

A Possible L-band Receiver for ROT-54

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CSIRO Astronomy and Space Science
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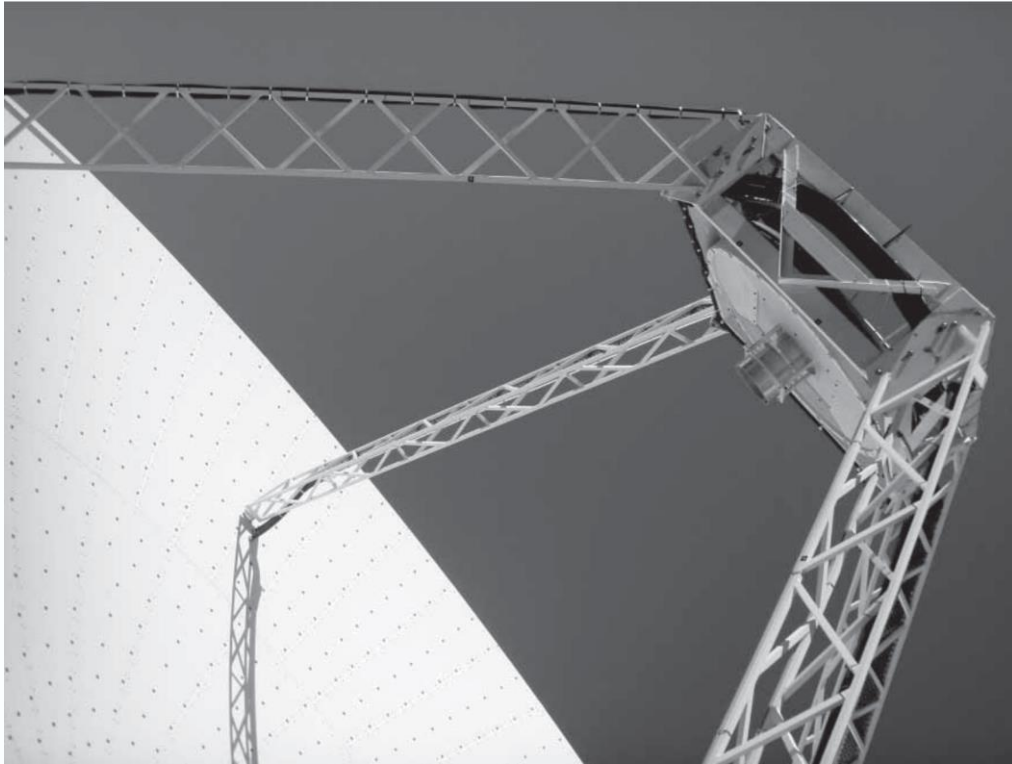


ex-NTD receivers in 2009

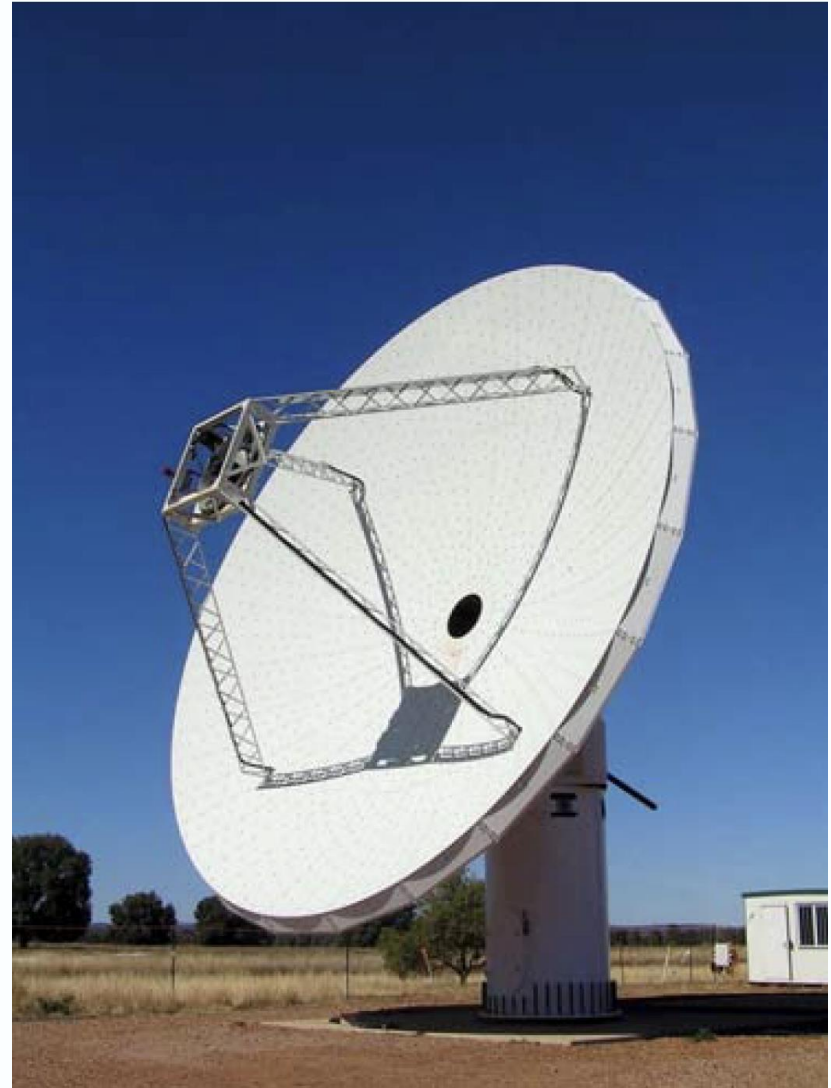


Two uncooled, L-band receivers were constructed and mounted on two antennas at the ATNF Headquarters, Sydney, for the extended New Technology Demonstrator (ex-NTD) of the Australian SKA project

ex-NTD receiver at Parkes in 2009



Following the initial tests, one of the ex-NTD receivers was mounted on the Parkes 12m test bed antenna (Patriot Antenna Systems)



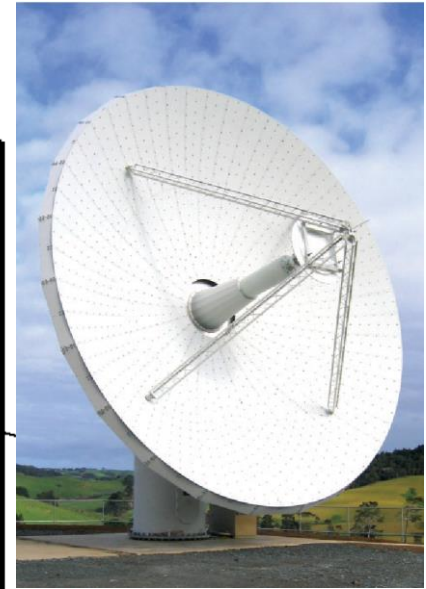
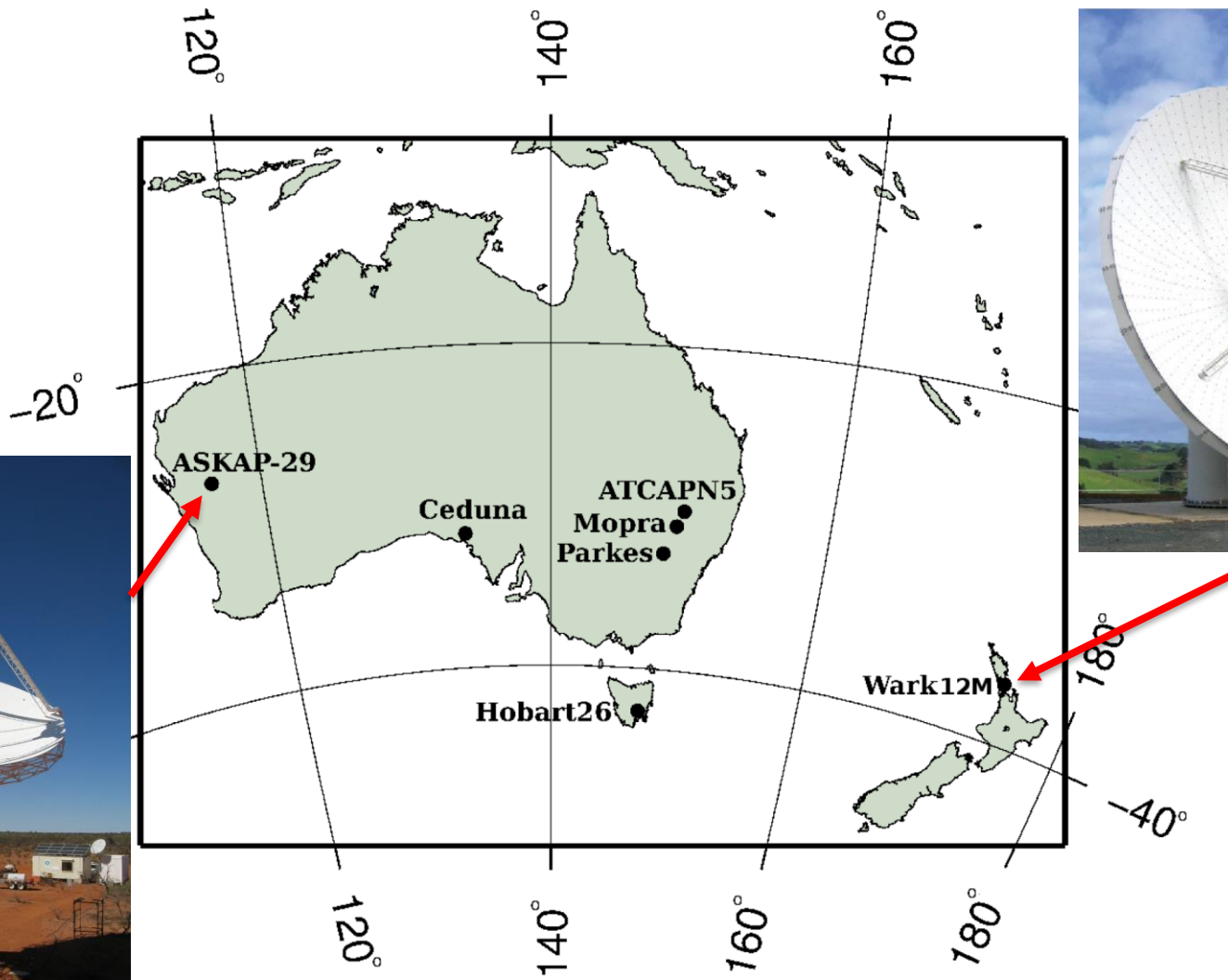
Upgrades of the ex-NTD receivers

In 2010, the two ex-NTD receivers were used for VLBI experiments. One of these was upgraded with a new feed and was mounted on the ASKAP antenna #29. The second receiver was sent to New Zealand to be mounted on the Warkworth Observatory's 12m Patriot antenna.

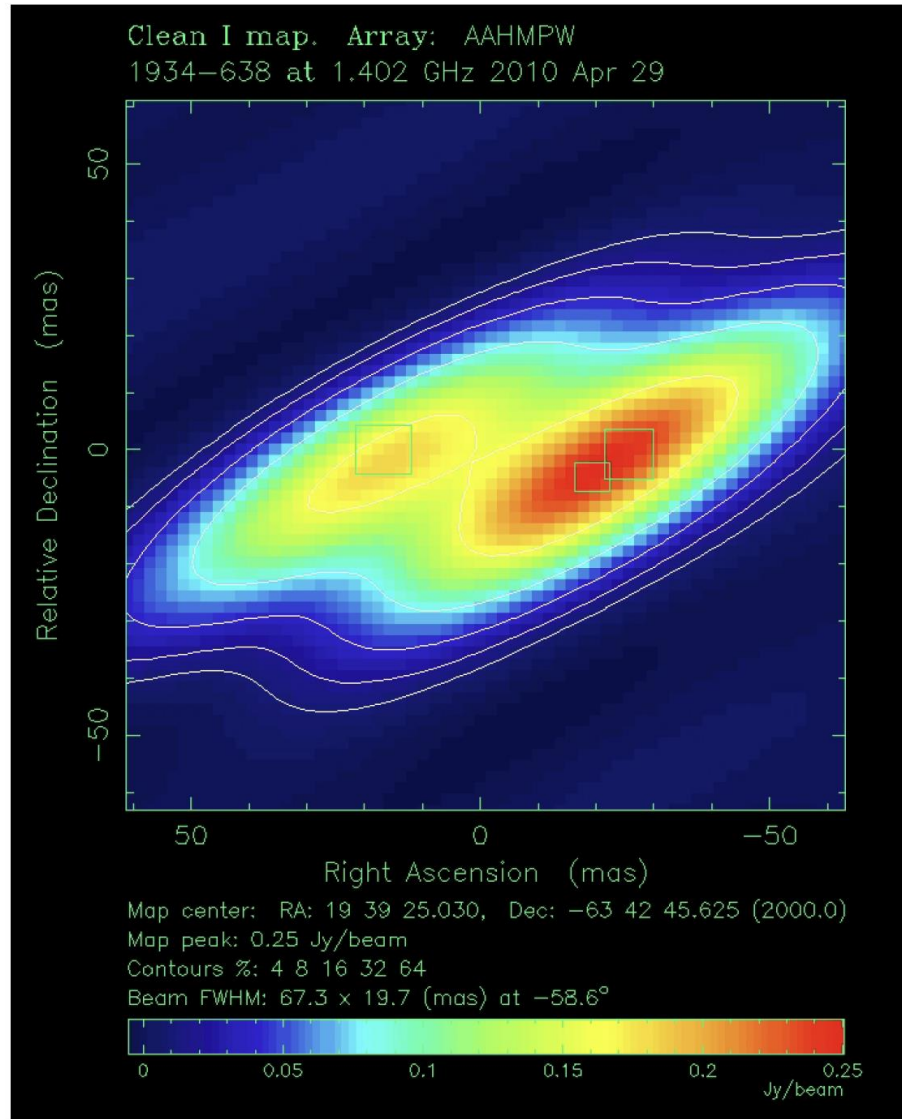
The two antennas were included in the Long Baseline Array (LBA) Australian VLBI network. This increased the UV coverage, resulting in increased spatial resolution.

It is one of these non-upgraded, ex-NTD receivers we propose to loan/donate to the ROT-54 upgrade project.

L-band receivers used in VLBI

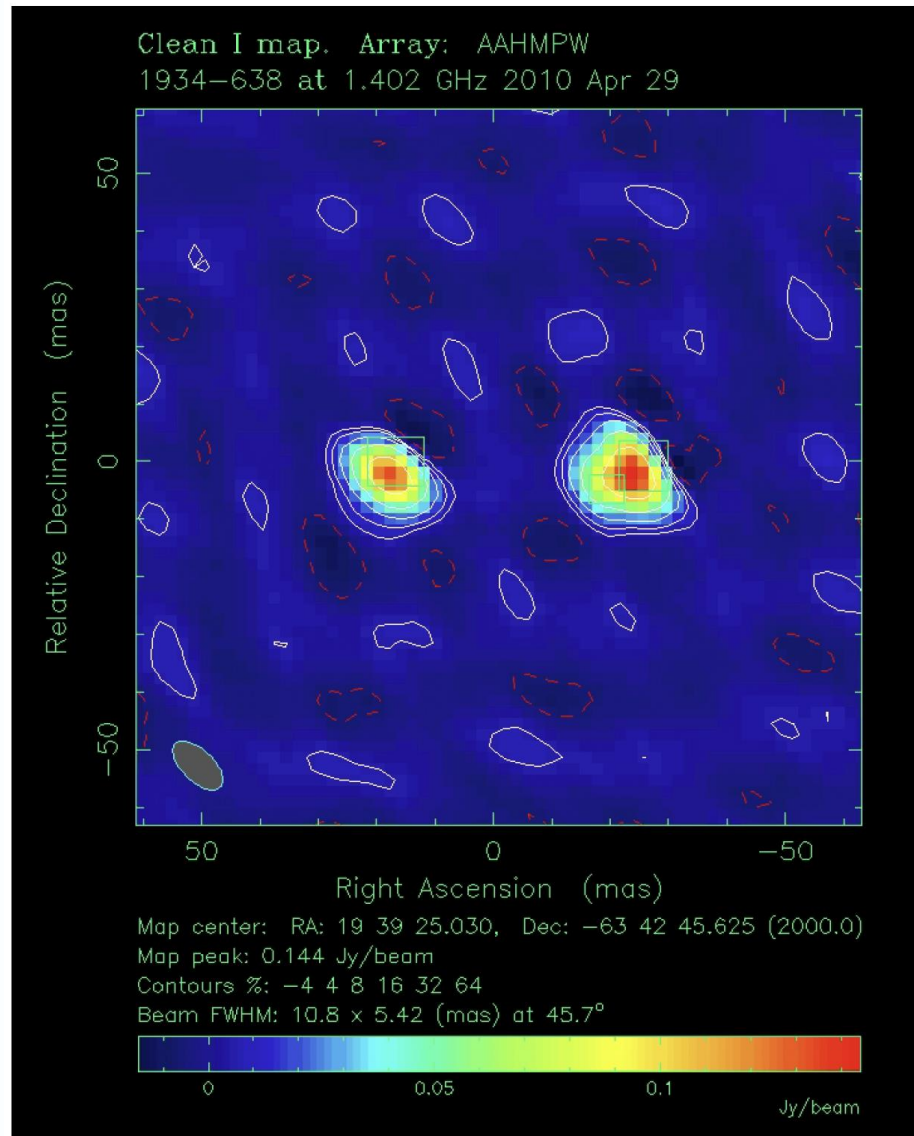


VLBI Image of PKS 1934-638 at 1.4 HGz



LBA Only

VLBI Image of PKS 1934-638 at 1.4 HGz



**LBA +
ASKAP-29 +
Wark12M**

The Upgraded ASKAP Single Pixel Receiver

The 1.1 – 1.7GHz single pixel receiver is a dual, linear polarisation receiver with associated electronics contained inside an environmental shield. The receiver is designed to be fitted to the ASKAP antennas as a complete self contained assembly.



The Mechanical Details

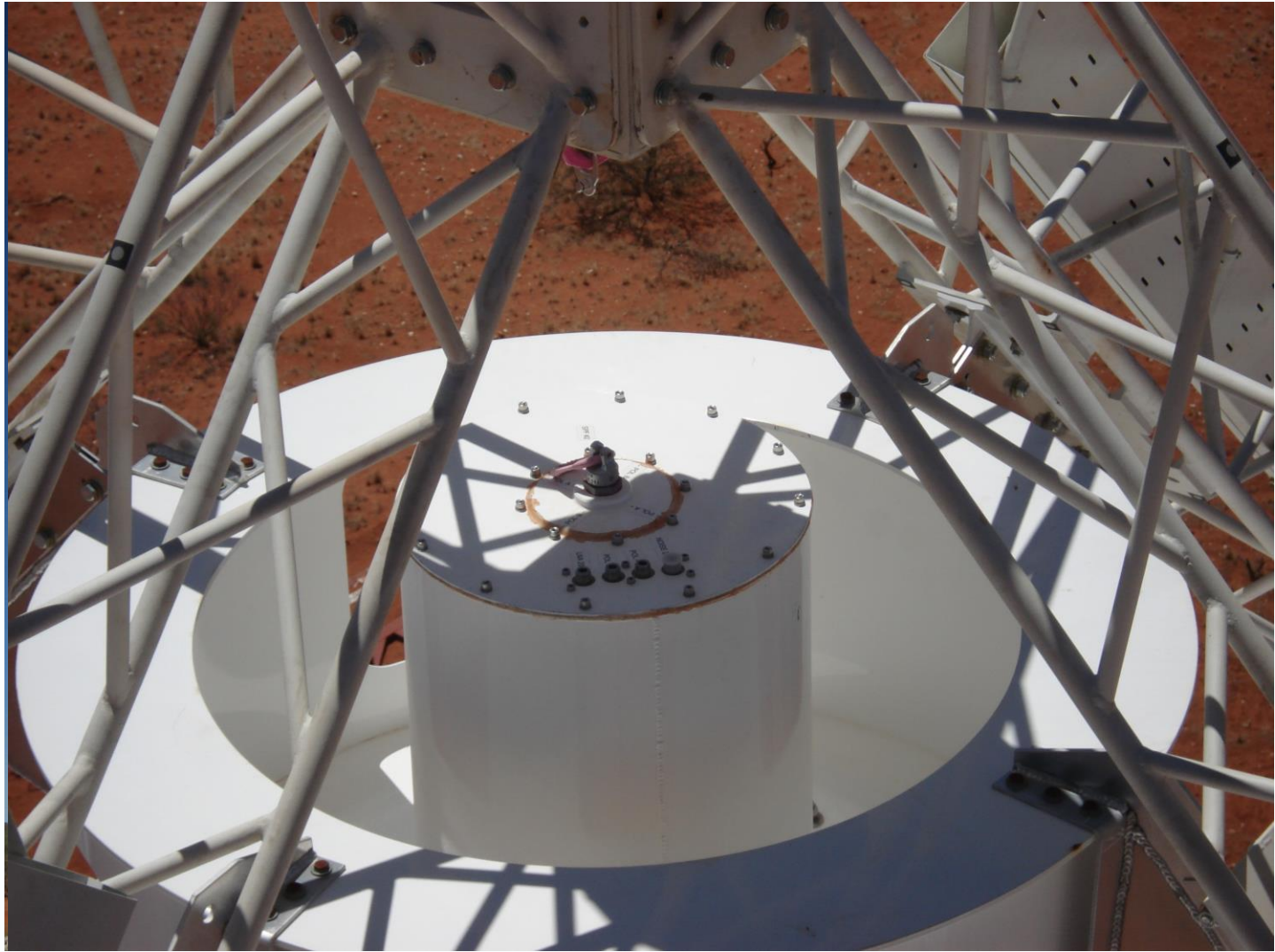
Weight

Receiver including shipping case:	65kg
Receiver:	31.0kg
Receiver and interface plate:	43.0kg
Interface plate:	11.5kg
Spacers and mounting hardware:	4.5kg

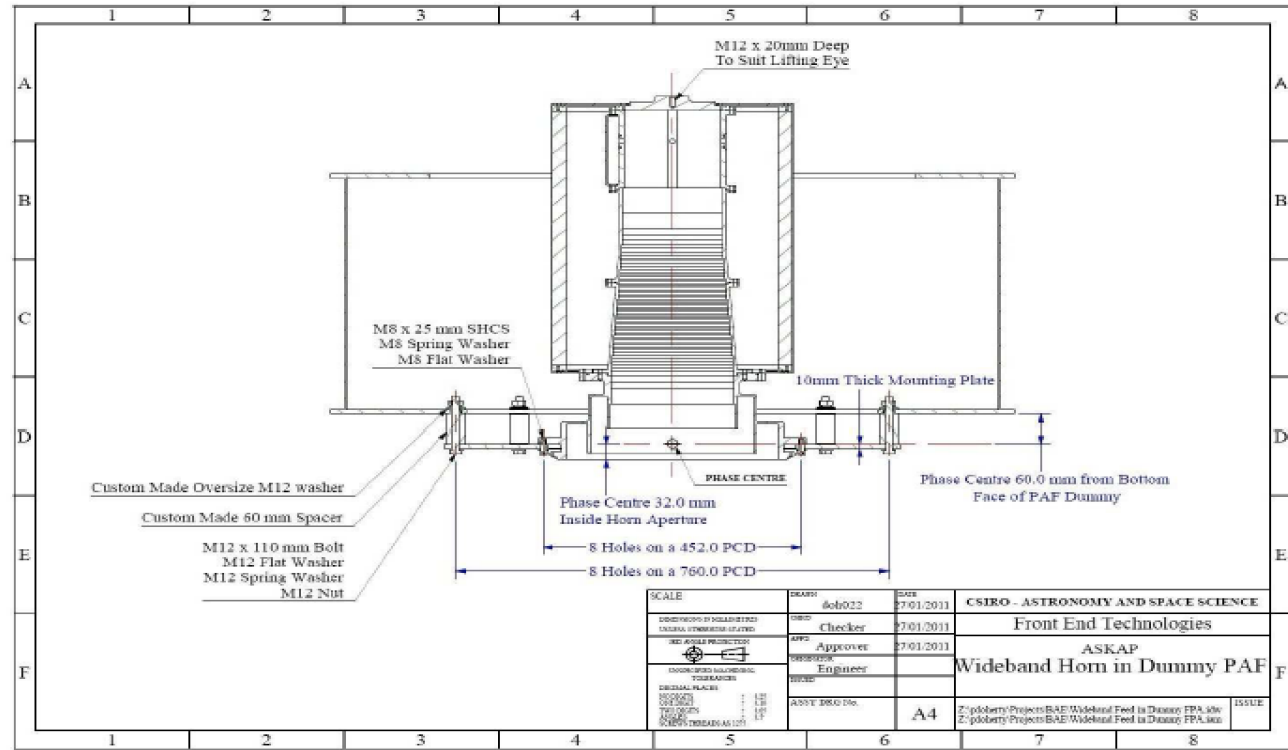
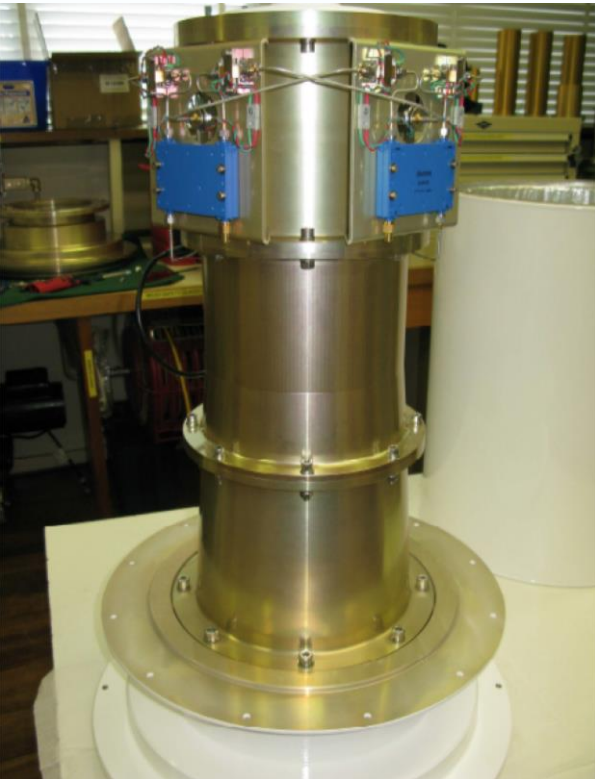
Dimensions

Shipping case:	1000mm x 570mm x 580mm (H x W x D)
Receiver	Ø470 x 753mm
Interface Plate	Ø800 x 10mm

The Receiver mounted on ASKAP-29



The Upgraded 1.1 – 1.7 GHz ASKAP Receiver



This is an uncooled receiver with a measured $T_{\text{sys}} \sim 60\text{-}70\text{ K}$

Feed Characteristics

ASKAP L-Band Feed

$$f/D = 0.5$$

Opening angle of the feed = 106°

64m Parkes Telescope

$$f/D = 0.41$$

Opening angle of the feed = 124°

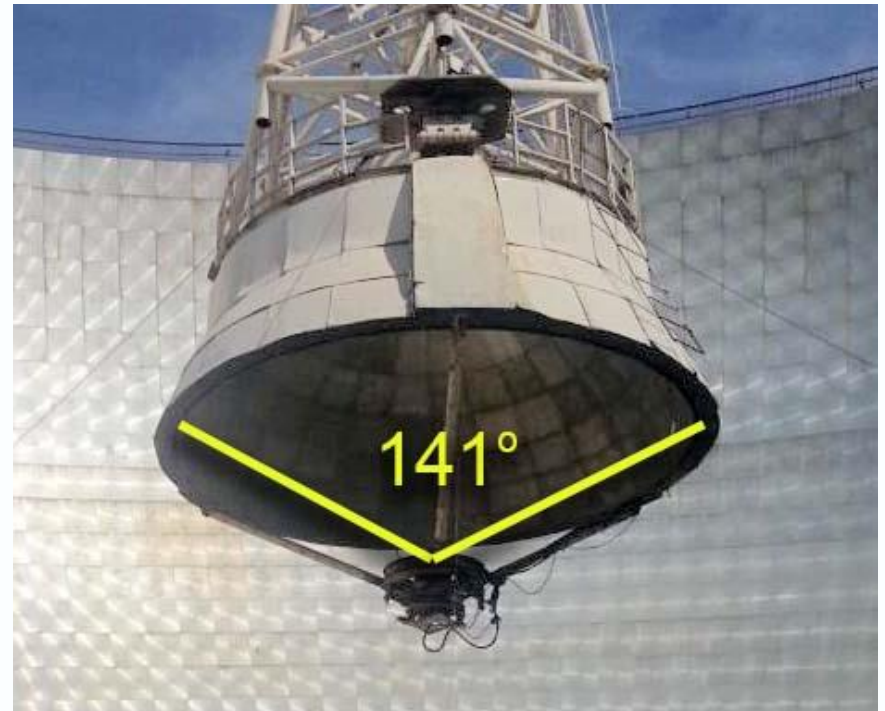
ROT-54

$$f/D = ?$$

Opening angle of the feed = 141°

(From the Technical Certificate on the Radio-optical Telescope ROT-54/2.6)

\therefore will need to manufacture a new feed



The Upgraded ASKAP Receiver at Parkes



The Upgraded ASKAP Receiver at Parkes



Cautionary Concerns

- Concern that it will require a lot of work on our part (CSIRO)
 - We don't have the personnel, time or funds to devote to the project
 - Lots of questions, diagrams, plans etc.
 - NZ Experience (required a lot of effort to help them)
 - Travel limitations in place due to COVID-19

Therefore:

- Will require RF Engineers at HUSC who know what they are doing
- Technical support from Europe will make it easier
- Will require the manufacture of a new feed horn, samplers, and backends, by HUSC
- **It is the non-modified (pre-upgraded) receiver we propose to donate/loan**
- **No guarantees, though**

The Florence Convention

STATUS AS AT : 15-09-2020 07:18:55 EDT

CHAPTER XIV

EDUCATIONAL AND CULTURAL MATTERS

2. Agreement on the Importation of Educational, Scientific and Cultural Materials

Lake Success, New York, 22 November 1950

Entry into force : 21 May 1952, in accordance with article XI.

Registration : 21 May 1952, No. 1734

Status : Signatories : 29. Parties : 98. ¹

Text : [Certified true copy](#)

United Nations, *Treaty Series*, [vol. 131](#), p. 25.

Note : The Agreement was approved by the General Conference of the United Nations Educational, Scientific and Cultural Organization at its fifth session, held at Florence from 22 May to 17 June 1950, in a resolution² adopted at the fourteenth plenary meeting on 17 June 1950.

Participant ^{1, 3, 4, 5}	Signature	Ratification, Acceptance(A), Succession(d)
Afghanistan	8 Oct 1951	19 Mar 1958
Armenia		23 Aug 2010 A
Australia		5 Mar 1992 A
Austria		12 Jun 1958 A
Barbados		13 Apr 1973 d
Belgium	22 Nov 1950	31 Oct 1957
Benin		18 May 2017 A
Bolivia (Plurinational State of)	22 Nov 1950	22 Sep 1970
Bosnia and Herzegovina ⁶		1 Sep 1993 d
Burkina Faso		14 Sep 1965 A
Cambodia		5 Nov 1951 A
Cameroon		15 May 1964 A



Thank you

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Observing with the 2.6m telescope of the Byurakan Observatory
- 18 September 1991