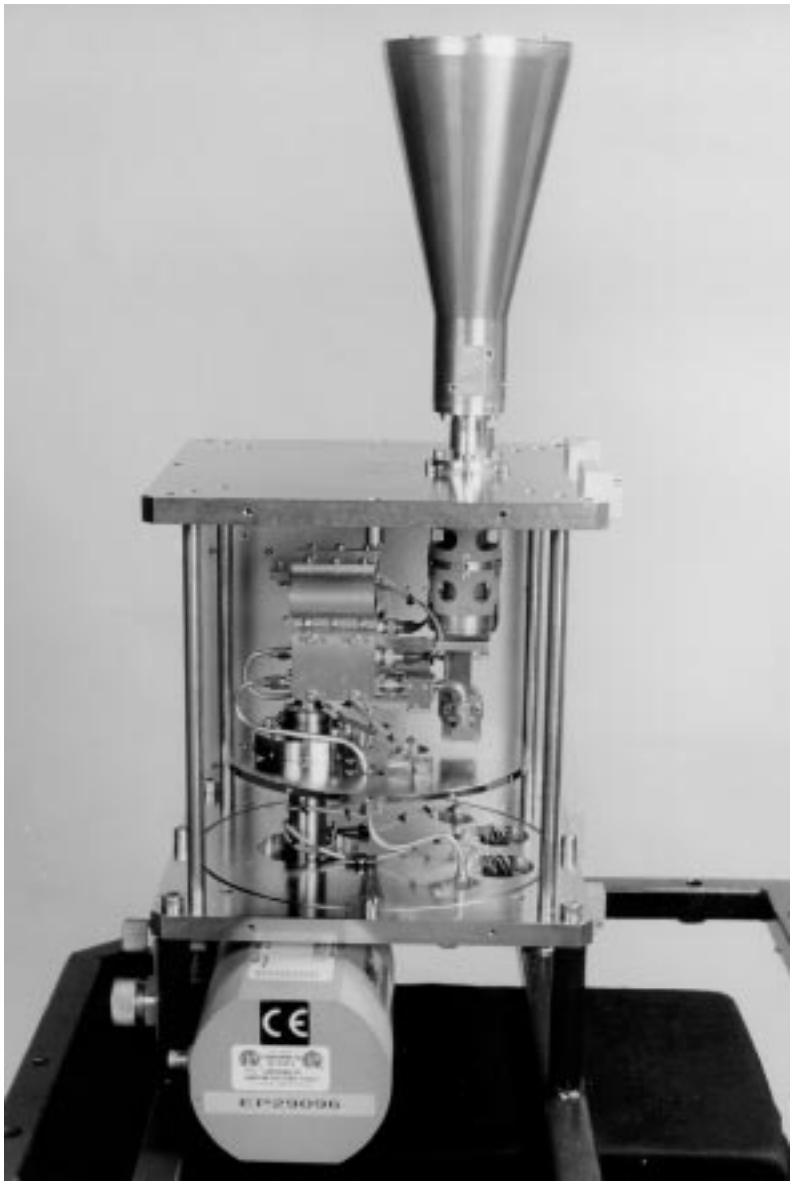
Major National Research Facilities Program

Annual Report by the Australia Telescope National Facility to the Department of Industry, Science and Tourism

Report Number 1, 19 February - 30 June, 1997



Prototype 12 mm (16-26 GHz) receiver built by the ATNF and tested recently at the Mopra radio telescope. The photograph shows the feed horn (top) attached to the open cryogenic dewar assembly. Low-noise amplifiers within the dewar are cooled to about -260° C by the cryogenic refrigerator at the lower left of the picture.

Major National Research Facilities Program

Annual Report by the Australia Telescope National Facility to the Department of Industry, Science and Tourism

Report Number 1, 19 February - 30 June, 1997

Table of Contents

PJHall, 29 August 1997

1. Introduction

This document is the annual report by the CSIRO Australia Telescope National Facility (ATNF) to the Department of Industry, Science and Tourism (acting for the Commonwealth of Australia) covering activities supported under the Major National Research Facilities (MNRF) program. The report covers the period 19 February 1997 to 30 June 1997. It incorporates material supplied by the University of Tasmania, a co-signatory to the MNRF agreement, as well as summaries lodged by recipients of funds paid under an MNRF-supported international astronomy collaboration scheme.

2. Background

The ATNF, together with co-proponents the University of Tasmania and the (then) CSIRO Division of Radiophysics, lodged an initial funding submission under the Major National Research Facilities Program scheme in November 1994. A final proposal by the ATNF and the University of Tasmania was submitted in January 1995. Following notification of the success of the application in January 1996, a contract was signed between the Commonwealth, CSIRO and the University of Tasmania on 19 February 1997. The contract covers three major areas:

- an ATNF upgrade of its Compact Array radio telescope to operate at high frequencies (corresponding to millimetre wavelengths), and an extension of its very long baseline interferometry (VLBI) capabilities;

- a University of Tasmania expansion of its VLBI capabilities at radio observatories in Hobart and Ceduna, and the operation of those observatories as national facilities;

- a program to fund international astronomical collaboration, administered by the ATNF acting on recommendations from the Australian Academy of Science's National Committee for Astronomy.

In addition to the major ATNF upgrades, the contract provides for the funding of two small ATNF strategic research projects, purchase of test equipment by both the ATNF and the University of Tasmania, program definition and project management, and project manpower.

The upgraded ATNF and University of Tasmania telescopes will provide Australian astronomers with important new observational tools with which to view the Universe. The ATCA millimetre-wave capability will permit astronomers, for the first time in the Southern Hemisphere, to image the signature emission from many cosmically abundant molecules active in regions extending from the solar system to the distant universe. Similarly, the VLBI upgrades will allow data from radio telescopes, separated by thousands of kilometres, to be

combined to produce images with a resolution far superior to those from the largest optical telescopes.

Figure 1 is a diagram illustrating the placement of various specific projects and sub-projects in the overall MNRF program. In the next Section, overall program management details are outlined, and subsequent Sections contain reports on the individual projects grouped according to the three major contractual areas outlined above. A financial and asset statement is also included (Section 7). Appendix 1 contains details of the ATNF Steering Committee, and additional information required under the terms of the contract is contained in Appendix 2 (senior personnel) and Appendix 3 (publications). Appendix 4 lists the panel of international experts in the field of millimetre-wave astronomy constituted by the ATNF as a Technical Advisory Committee for its high-frequency upgrade.

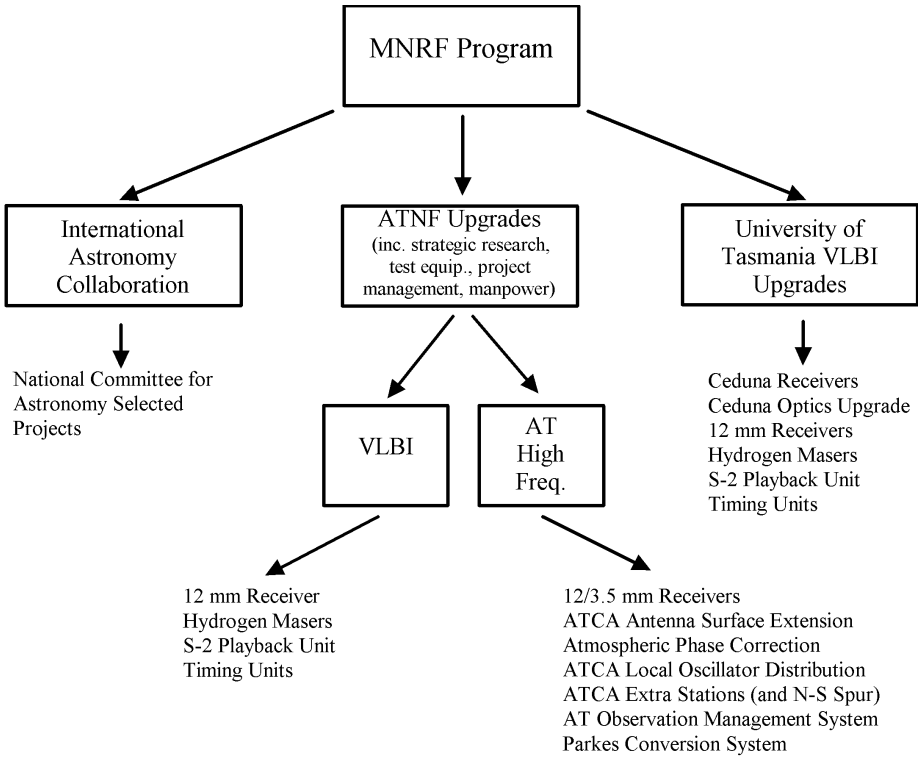


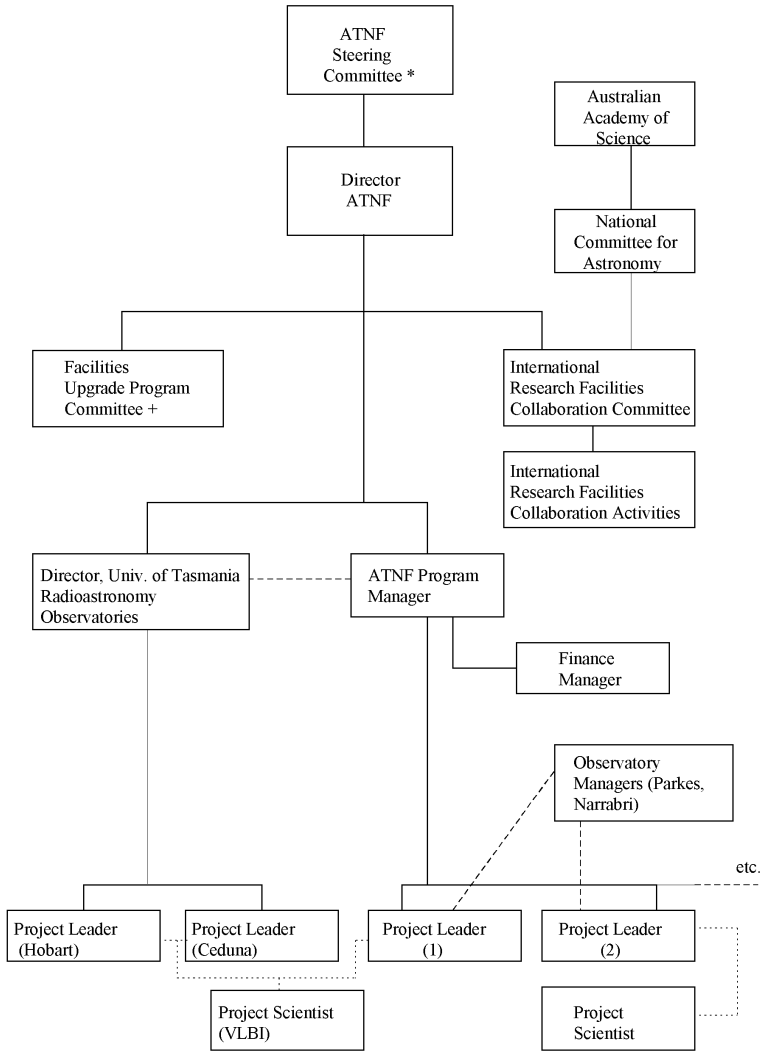
Figure 1 - MNRF Program Structure

3. MNRF Program Management

Figure 2, extracted from the MNRF upgrade contract, shows the overall structure of MNRF Program. The ATNF Steering Committee (Appendix 1) is the principal policy body advising the ATNF Director. It is an independent body appointed by the Minister responsible for CSIRO. Annex 3.1 to the MNRF-upgrade contract details the operation of the Committee in terms of its role in overseeing ATNF operation and reporting to the CSIRO Executive and Minister for Science. In the MNRF context, the Steering Committee has no direct management function but is responsible for Program guidance and annual report submission. At its meeting of 8 April 1997, the Steering Committee accepted these roles and established a

sub-committee (Appendix 1) with responsibility for commenting on annual reports outlining MNRF Program progress and expenditure. The Committee further recommended that draft reports be distributed to all its members, endorsed the formation of a Technical Advisory Committee for the ATNF high-frequency upgrade, and accepted the ATNF Director's recommendation that the upgrade encompass 12/3.5 mm band operation (rather than the 12/7 mm band operation discussed previously) with an upper frequency limit of 100 GHz.

Schedule 5 of the MNRF-upgrade contract details the operation of two working committees, the Facilities Upgrade Program Committee and the International Research and Collaborations Committee. In addition, the Schedule specifies the responsibilities of the Program Manager and executive staff. Committee members and senior program personnel are listed in Appendix 2.



* During the Upgrade period, the University of Tasmania has a representative on the Steering Committee.

\+ The Director, University of Tasmania Radioastronomy Observatories, is a member of this Committee.

Figure 2 - MNRF Program Management and Overall Structure

Figure 3 shows the MNRF-upgrade management in more detail; note that the ATNF Director is also the MNRF Program Director. For a complete list of senior personnel, refer to Appendix 2.

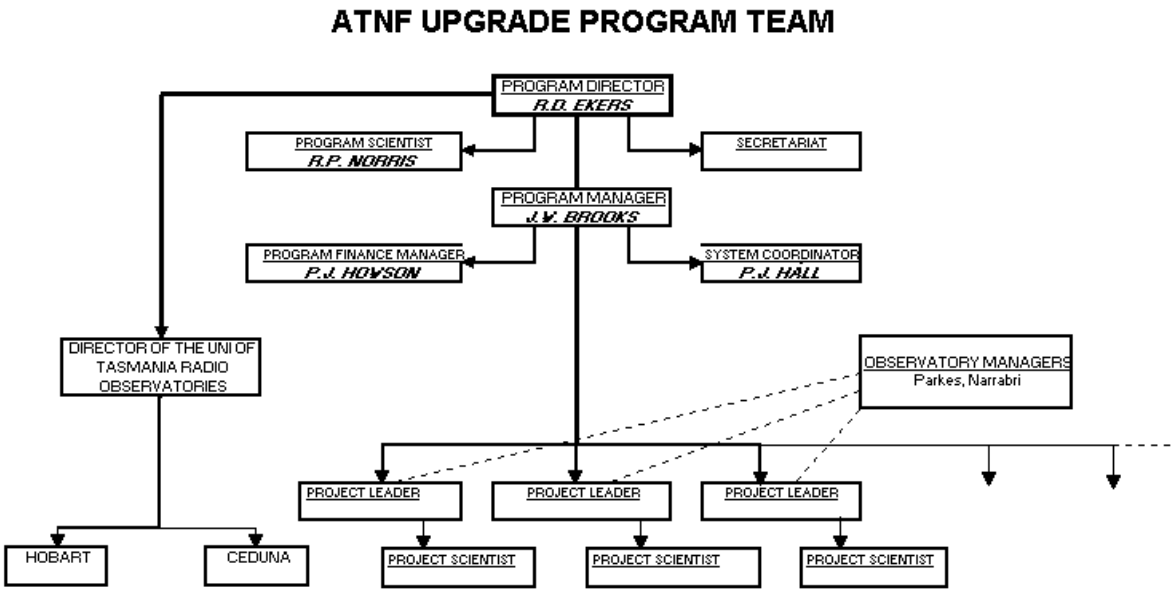


Figure 3 - MNRF Executive and Program Structure

4. International Astronomy Collaboration

The MNRF Program funding included an allocation of $1.26M to enhance international collaboration by Australian astronomers. A call for proposals was made in November 1996 and, at a preliminary review meeting of the National Committee for Astronomy held in December 1996, sixteen proposals were reviewed. The Committee ranked the proposals in terms of relevance to MNRF international collaboration goals and scientific merit, deciding at its meeting in February 1997 to fund ten projects, to reserve funds for certain applicants, and to retain some funds for future allocation. An overview of the funding arrangements is contained in the attached financial report (Section 7). Recipients of funds have been made aware of MNRF reporting obligations and, although many projects are still in very early stages, the following information has been received by the ATNF as at 12 August, 1997. Future annual reports will contain details of all projects supported.

(i) A Joint ESO/Australia Workshop "Looking Deep in the Southern Sky"
Proposers: R. Morganti and E. Sadler
The workshop will be held in Sydney from 10-12 December, 1997. Astronomers from Australia and overseas will discuss the impact on extragalactic astronomy of new radio and optical instrumentation soon to be available in the Southern Hemisphere. The forum will provide a focus for initiating co-ordinated projects between optical and radio astronomers. MNRF funding is being used to support travel to Australia by several key international

participants. Workshop preparations are well under way and updates are available on the World Wide Web at <http://www.atnf.csiro.au/~rmorgant/workshop/> .

(ii) The One-Kilometre-Square Telescope (1kT)
Proposer: B. MacA. Thomas
This project is being supported by both the ATNF and the MNRF International Astronomy Collaboration. The MNRF International Astronomy Collaboration funding is providing the salary (but not all overheads) for a Post-Doctoral Research Fellow. The position has been advertised and 12 applications received; two applicants were outstanding and are currently being assessed further. It is expected that the successful applicant will begin duty in early 1998. On the advice of the National Committee for Astronomy, the ATNF applied to DIST for travel funds to support an international 1 kT workshop to be held in Sydney from 15-18 December 1997. The submission, made under the Bilateral Science and Technology Program, has been approved in principle, with final approval to follow the submission of detailed support requirements.

(iii) Studies of the Highest Energy Particles in Nature
Proposer: R. W. Clay
MNRF funds have been used to cover partly the costs involved in R. W. Clay's attending the May 1997 Project Auger Collaboration Board Meeting (which included a scientific gathering) in Utah. Attendance at these meetings allows Australia to maintain a high profile in the Auger high-energy cosmic-ray observatory project for a very modest cost. As a consequence of the involvement to date, Clay and colleagues have influenced significantly the project direction, principally through their leadership in the design of the fluorescence detection system and, recently, their proposals for atmospheric monitoring.

(iv) X-ray Observatory - CANGAROO Project
Proposer: J. Patterson
The Australian - Japanese CANGAROO project, located at Woomera, studies the most energetic objects in the universe and aims to contribute to the understanding of the origin and acceleration mechanisms of cosmic rays. Two telescopes are presently used, and the University of Adelaide collaborates with 11 Japanese universities. At present, 25 overseas scientists and five Australian researchers are involved. The Japanese Government has announced funding for a new $3M telescope, and it is clear that the collaboration, which the MNRF allocation is supporting, is flourishing.

(v) Australia - Japan Collaborative Workshops
Proposer: M. Bessell
This project will facilitate contact and collaboration between Australian and Japanese astronomers, initially using Australian telescopes. The longer-term objective is to foster observing and instrumentation collaboration on larger telescopes. So far, informal discussions have been held with senior Japanese astronomers, and the intention is to schedule a visit to Australia by a Japanese team in late 1997 or early 1998. The team would visit a number of major optical and radio observatories, as well as discuss collaborative programs with Australian counterparts.

5. ATNF Upgrades and Extensions

The main ATNF contract activities - the high-frequency and VLBI upgrades - are described in some detail in the sub-sections below. In other contract technical activities, the ATNF has begun two smaller projects, drawing on the strategic research funding made under the terms of the MNRF contract. An array-technology project addressing the needs of the next-generation large radio telescope (the 1 kT) has been described in Section 4(ii). A second strategic project, dealing with radio-frequency interference and associated mitigation techniques, has just begun. Initial collaborators are from the University of Technology (Sydney) and the National Radio Astronomy Observatory (USA).

In infrastructure support areas, engineering test equipment needs have been identified and larger items will be ordered in the current financial year. MNRF allocations for project management and manpower will continue to supplement ATNF contributions in areas such as travel for specialist advisors, interaction of project leaders with international counterparts, and retention or engagement of specialist engineering and technical staff.

(a) High-Frequency Upgrade

The aim of this upgrade is to extend the operating frequency of the Australia Telescope Compact Array (ATCA) at Narrabri to cover the 12 mm (16-26 GHz) and 3.5 mm (85-95 GHz) bands; the band-edge frequencies are yet to be defined precisely, being dependent on the performance achieved in prototype systems. As well as the ATCA work, the project will provide a new frequency-conversion system for the 64 m radio telescope at Parkes, enhancing its high frequency observing performance and versatility. Progress reports on individual sub-projects are given below.

(i) 12/3.5 mm Receivers

A prototype 12 mm receiver has been built and installed on the Australia Telescope's 22 m Mopra antenna near Coonabarabran, a very similar antenna to those of the ATCA. The Project Leader has recently returned from overseas where he investigated the latest developments in high-frequency passive-device technology and low-noise amplifier design. A preliminary design for an ATNF multiband receiver package will be refined over the next six months and 3.5 mm receiver prototyping will begin in early 1998. In initial infrastructure work, an electroforming facility for the precision fabrication of mm-wave passive devices is currently being constructed.

(ii) ATCA Antenna Surface Extension

Extending the precision solid surfaces of five ATCA antennas from 15 m to the full 22 m diameter is in a preliminary stage. The ATNF is currently negotiating a contract with Connell Wagner P/L, the Sydney consulting engineers involved in constructing the original ATCA, to supervise the tendering and panel manufacturing processes. Panels will be fabricated by Australian companies, probably using technology developed during the ATCA construction and since transferred to industry. To allow timely asssessment of the effect of the new panels on antenna pointing, wind loading, and deformation, a customized antenna control computer will shortly be installed in one antenna.

(iii) Atmospheric Phase Correction
A prototype, high-stability, 225 GHz water-vapour radiometer has been completed and a new series of atmospheric measurements will begin shortly at Narrabri. The use of 22 GHz water line radiometers may offer some advantages over the originally proposed 225 GHz continuum radiometer system. The ATNF is assessing this rapidly changing area of radio science and expects to decide on a phase-correction strategy by the beginning of 1998. As an adjunct to any radiometric correction, fast position switching of the antennas will be an important component in the final phase-correction scheme.

(iv) ATCA Local Oscillator Distribution Upgrade
A preliminary design using a "star" distribution topology and single-mode optical-fibre transmission media has been produced. Following a staff change, a new Project Leader has been appointed who will provide much-needed impetus to this project. Installation and termination of fibres will be done by Australian companies; the installation timescale will be determined largely by the test and operational requirements of new ATCA stations on the east-west track and north-south spur (see below).

(v) Extra Stations on the ATCA 3 km East-West Track
Tenders will be called for the civil and mechanical aspects of this project within the next few months. Current estimates are that this portion of the upgrade could be completed within 18 months.

CSIRO has provided an additional $1.1M in capital funds for the construction of a short (about 150 m) north-south spur connected to the existing east-west track. Construction of the spur will be done concurrently with the E-W track upgrade. All site works will be integrated with the ATCA four-monthly observing schedules to minimise disruption of the National Facility radio astronomy program. Connell Wagner P/L are acting for the ATNF in specifiying works, co-ordinating tendering and, ultimately, supervising site works. All civil and associated works will be undertaken by local firms.

(vi) AT Observation Management System (ATOMS)
Two software engineers will be appointed shortly to assist in the design of new observing systems. Object-oriented software techniques will be used in these designs and, as a demonstration of the methodology, new ATCA and Mopra antenna-control computers will be delivered by mid-1999. As part of the project, a substantial collaboration has been forged with Monash University to develop software design and implementation methodologies for research environments.

(vii) Parkes Conversion System
All design work is complete and component orders will be placed within a month. The project will be finished by July 1998, increasing considerably the versatility and performance of the Parkes telescope for many observations. Significantly, the new system will ensure that the Telescope will be much more compatible with new-generation equipment and observing techniques developed as part of the remainder of the MNRF program.

(b) ATNF VLBI Upgrade

This upgrade will allow ATNF telescopes to participate in Australian and international VLBI experiments at short wavelengths. In particular, VLBI experiments using an orbiting radio telescope (the Japanese VSOP spacecraft) will begin in the second half of 1997. The purchase of new frequency and time standards is a major part of the upgrade and, for reasons of economy and standardization, some orders have also been placed on behalf of the University of Tasmania. The ATNF is responsible for correlating (combining) VLBI data recorded at all seven Australian telescopes (Narrabri, Mopra, Parkes, Tidbinbilla, Hobart, Ceduna and Perth) equipped with S-2 standard equipment. An additional S-2 playback unit, to be added to the ATNF VLBI correlator, will substantially enhance its processing capability.

(i) 12 mm (22 GHz) Receiver
As reported in the previous Section, the ATNF has built and tested a prototype 12 mm receiver. System performance on the Mopra antenna is outstanding (system temperature < 60 Kelvin) and the measured telescope aperture efficiency is around 65%. A final version of the receiver will remain at Mopra and will be used in ground and satellite VLBI experiments. Two similar units will be assembled by the University of Tasmania for use at its Hobart and Ceduna observatories.

(ii) Hydrogen-Maser Frequency Standards
The ATNF has placed orders with Vremya-CH Ltd in Russia for three hydrogen-maser frequency standards (one ATNF, two University of Tasmania). The specifications of the units are excellent and the price ($150K each) is very competitive internationally. Some difficulty is being experienced with Russian ordering processes, but delivery is now expected by November 1997.

(iii) S-2 Playback Unit
An order will be placed with the Canadian supplier of this unit by the end of 1997. On past experience, a delivery lead time of six to nine months is anticipated.

(iv) Timing Units
The seven required personal computers (five ATNF, two University of Tasmania) have been purchased, and the relevant control and data acquisition software written. The associated global positioning system (GPS) receivers and PC integration kits will be purchased within the next few months.

6. University of Tasmania VLBI Expansion

The University of Tasmania acquired the 30 m antenna at Ceduna in South Australia from Telstra in October 1995 with the intention of developing it into a radio astronomy facility able to be used either as a stand-alone instrument or as part of an Australian and international VLBI array. With considerable assistance from the ATNF, the facilities at Ceduna have been extensively modified and upgraded. Mains power has been connected to the site and new drive motors, gearboxes and controllers have been installed on the antenna. The cable twister has been modified to allow for more than 360° rotation in azimuth and new receiving-system electronics have been installed. The position encoding electronics have been modified to provide readouts accurate enough for radio astronomy use, and the computer control software written for the Hobart antenna has been modified and installed at Ceduna. The first stand-alone radio astronomy tests were made (at 6.7 GHz) on 8 March this year and were followed a few days later by the first VLBI observations between Ceduna and Hobart. Since that time modification and upgrade work has continued, and an official opening of the site as a radio astronomy observatory is planned for October 1997.

(i) Ceduna Receivers
Preliminary design work on a range of low noise amplifiers is in progress, with construction of some prototypes due to begin soon.

(ii) 12 mm Receivers
No work has been done on this project pending completion of design studies at the ATNF.

(iii) Hydrogen Masers
See Section 5b (ii) for details of the joint ATNF - University of Tasmania order. The two units purchased by the University of Tasmania will be installed initially at Ceduna and Mopra.

(iv) Timing Units
See section 5b*(iv)* for the status of this project.

(v) Ceduna Antenna Optics
Considerable progress has been made towards upgrading the antenna optics at Ceduna. A new section of feed horn was designed by the ATNF to cover the frequency range from 4.7 - 6.8 GHz. A scaled version of this horn was manufactured and tested by CSIRO and a full-scale horn was subsequently built in the Physics Department workshops of the University of Tasmania. This horn was tested at CSIRO, installed at Ceduna, and used for the first radio astronomy observations. Two additional horns covering the ranges 8.2 - 9.0 GHz and 2.2 - 4.4 GHz have been designed by the ATNF; construction will begin soon at the University of Tasmania. A preliminary feed design for the range 1.6 - 1.8 GHz has revealed significant difficulties, and alternatives such as a prime focus feed are now being investigated.

Two surveys of the structure of the Ceduna antenna have been conducted by ATNF staff. The first was a tape and theodolite survey of the surface of the dish which showed that, while there were considerable departures from the ideal shape (3 mm rms error), the dish was useable in its current state to frequencies of about 8 GHz. The second survey investigated the

stability of the backing structure and sub-reflector at a range of elevation angles. The results were extremely encouraging, indicating that, with appropriate panel adjustments, the dish is capable of giving good performance at 22 GHz. Plans are under way to make the panel adjustments during the summer.

7. MNRF Financial Statements

Table 7-1 summarizes the overall MNRF financial situation as at 30 June 1997. This initial summary is a basic one; future annual reports will contain audited statements and asset register overviews.

Table 7-2 is a summary of international astronomy collaboration projects funded under the MNRF program. Note that, of the original $1260k allocated to the fund, $260k has been reserved for distribution in future proposal calls. Table 7-3 shows a further breakdown of MNRF overseas travel payments, including those payments designed to foster on-going collaboration between Australian researchers and the European Southern Observatory (ESO).

Table 7-1 Program Financial Summary as at 30 June 1997

Projects	Provision	Exp to 30/6/96	Exp 1/7/96 to 30/6/97	Liabilities	Balance
AT High Frequency Upgrade					
12/3.5 mm ATCA receivers	2,860,000		20,960	58,354	2,780,686
Atmospheric phase correction	160,000		23,925		136,075
ATCA antenna surface extension	910,000		350		909,650
3.5 new E-W stations for ATCA	440,000		10,192		429,808
ATCA local oscillator upgrade	750,000				750,000
ATOMS	200,000				200,000
Parkes conversion system	230,000		114,099	1,412	114,489
AT VLBI Ugrade					
12 mm receiver for VLBI	200,000		35,272	2,334	162,394
Other VLBI improvements	336,000	4,257	16,150	148,215	167,378
Strategic Research					
Array technology	150,000		9,269		140,731
Interference excision/mitigation	50,000			3,503	46,497
Project Management					
Infrastructure	300,000	30,188	45,390	71	224,351
Test Equipment	400,000		73,880	5,348	320,772
Manpower	1,250,000	151,267	186,495		912,238
Payments to University of Tasmania	1,504,000		414,000		1,090,000
International Astronomy Collaboration	1,260,000	4,960	247,696		1,007,344
TOTAL	**11,000,000**	**190,672**	**1,197,678**	**219,237**	**9,420,978**

(all amounts in Australian dollars)

Table 7-2 International Collaboration Projects - Summary as at 30 June 1997

Proposer	Proposal	Project Id.	Requested	Committed	Reserved	Comments	Payment Details
R Morganti (ATNF); E Sadler (U. Syd.)	A Joint ESO/Australia Workshop "Looking Deep in the Southern Sky"	1AA	$20K	$15K		Dec. '97 - 100% travel support for invited workshop speakers.	
B MacThomas (ATNF)	The One Kilometre Square Telescope (1kT)	2AA	$191.8K	$87K	$45K	2 + 1 year post-doc position ATNF payroll, salary overheads from Strategic Research project.	
R W Clay (U. Adel.)	Studies of the Highest Energy Particles in Nature	3AA	$198K	$6K	$24K	Travel support grant.	$6,000 Paid 30/4/97
LE Allen, JW Storey et al (UNSW); MA Dopita, JR Mould (MSSSO)	SPIRIT 'The South Pole Infrared Imaging Telescope' - NOAO/CARA collaboration	4AA	$255K	$225K		Progress payments to Univ. of NSW.	$151,661 Paid 26/6/97 (for Apr - Nov 97)
J Patterson (U. Adel.)	X-ray Observatory - CANGAROO Project	5AA	$90.5K	$30K		Seed money for Japanese collaboration.	
JB Whiteoak (ATNF)	Phase 2 Activities of European Large Southern Array (LSA) Project	6AA	$100K		$100K	On hold awaiting further developments.	
K Taylor (AAO); M Colless (MSSSO)	Australis Phase A Study	7AA	$400K		$320K		
K Nugent, R Webster (U. Melb.)	LOBSTER X-ray Satellite Project	8AA	$141K	$58K		Salary Res. Fellow + travel. Pay quarterly on invoice.	$58,000 Paid 26/6/97
M Bessell (MSSSO)	Australia-Japan Collaborative Workshops	9AA	$115K		$20K	Seed money for Japanese collaboration.	
DL Jauncey (ATNF)	VLBI Exploration of Radio Astrometry, (VERA)		$255K			Information requested was received after 21 February 1997 meeting. No decision.	
	Travel related to international collaboration; miscellaneous; establishment costs	AAA		$50K	$20K	Direct reimbursements from ATNF. See Table 7-3.	$36,994.51
TOTALS:			**$1752.6K**	**$471K**	**$529K**		**$267,655.51 Paid**

Total Committment { $471K
{$529K

Unallocated $260K

Total Budget $1260K

Table 7-3 International Collaboration Funding - Overseas Travel

Name	Institution	Travel Dates	Destination	Purpose	MNRF Contribution	Date Paid
Prof J Davis	University of Sydney	11/2/96 - 18/2/96	Munich, Germany	ESO/VLTI neg.	$2501.96	3/4/96
Dr W J Tango	University of Sydney	11/2/96 - 18/2/96	Munich, Germany	ESO/VLTI neg.	$2454.78	3/4/96
Dr M Colless	MSSSO, Australian National University	26/3/96 & 30/3/96 - 29/3/96 - 4/4/96	Bangalore & Munich	Receive ASI medal, present medal lecture. Attend Australis mid-study rev., ESO workshop.	$1852.00	10/6/96
Dr K Taylor	Anglo-Australian Observatory	26/3/96- 5/4/96	Munich, Germany	Attend Australis mid-study rev., ESO design study.	$2467.60	9/1/97
Prof J R Mould	Australian National University	1/4/96 - 4/4/96	Munich, Germany	ESO neg.	$2500.00	28/2/96
Dr K Taylor	Anglo-Australian Observatory	30/4/96 - 4/5/96	Munich, Germany	Attend Australis mid-study rev., ESO design study.	$3848.29	31/7/96
Mr J Van Harmelen	MSSSO, Australian National University	26/5/96 - 4/7/96	Landskrona Sweden, Munich Germany, Zurich Switzerland, USA	Attend SPIE/ESO symp.; visit ESO, Philips Semicon., Lick Observ., Gemini Project.	$3300.00	10/6/96
Dr R P Norris	ATNF	19/8/96	Pusan, Korea	Attend 7th Asian-Pacific Regional IAU Meeting	$1000	1/9/96

Table 7-3 (continued)

Prof R Ekers	ATNF	28/8/96 - 6/9/96	Lille, France, Leiden, NL	ESO/SEST, ESO/VLBI issues.	$1000.00	4/11/96
Dr G S Da Costa	MSSSO, Australian National University	28/10/96 - 4/11/96	Tucson, Arizona	Visit Gemini Program Office.	$2767.80	27/11/96
Dr T R Bedding	University of Sydney	8/11/96 -10/11/96	San Francisco/El Paso	Attend Hobby Eberly Telescope Board Meeting.	$2727.39	10/12/96
Prof J R Mould	MSSSO, Australian National University	12/11/96 -12/12/96	Pasadena, Munich, Pasadena	Discussions with ESO re Australis & VLTI.	$1750.00	Unpaid
Dr K Taylor	Anglo-Australian Observatory	13/1/97 - 25/1/97	Groningen, Leiden, NL, Abingdon, Cambridge UK & Munich, Germany	Attend Gemini Instrumentation Workshop. Australis issues.	$5465.21	19/5/97

Appendix 1 - ATNF Steering Committee Membership, 1997

CHAIRMAN
*__Dr R Webster__, University of Melbourne

Deputy Chair
Prof D B Melrose, Director, Research Centre for Theoretical Astrophysics

MEMBERS
Ex-officio
Prof R D Ekers, Director, CSIRO Australia Telescope National Facility
Dr B Boyle, Director, Anglo-Australian Observatory
Dr D N Cooper, Chief, CSIRO Telecommunications & Industrial Physics
Dr R H Frater, Deputy CEO, CSIRO
Prof P A Hamilton, Pro-Vice-Chancellor (Research), University of Tasmania

Astronomers
Dr R M Price, Officer-in-Charge, Parkes Observatory, CSIRO ATNF
***Prof J R Mould**, Director, Mt Stromlo and Siding Spring Observatories
Prof J W V Storey, University of New South Wales

International Advisors
Dr J Bergeron, European Southern Observatory, Munich, Germany
Prof J Welch, Director, Hat Creek Observatory, University of California, USA
Prof H Hirabayashi, Professor of Deep Space Communication & Research, Institute of Space and Astronautical Science, Japan

Industry
***Dr P Scaife,** Chief Environmental Scientist, BHP
Dr J O'Sullivan, Director of Technology, News Limited

* Denotes membership of the sub-committee responsible for MNRF Program annual reports.

Appendix 2 - Senior MNRF Program Personnel

Facilities Upgrade Program Committee

Prof R D Ekers, ATNF Director
Mr J W Brooks, ATNF Program Manager
Prof P M McCulloch, Director, Univ. of Tasmania Radio Astronomy Observatories
Dr R P Norris, Program Scientist
Mr P J Howson, ATNF Divisional Secretary and Finance Manager

International Research Facilities Collaboration Committee

Prof R D Ekers, ATNF Director
Mr P J Howson, ATNF Divisional Secretary
Prof J Mould, Chairman, National Committee for Astronomy
Dr E Sadler, Astronomy Community Representative (NCA appointee)

Table A2-1 MNRF Program (Executive)

Executive Position	Officer
Program Director	Prof R D Ekers (Director, ATNF)
Program Manager	Mr J W Brooks (Assistant Director and Engineering Manager, ATNF)
Program Scientist	Dr R P Norris (ATNF Group Leader, Astrophysics and Computing)
System Co-ordinator	Dr P J Hall (ATNF Principal Research Scientist)
Program Finance Manager	Mr P J Howson (ATNF Divisional Secretary)

Table A2-2 ATNF Projects (Senior Personnel)

Project	Project Leader	Project Scientist(s)
12/3.5 mm ATCA Receivers	Mr M Sinclair	Dr R Manchester (12 mm) Dr B Koribalski [1] (3.5 mm)
ATCA Antenna Surface Extension	Dr M Kesteven	Dr B Thomas
Atmospheric Phase Correction	Dr P Hall	Dr R Sault Dr M Wieringa Mr G Carrad [2]
ATCA Local Oscillator Distribution Upgrade	Mr R Beresford [3] Dr W Wilson [4]	Dr J Higdon
ATCA Extra Stations	Mr J Brooks	Dr J Caswell
AT Observation Management System	Dr D McConnell [5] Mr D Loone [6]	Dr W Brouw
Parkes Conversion System	Mr G Moorey	Dr J Caswell
VLBI 12 mm Receiver	Mr M Sinclair	Dr D Jauncey
VLBI, Other Projects	Dr W Wilson	Dr J Reynolds

Table A2-2 Notes

1. The 3.5 mm Receiver project has special status and has a science team consisting of L. Allen (UNSW), P. Hall, B. Koribalski (chair), R. Norris, P. te Lintel Hekkert and J. Whiteoak.
2. G. Carrad is the Project Engineer.
3. Until May, 1997.
4. From May, 1997.
5. Until June, 1997.
6. From June, 1997.

University of Tasmania Projects (Senior Personnel)

The management of all University of Tasmania projects is undertaken by Prof P. M. McCulloch, Director, University of Tasmania Radio Astronomy Observatories.

Appendix 3 - Publications

Web Site

The ATNF has established a World Wide Web site describing the MNRF project and its progress. The site URL is <http://www.atnf.csiro.au/mnrf/mnrf.html>.

Publications

The first months of the MNRF Program have resulted in the following publications.

1. Hall, P. J. and Brooks, J. W., The Australia Telescope Millimetre-Wave Upgrade, in "Millimeter and Submillimeter Astronomy at 10 Milli-Arcseconds Resolution", Proc. Japan - US joint workshop (Tokyo), NRO Report No. 430, 1997.
2. Abbott, D. A. and Hall, P. J., A Stable Millimetre-Wave Water Vapour Radiometer, submitted to JEEEA.
3. Hall, P. J., Brooks, J. W., Sinclair, M. W., Wilson, W. E. and Kesteven, M. J., The Australia Telescope Millimetre-Wave Upgrade, submitted to Proc. Workshop on Applications of Radio Science (Aust.), 1997.
4. Thomas, B. M., Hall, P. J. and Brooks, J. W., The Australia Telescope Large-Array Research Project, submitted to Proc. Workshop on Applications of Radio Science (Aust.), 1997.

Appendix 4 - ATNF Technical Advisory Committee

To ensure that the ATCA millimetre-wave upgrade proceeds according to best international science and engineering practice, the ATNF has established a Technical Advisory Committee comprising four radio scientists and astronomers recognized internationally for their expertise in the field of millimetre-wave astronomy. The Committee will meet once each year. The 1997-98 Committee members are:

Dr Peter Napier, National Radio Astronomy Observatory (USA), Project Manager for the US Millimeter Array, expert in antenna engineering and optics;

Dr Rachel Padman, Assistant Director of Research, Department of Physics, University of Cambridge, expert in millimetre-wave receiver design, observing techniques and astronomy;

Dr Alan Young, Portfolio Manager, Mobile Systems and Networks, CSIRO Telecommunications and Industrial Physics, expert in electronics and signal distribution;

Dr Nick Whyborn, Space Research Office of The Netherlands, expert in millimetre-wave receiver design and antenna optics.

For the first Committee meeting (scheduled for September 1997), Dr Whyborn will be unavailable and will be replaced by Dr Stephane Guilloteau, Institut de Radioastronomie Millimetrique (France), an expert in millimetre-wave aperture synthesis, system and software design, array operations, and astronomy.