Table I

MANPOWER REQUIREMENTS FOR VLBA/VLA OPERATIONS IN SOCORRO

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Division	Position	VLBA Personnel Stand Alone	VLA Personnel at Site	VLA Personnel in Socorro	VLBA Personnel at Site	VLBA Personnel at Socorro	Total Personnel VLA/VLBA Combined	Total Personnel VLA and VLBA Stand Alone	Differences Combined - Stand Alone
Electronic	Head	1	0	1	0	0	1	2	-1
	System Technician	1	0	0	0	1	1	1	0
	Cryogenic Grp Ldr	1	1	0	0	0	1	2	-1
	Cryogenic Tech	3	2	0	3	0	5	5	0
	Low Noise Rcvr Grp Ldr			0	1	0	1	1	0
	Low Noise Rcvr Engr	1	0	1	0	1	2	2	0
	Low Noise Rcvr Tech	2	2	4	0	2	8	8	0
	IF/LO Grp Ldr			0	1	0	1	1	0
	IF/LO Engr	1	0	0	0	2	2	2	0
	IF/LO Tech	2	1	3	0	2	6	6	0
	Digital Grp Ldr			0	1	0	1	1	0
	Digital Engr	1	0	0	0	1	1	1	0
	Digital Tech	2	1	2	0	2	5	5	0
	Correlator Engr	1	0	1	0	1	2	2	0
	Correlator Tech	2	1	0	0	2	3	3	0
	Recorder Engr	1	0	0	0	1	1	1	0
	Recorder Tech	4	0	0	0	3	3	4	-1
	Field Grp Ldr	1	0	0	0	1	1	1	0
	Field Tech(at sites)	20	0	0	0	20	20	20	0
	Waveguide Grp Ldr			1	0	0	1	1	0
	Waveguide Tech			1	0	0	1	1	0
	Draftsman			0	1	0	1	2	0
	Total		44	10	16	3	40	69	72
E&S/Antennas	Head	1	1	0	0	0	1	2	-1
	Vehicle Mechanic		1	0	0	0	1	1	0
	Site Electrician		1	0	0	0	1	1	0
	Aircondition,Plumbng		1	0	0	0	1	1	0
	Carpenter		1	0	0	0	1	1	0
	Antenna Mechanic	3	8	0	2	0	10	11	-1
	Antenna Servo Tech	2	4	0	2	0	6	6	0

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Division	Position	VLBA Personnel Stand Alone	VLA Personnel at Site	VLA Personnel in Socorro	VLBA Personnel at Site	VLBA Personnel at Socorro	Total Personnel VLA/VLBA Combined	Total Personnel VLA and VLBA Stand Alone	Differences Combined - Stand Alone
	Engineer/Supervisors		3	0	0	0	3	3	0
	Machinist	2	2	0	1	0	3	4	-1
	Draftsman	1	1	0	2	0	3	3	0
	Labourer		3	0	0	0	3	3	0
	Total	9	26	0	7	0	33	36	-3
Array	Head			1			1	1	0
	Chief Array Oper.	1		1		1	2	2	0
	Array Oper.	5	4	5		5	14	12	2
	Main. Coord.			1			1	1	0
	Chief Corr. Oper.	1				1	1	1	0
	Corr. Oper.	5				5	5	5	0
	Data Analysts	2		1.5		2	3.5	3.5	0
	Total	14		9.5		14	27.5	25.5	2
Business	Head	1		1			1	1	0
	Sr. Adm. Ass.			1			1	1	0
	Adm. Aide-personnel			1			1	2	-1
	Secr. Pool	3	2	1		2	5	4	1
	Recep./Oper.			1			1	2	-1
	Libr./Ship Clerk	1				1	1	1	0
	Guard/Janitor		3.5				3.5	3.5	0
	Janitor	1				1	1	2	-1
	Warehouse/Bus		1				1	1	0
	Receiving			1			1	1	0
	Leadman/Shuttle Dr.			1			1	1	0
	Shuttle Driver			1			1	0	1
	Sr. Buyer	1		1			1	1	0
	Buyer			1		1	2	3	-1
	Purch. Secr.	1		1.8		0.7	2.5	1.8	0.7
	Head Cook		1				1	1	0
	Cook/Housekeeper		1				1	3.8	-2.8
	Accountant			2			2	2	0
	Bookkeeper	1		1			1	2	-1
	Fiscal Clerks	2		2			2	4	-2
	Total	11	8.5	16.8		5.7	31	38.1	-7.1
Computer	Head	1		1			1	2	-1

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Division	Position	VLBA Personnel Stand Alone	VLA Personnel at Site in Socorro	VLA Personnel in Socorro at Site	VLBA Personnel at Site at Socorro	VLBA Personnel at Socorro	Total Personnel VLA/VLBA Combined	Total Personnel VLA and VLBA Stand Alone	Differences Combined - Stand Alone
	Ass. Div. Head/Oper. Man.	1		1		1	2	2	0
	Systems Programmers	1		1		1	2	2	0
	Senior Programmers	2		4		2	6	6	0
	Programmers	4		3		2	5	7	-2
	Engineer			1			1	1	0
	Technician	2.5		2		2.5	4.5	4.5	0
	Prog. Libr/Comp. Oper.	2		3		2	5	5	0
	Total	13.5		16		10.5	26.5	29.5	-3
Scientific Services/ Management	Director	1		1			1	2	-1
	Deputy Director	1		1		1	2	2	0
	Scientists	5		5		3	8	10	-2
	Systems Scientists	5		5		4	9	10	-1
	Post Docs	2		2		2	4	4	0
	Resident Cust./Sup.		1				1	0	1
	Secretaries	1		1			1	2	-1
	Total	15		15		10	26	30	-4
Grand total		106.5	44.5	73.3	10	80.2	213	231.1	-18.1

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Table II

VLBA OPERATIONS BUILDING SPACE REQUIREMENTS

Division	Purpose	#	VLBA Stand Alone Area(sq ft)	#	VLA Area(sq ft)	#	VLBA Savings by combined oper(sq ft)	Total Space for combined oper(sq ft)
Scientific Services	Library /study area		1500					1500
	Secretary Office & Receptionis	2	300					300
	Directors Office		300					300
	Deputy Directors Office		200		200			400
	Scientific Offices	14	2100	18	2700	3	450	4350
	Visitors Offices	9	825	18	1350			2175
	Auditorium		1500					1500
	Journal/Coffee area		500					500
	Visitor's kitchen		200					200
	Conference room		400		200			600
	Canteen		200					200
Array Operations	Array Control Room		600		600			1200
	Correlator Control Room		400					400
	Offices	6	900	6	900			1800
Tape Storage	Storage for 60 days at AOC		750				750	
Computer	Offices	13	1950	13	1950	4	600	3300
	Computer room (not Post Proc)		1100		2500			3600
	Correlator Room							
	Electronic racks	46	920					920
	Tape staging Area		500					500
	Expansion rack space	18	480					480
	Computer room (Post Process)		1300		600			1900
	AIPs terminal rooms	2	300	2	300			600
	General tape archiving		500		1000			1500
	Maintenance lab		400		400		200	600
	Parts/comm equip/supplies		300		150			450
Special AC room		300		300			600	
Business	Offices	11	1300	15	1950	5	600	2550
	Files		700		700		700	700
	Warehouse, Equipment rooms		1500		1000		750	1750
	Macines (copies, etc)		200		200		200	200
Electronics, Field	Front End Lab		864		864			1728
	Cryogenics Lab		960				960	0
	Local Osc. and IF Lab		648		960			1608
	Digital Lab		432		864			1296
	Recorder Lab		432					432
	Maser Lab		324					324
	Test System Lab		162		252			414
	Diagnost. and Monitoring Area		288		288			576
Record Keeping and File Area		144		144			288	

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VLBA OPERATIONS BUILDING SPACE REQUIREMENTS

Division	Purpose	VLBA Stand Alone # Area(sq ft)	VLA # Area(sq ft)	VLBA Savings by combined # oper(sq ft)	Total Space for combined oper(sq ft)	
	Offices	12	1800	8	1200	3000
	Shipping and Receiving Area		192			192
	Stock Area		288			288
	Modules to be Repaired Area		48		48	96
	Modules Ready for Use Area *		48		48	96
	Drafting area		360		360	360
	Screened room				130	130
Antennas	Drafting Area		48			48
	Office		150			150
	Antenna Servo/Electrical		648		648	0
	Antenna Mechanical		864		864	0
	Machine Shop		960		960	0
Overhead (hallways, washrooms, etc)			6417		4412	1458
Total			38502		26470	8750
						56221

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Table III

WORK LOAD OF ANTENNA SITE TECHNICIANS

Equipment/Area	Work Description	Rate	Hours Per Year	Days Per Year
Antennas	Monthly inspection	4 hrs/mo	48	6.0
	Quarterly maintenance	16 hrs/3mo	64	8.0
	Semi-yearly maintenance	38 hrs/6mo	76	9.5
	Yearly inspection	58 hrs/yr	58	7.3
	Servo main./semi-annual	12 hrs/6mo	24	3.0
	Unscheduled repair/replacement	92 hrs/yr	92	11.5
Electronics	Prev. maintenance	4 hrs/wk	208	26.0
	Module replacement	16 hrs/wk	832	104.0
	Systems tests	18 hrs/mo	216	27.0
Computers	Preventative main.	2 hrs/wk	104	13.0
	Repairs, diagnostics	8 hrs/mo	96	12.0
Supervisory	Schedule, procure part time assistance	16 hrs/mo	192	24.0
	Keep track of module, tape and other shipments	3 hrs/wk	156	19.5
Tape Handling	Unpack/pack tapes and record information	1.5 hrs/day	540	67.5
Buisness	Travel for module and other equip. deliveries (tapes?)	14 hr/wk	728	91.0
	Janitorial duties	2.5 hrs/wk	130	16.3
Total			3564	445.5

Final manpower requirements: 1.9 employees.

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SPECIAL REQUIREMENTS
FOR THE
VLBA OPERATIONS CENTER

- (A) Each room will have terminal or Ether-Net outlets installed in addition to telephone jacks.
- (B) The building will have moveable walls so that the interior can be redesigned when the VLBA needs change with time.
- (C) The array control room will have a special arrangement with respect to the computer rooms such that access to necessary tape drives is made easy. The same will hold true for the correlator control room.
- (D) The appropriate rooms will be screened in a Faraday cage.
- (E) The Air conditioning, heating and humidity requirements will be controlled closely for the computers and special hardware.
- (F) There should be an easy access cable trough system installed.
- (G) The tape storage areas should have temperature, humidity and clean air controls.
- (F) Special safety requirements.
- (G) The building should be designed such that it can be expanded easily to accomodate (a) the combined VLA/VLBA operations and (b) possible inclusion of the mm array operations in the future.

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Table 5

Manpower Acquisition Plan for VLBA Operations

Division	Personnel Category	Final Level	1985	1986	1987	1988	1989	Final Total
Electronic	Head	1	1					1
	System Technician	1		1				1
	Cryogenic Grp Ldr	1	1					1
	Cryogenic Tech	3		1	1	1		3
	Low Noise Rcvr Grp Ldr							0
	Low Noise Rcvr Engr	1		1				1
	Low Noise Rcvr Tech	2		1	1			2
	IF/LO Grp Ldr							0
	IF/LO Engr	1		1				1
	IF/LO Tech	2		1	1			2
	Digital Grp Ldr							0
	Digital Engr	1	1					1
	Digital Tech	2	1	1				2
	Correlator Engr	1		1				1
	Correlator Tech	2			2			2
	Recorder Engr	1		1				1
	Recorder Tech	4		2	1	1		4
	Field Grp Ldr	1	1					1
	Field Tech(at sites)	20	1	3	6	6	4	20
	Waveguide Grp Ldr							0
	Waveguide Tech							0
	Draftsman							0
	Total		44	6	14	12	8	4
E&S/Antennas	Head	1	1					1
	Vehicle Mechanic							0
	Site Electrician							0
	Aircondition,Pluabng							0
	Carpenter							0
	Antenna Mechanic	3		1	2			3
	Antenna Servo Tech	2		1	1			2
	Engineer/Supervisors							0
	Machinist	2	1	1				2
	Draftsman	1	1					1
	Labourer							0

Table 5

Manpower Acquisition Plan for VLBA Operations

Division	Personnel Category	Final Level	1985	1986	1987	1988	1989	Final Total
	Total	9	3	3	3	0	0	9
Array	Head							0
	Chief Array Oper.	1	1					1
	Array Oper.	5		2	2	1		5
	Main. Coord.							0
	Chief Corr. Oper.	1		1				1
	Corr. Oper.	5		1	2	2		5
	Data Analysts	2				2		2
	Total	14	1	4	4	5	0	14
Business	Head	1	1					1
	Sr. Adm. Ass.							0
	Admin. Aide-personnel							0
	Secr. Pool	3	1		2			3
	Recep./Oper.							0
	Libr./Ship Clerk	1		1				1
	Guard/Janitor				1			1
	Janitor	1						0
	Warehouse/Bus							0
	Receiving							0
	Leadman/Shuttle Dr.							0
	Shuttle Driver							0
	Sr. Buyer	1	1					1
	Buyer							0
	Purch. Secr.	1	1					1
	Head Cook							0
	Cook/Housekeeper							0
	Accountant							0
	Bookkeeper	1	1					1
	Fiscal Clerks	2	2					2
	Total	11	7	1	3	0	0	11
Computer	Head	1		1				1
	Ass. Div. Head/Oper. Man.	1				1		1
	Systems Programmers	1	1					1
	Senior Programmers	2		1	1			2
	Programmers	4		1	1	1	1	4
	Engineer							0
	Technician	2.5		1	1	0.5		2.5
	Prog. Libr/Comp. Oper.	2			1	1		2
	Total	13.5	1	4	4	2.5	1	13.5

Table 5

Manpower Acquisition Plan for VLBA Operations

Division	Personnel Category	Final Level	1985	1986	1987	1988	1989	Final Total
Scientific	Director	1	1					1
Services/	Deputy Director	1		1				1
Management	Scientists	5			1	2	2	5
	Systems Scientists	5	1	1	1	1	1	5
	Post Docs	2				1	1	2
	Resident Cust./Sup.							0
	Secretaries	1	1					1
	Total	15	3	2	2	4	4	15
Grand Total		106.5	21	28	28	20.5	9	106.5

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NOTES TO TABLE 5

The schedule for moving into the operations phase is predicated on the assumption that the antennas and array will be partly operated throughout construction. The additional requirement of having personnel fully trained and available for the full operations mode and at least sufficiently trained for the partial operation mode during construction is the second rationale for the proposed schedule.