

WIA Submission – Part 2: Foundation Licence Conditions

SUMMARY

- Permit use of digital transmission modes
- Relax permitted transmission bandwidths
- Add access to more frequency bands
- Increase maximum power from 10 W to 50 W pX
- Relax conditions to enable limited home construction and use of re-purposed transmitting equipment
- Identify a 6-character callsign range to replace the current 7-character callsigns

2.1 Foundation Licence Conditions – Transmitting Modes as in LCD 2015

Part 6

29 Emissions from an amateur foundation station

The licensee must not operate an amateur foundation station in a frequency band mentioned in column 1 of an item in Schedule 3A unless:

- it is operated using an emission mode mentioned in column 2 of that item; and
- if the emission mode is 200HA1A – the information to be transmitted by the station is sent by the use of a manually operated Morse key; and
- the transmission remains entirely within that frequency band.

Schedule 3A

Permitted frequencies and emission modes (amateur foundation station) (sections 27 and 29)

| <i>Item</i> | <i>Column 1</i> Frequency band | <i>Column 2</i> Permitted emission modes |
|-------------|-----------------------------------|---|
| 1 | 3.500 MHz–3.700 MHz | 200HA1A |
| | 7.000 MHz–7.300 MHz | 8K00A3E |
| | 21.000 MHz–21.450 MHz | 4K00J3E |
| 2 | 28.000 MHz–29.700 MHz | 200HA1A |
| | 144.000 MHz–148.000 MHz | 8K00A3E |
| | 430.000 MHz–450.000 MHz | 4K00J3E |
| | | 16K0F3E |
| | | 16K0G3E |

2.1.1 Permitting use of digital modes

It is anachronistic in an era when digital communication is the underlying infrastructure to daily life, that Foundation licensees are denied the opportunity to learn and experience the use and applications of digital communications.

The WIA notes that the entry-level licence conditions in a number of other countries have included digital modes and image transmissions since inception, and to the WIA's knowledge without reports of noteworthy issues. The entry-level licences in Argentina, Canada, Japan, USA and the UK are cases in point.

The WIA also notes that non-licensed persons are afforded an opportunity to experiment with modern digital communications techniques using the freely available class-licensed LIPD bands. However, persons who have undergone the extra training and accreditation in order to achieve an Amateur Radio Foundation grade licence do not have the same learning opportunities presented to them through Amateur Radio.

With increasing technology development, and the use of digitally-generated transmission modes, particularly with Software-defined Radio (SDR), the WIA believes that selecting permitted modes based on current and past practice is an unnecessary hindrance to future experimentation that also unnecessarily adds to the regulatory burden.

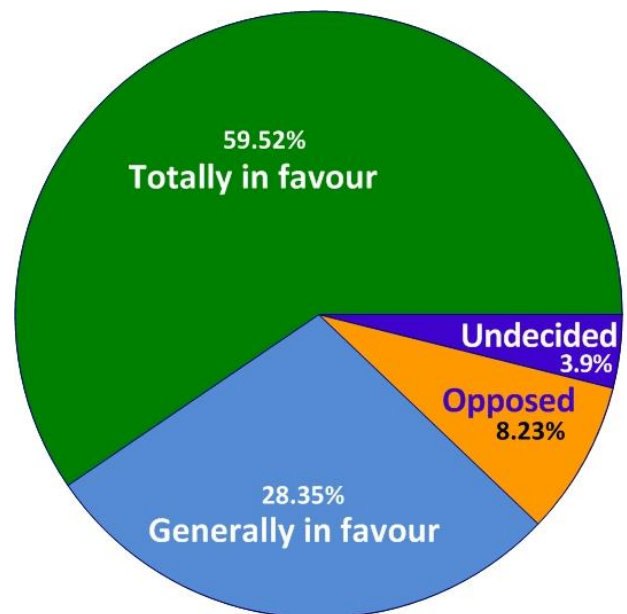
2.1.2 WIA survey - Permitting use of digital modes

Survey participants were asked their view of the desirability of access to digital modes of communication, with a choice of four responses.

Foundation Licence – use of digital modes

| | | | | |
|---------|-------------------|---------------------|-----------|---------|
| N = 462 | Totally in Favour | Generally in Favour | Undecided | Opposed |
| No. | 275 | 131 | 18 | 38 |
| % | 59.5 | 28.4 | 3.9 | 8.2 |

Over 87% of respondents favoured allowing Foundation Licensees to use digital modes. The 28% Generally in Favour expressed the view that it be limited to a prescribed range of modes. Those Opposed expressed views that adding permission for digital modes was providing 'unearned' and unassessed privileges, that use of digital transmission was 'unsafe' with neophyte licensees and was a disincentive to upgrade. Undecided respondents expressed no views.



WIA recommendations:

That Foundation licensees be permitted to use a range of digitally-produced data modes, including (but not limited to) text transmission (eg, RTTY, PSK-31, FT8), digitally-mediated voice transmission (eg, CFM, D-Star, DMR, FreeDV), and image transmission modes (eg, facsimile, video, CGI).

That **Schedule 3A** be amended so that Column 2 has the same or similar wording to **Schedule 2** (Advanced) and **Schedule 3** (Standard), except where otherwise necessary. Consequent amendments to **Part 6, Clause 24** may be necessary.

2.2 Foundation Licence Condition – Permitted bandwidth

2.2.1 Relaxation of permitted bandwidths

In keeping with the principle of enabling licensees to explore the use of more transmission modes, whether extant or yet to emerge, the WIA suggests that permitted bandwidths be reviewed so as to reduce prescriptive specifications wherever practicable. This works in conjunction with 2.1 above (digital modes) and adds to the general vision of expanding operators' learning opportunities.

2.2.2 WIA survey - Relaxation of permitted bandwidths

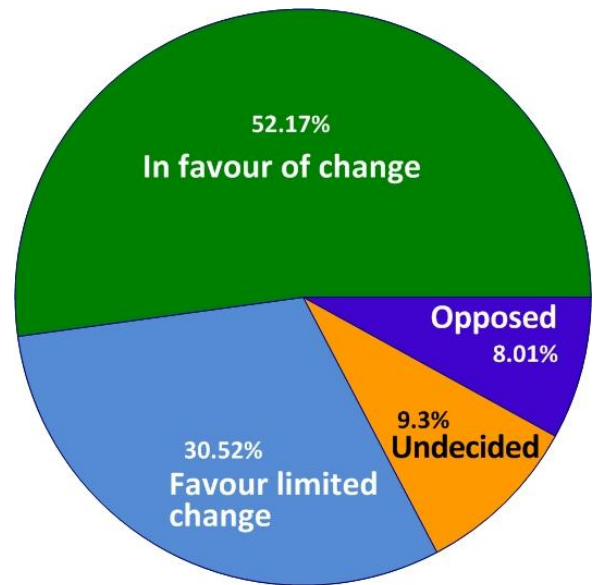
This is about accommodating the future, and future technologies.

Survey participants were asked their views about access to greater bandwidths than currently permitted, with a choice of four responses.

Foundation Licence – relax bandwidths

| | | | | |
|---------|---------------------|-----------------------|-----------|---------|
| N = 462 | In Favour of Change | Favour Limited Change | Undecided | Opposed |
| No. | 241 | 141 | 43 | 37 |
| % | 52.2 | 30.5 | 9.3 | 8.0 |

Over 82% of respondents favoured an increase in permitted bandwidths for Foundation Licensees. Of the 30% Favouring Limited Change, the general view came down to limiting opportunities for on-air inter-operator interference and poor quality transmissions. Those Opposed expressed a view that enabling use of transmission modes other than those currently permitted was 'unsafe' with neophyte licensees, provided 'unearned' and unassessed privileges, and a disincentive to upgrade. Respondent numbers signifying Undecided were consistent with prior propositions, except section 2.1.2.



Phase 2: Foundation – relax bandwidths

WIA Recommendation:

That **Schedule 1 Emission Modes** be reduced to a practicable minimum to avoid prescribing emission modes in every detail.

That **Part 6, Clause 29 - Emissions from an amateur foundation station** - could be reduced to:

The licensee must not operate an amateur foundation station in a frequency band mentioned in column 1 of an item in Schedule 3A unless the transmission remains entirely within that frequency band, except where transmission bandwidth is otherwise specified.

2.3 Foundation Licence Condition – Frequency bands as in LCD 2015

Part 6

27 Permitted frequency bands

The licensee must operate an amateur foundation station to transmit only on a frequency in a frequency band mentioned in column 1 of an item in Schedule 3A.

Schedule 3A Permitted frequencies and emission modes (amateur foundation station) (sections 27 and 29)

| <i>Item</i> | <i>Column 1</i> Frequency band | <i>Column 2</i> Permitted emission modes |
|-------------|---|---|
| 1 | 3.500 MHz–3.700 MHz | 200HA1A |
| | 7.000 MHz–7.300 MHz | 8K00A3E |
| | 21.000 MHz–21.450 MHz | 4K00J3E |
| 2 | 28.000 MHz–29.700 MHz 144.000 MHz–148.000 MHz 430.000 MHz–450.000 MHz | 200HA1A |
| | | 8K00A3E |
| | | 4K00J3E |
| | | 16K0F3E 16K0G3E |

2.3.1 Access to more bands

Table 2.1 (next page) provides a comparison of band access provisions for entry-level amateur licences in eight comparative countries. With only six permitted bands, the current Australian Foundation licence band access conditions are readily seen as unnecessarily restrictive when viewed in comparison with other countries' entry level licences.

Traditionally, entrants to amateur radio came through the special interest routes of shortwave listening, CB radio or an interest in electronics. Newer, younger entrants to amateur radio are more likely to approach amateur radio via an interest in more modern technologies such as IT wireless applications, WiFi (microwave bands), drones, astronomy (and radio astronomy) and like STEM pursuits that predominantly involve higher frequencies than those of past eras.

The UK Foundation licence, on which the Australian Foundation licence was initially modelled, now provides access to 16 bands, covering LF through to UHF and microwaves, (additional bands were added in 2006 – all below 3.5 MHz, plus 10 GHz). The WIA is not aware of any persistent or repeated negative incidents since band access was increased in the UK.

Denmark has a non-technical entry-level licence category that provides access to five amateur bands above 50 MHz (viz, 6 m, 4 m, 2 m, 70 cm and 23 cm).

The WIA notes that the Malaysian Class B category shown in **Table 2.1** is an exception, with only four permitted bands. However, the WIA notes that the Malaysian regulatory authority (SKMM) has introduced

a Class C entry level licence, with access to the 6 m, 2 m and 70 cm bands; this entry level licence is thus very restricted. The Class A and B licences are retained, with the Class B licence providing access to more bands across HF, VHF and UHF, and powers of 50 W pX; the Class A licence provides access to more bands and use of up to 1 kW in all of the HF bands “except if otherwise indicated”.

Table 2.1 Entry level licences – band access in different countries.

■ = access to part or all of the nominated band

| Amateur Band | Australia Foundation | Argentina Novicio | Canada Basic | India Restricted | Japan 4th Class | Malaysia Class B | Sth Africa Class B | UK Foundation | USA Technician |
|--------------|----------------------|-------------------|--------------|------------------|-----------------|------------------|--------------------|---------------|----------------|
| 2200m | | | | | ■ | | | ■ | |
| 600m | | | | | | | | | |
| 160m | | | | ■ | ■ | | | ■ | |
| 80m | ■ | ■ | | ■ | ■ | | ■ | ■ | ■ |
| 60m | | | | ■ | | | | ■ | |
| 40m | ■ | ■ | | | ■ | | ■ | ■ | ■ |
| 30m | | | | | | | | ■ | |
| 20m | | ■ | | ■ | | | | ■ | |
| 17m | | ■ | | ■ | | | | ■ | |
| 15m | ■ | ■ | | ■ | ■ | | | ■ | ■ |
| 12m | | ■ | | ■ | ■ | | | ■ | |
| 10m | ■ | ■ | | ■ | ■ | ■ | | ■ | ■ |
| 6m | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 4m | | | | | | | ■ | ■ | |
| 2m | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 1.25m | | ■ | ■ | | | | | | ■ |
| 70cm | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 33cm | | | ■ | | | | | | ■ |
| 23cm | | ■ | ■ | | ■ | | ■ | | ■ |
| 13cm | | ■ | ■ | | ■ | | ■ | | |
| 9cm | | ■ | ■ | | ■ | | | | |
| 6cm | | ■ | ■ | | ■ | | ■ | | |
| 3cm | | ■ | ■ | | ■ | | ■ | ■ | |
| 12.5mm | | ■ | ■ | | ■ | | ■ | | |
| 6.38mm | | ■ | ■ | | ■ | | ■ | | |
| 4.0mm | | ■ | ■ | | ■ | | ■ | | |
| 2.5mm | | | ■ | | | | | | |
| 2.24mm | | ■ | ■ | | ■ | | ■ | | |
| 1.25mm | | ■ | ■ | | ■ | | | | |

2.3.2 WIA survey - Access to more bands

Other major countries that have a similar entry-level licence provide access to many more bands throughout the spectrum than Australia’s Foundation licence, in particular, the UK, Argentina, and Japan.

Enabling access to more bands provides a wider range of opportunities for Foundation licensees to learn and gain experience in communications across the radiofrequency spectrum. The one compelling reason not to provide Foundation licensees access to all amateur bands is to maintain an incentive to upgrade.

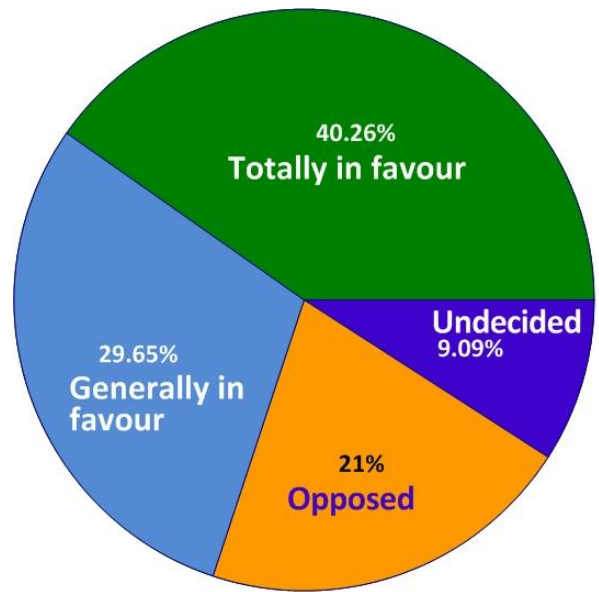
In other nations having a similar entry-level licence, access to a wide range of bands has apparently not proved a disincentive to upgrade, as other attractive conditions are balanced against band access.

Participants were asked their view, with a choice of four responses.

Foundation Licence – access to more bands

| | | | | |
|---------|-------------------|---------------------|-----------|---------|
| N = 462 | Totally in Favour | Generally in Favour | Undecided | Opposed |
| No. | 186 | 137 | 42 | 97 |
| % | 40.3 | 29.7 | 9.1 | 21.0 |

Over 70% of respondents favoured an increase in permitted bands for Foundation Licensees. Of the ~30% Generally in Favour, views were expressed that allowing more bands was a disincentive to upgrade, or that the bands currently permitted were adequate. The 21% Opposed expressed parallel views, while adding that allowing more bands was providing 'unearned' and unassessed privileges. Respondent numbers signifying Undecided were consistent with prior propositions, except section 2.1.2.



Phase 2: Foundation – access to more bands

WIA Recommendation:

That the number of permitted bands in **Schedule 3A Column 1** be increased to offer more opportunities for learning and inter-amateur communications and to harmonise better with those of other countries' entry-level licences. In some instances, access to a segment of some bands may be worth consideration.

2.4 Foundation Licence Condition – Transmitter output power as in LCD 2015

Part 6

30 Transmitter output power

The licensee must not operate an amateur foundation station using a transmitter output power of more than 10 watts pX.

2.4.1 Increased power

A decade's experience with the current permitted power of 10 W pX for the Foundation licence demonstrates that it is at a distinct disadvantage in today's urban RF noise environment on the HF and VHF bands, locally and globally.

Foundation station signals often struggle to rise above the prevailing RF noise levels within Australia and as experienced by amateurs in other countries. Competing with urban noise levels is exacerbated in mobile situations, particularly on the bands below 30 MHz.

The WIA notes that the permitted power for entry level licences varies widely around the world:

- 10 W pX (UK - Foundation)
- 50 W pX (Argentina: Inicial. Denmark: Kategori D. Swiss: Konzession 3, VHF-UHF. Mexico - Restringido)
- 100 W pX (South Africa – Class B; Swiss – Konzession 3, HF)
- 50 W dc input (India – Restricted Grade II; assessed equivalent to ~160 W pX)

- 200 W pX (Argentina – Novicio; USA - Technician)

The WIA initially proposed (in 2014) raising the permitted power to 25 W pX. Having considered the conditions prevailing in other countries, along with local circumstances, it is now suggested that 50 W pX would better address this issue for these reasons:

- Amateurs in Australia face the ‘tyranny of distance’ and are often located in remote or rural locations. The obstacle of distance dominates the ability of Foundation licensees to communicate with other stations, particularly for VHF/UHF and mobile operations, even via repeaters.
- A change to 25 W pX offers an increase in signal-to-noise ratio of just 4 dB, while a change to 50 W pX offers an increase of 7 dB which provides a more practical advantage.
- Many commercial transceivers currently available (HF and VHF-UHF) afford operation at 50 W pX, more so than those that conform to the current permitted power of 10 W.
- Commercial kits for self-assembly of amplifiers rated at 50 W pX are readily available, should Foundation licensees be permitted self-construction (see section 2.5).

There is no extant evidence to suggest that operating at the proposed 50 W pX power level, 7 dB above the current 10 W pX limit, creates any particular safety issue regarding management of electromagnetic emissions (EME).

2.4.2 WIA survey - Increased power

A decade’s experience with the 10 W Foundation power limit has demonstrated that it is at a distinct disadvantage in today’s urban RF environment and with Australia’s geography

The WIA advocates the power limit be increased to 50 W pX, which does not raise any particular safety issues regarding management of electromagnetic emissions.

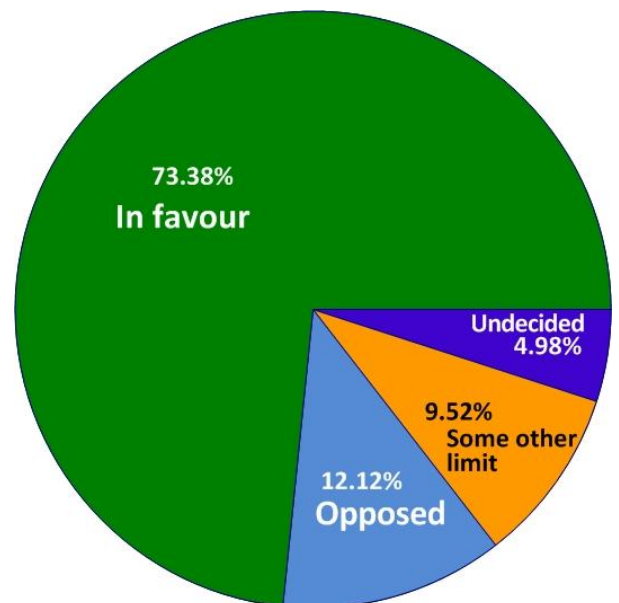
Should Foundation licensees gain access to bands above 70 cm, the power limits need to be set at pragmatic levels for safety.

Participants were asked their view, with a choice of four responses.

Foundation Licence – increase power to 50 W pX

| | | | | |
|---------|-----------|------------------|-----------|---------|
| N = 462 | In Favour | Some other Limit | Undecided | Opposed |
| No. | 339 | 44 | 23 | 56 |
| % | 73.4 | 9.5 | 5.0 | 12.1 |

Over 73% of responders favoured an increase in permitted transmitter output power for Foundation Licensees to 50 W pX. An additional 9.5% of respondents favoured an alternative increase in the permitted power, some suggesting a power below 50 W, while others suggested 100 W. Those Opposed to an increase in power variously cited that more power was ‘unsafe’ in an entry-level licence with regard to interference, or it provided an ‘unearned’ and unassessed privilege, or was a disincentive to upgrade (even if other



Phase 2: Foundation – power to 50W pX

licence grades gained increased power). Respondents selecting Undecided were generally undecided about other propositions or supported only limited change.

WIA Recommendation:

That **Part 6, Clause 30** be changed to:

The licensee must not operate an amateur foundation station using a transmitter output power of more than 50 watts pX, or more than 30 watts pY.

However, should Foundation licensees be authorised to use bands above 430 MHz, the WIA recommends a reduced power limit on those bands, mindful of the risks of electromagnetic emissions as set out in the Radiocommunications Licence Conditions (Apparatus Licence) Determination 2015.

2.5 Foundation Licence Condition – Commercially manufactured transmitters as in LCD 2015

Part 6

28 Transmitting equipment restrictions

The licensee must not operate an amateur foundation station using a transmitter that has not been manufactured commercially.

2.5.1 Relaxing restriction on use of commercially manufactured transceiver equipment

The WIA seeks relaxation of the restriction on Foundation licensees to use only commercially manufactured transceivers, which includes the microphone.

The objective is to enable Foundation licensees to broaden their range of learning experiences, and for their conditions to more closely match those applicable to like or similar entry-level licences overseas, in particular the UK foundation licence.

The WIA believes this change is also important to encourage self-learning in wireless communication technologies among young people (particularly STEM activities), and to the ‘Maker/Hacker’ community.

The WIA suggests that Foundation licensees be permitted to:

- assemble and use commercially available receiver, transmitter and transceiver kits. The WIA notes that the UK Foundation licence has permitted this for some years and the WIA notes that there is no evidence of notable incidents or issues reported. The USA’s Technician licence has never restricted licensees to commercial equipment
- connect personal computers for the purpose of using digital transmission modes
- use microphones other than the standard microphone provided by the transceiver’s manufacturer
- use transceivers commercially manufactured for non-amateur band applications, but adapted for operation on permitted amateur bands and operated within the terms of their licence.

Such conditions have applied to the UK Foundation licence for some years, and to the WIA’s knowledge no evidence has emerged of compliance issues requiring regulatory action or management. Likewise with the US Technician licence. Entry-level licences in other nations do not have the restriction to commercial equipment as in Australia’s Foundation licence. It would thus seem to be an unnecessary impediment to

licensees' opportunities for learning experiences. Permitting Foundation licensees' self-construction would better reflect the principles embodied in the ITU definition of the Amateur Service.

2.5.2 WIA survey - Relax the restriction to commercial rig use and enable limited DIY

Self-learning and technical experimentation are at the heart of the ITU definition of the Amateur Service.

The WIA advocates relaxing the restriction on Foundation operators to the use of commercially manufactured transceivers.

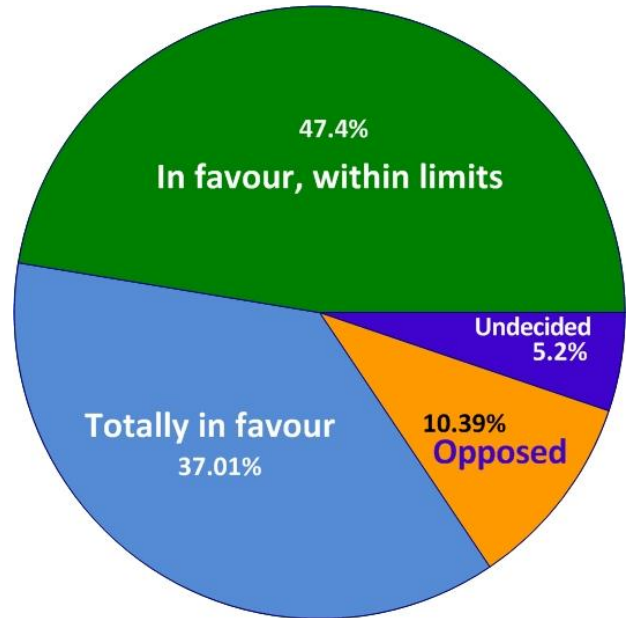
Participants were asked their view, with a choice of four responses.

Foundation Licence – allow limited DIY

N = 462

| | Totally in Favour | In Favour Within Limits | Undecided | Opposed |
|-----|-------------------|-------------------------|-----------|---------|
| No. | 171 | 219 | 24 | 48 |
| % | 37.0 | 47.4 | 5.2 | 10.4 |

Over 84% of responders favoured relaxing the restriction to commercial rig use, and enabling limited DIY for Foundation licensees. While 47% were In Favour Within Limits, a variety of views was expressed about what limits should be imposed. Some cited the likelihood of on-air inter-operator interference and poor quality transmissions, while others advocated some method of supervision or validation of DIY equipment. Those Opposed cited the principle that the Foundation licence was designed as, and should remain, an entry-level licence and that if Foundation operators wanted to build things, they should do the study and upgrade. Those selecting Undecided were generally undecided about other propositions or supported only limited change.



Phase 2: Foundation – allow limited DIY

WIA Recommendation:

That **Part 6, Clause 28** be changed to:

The licensee may operate an amateur foundation station using a transmitter that has been:

- (i) manufactured commercially
- (ii) assembled from an unmodified commercially available receiver and transmitter kit
- (iii) a commercially manufactured transceiver intended for non-amateur band applications, but converted for operation on permitted amateur bands and operated within the terms of this licence.

The transmitter in (i), (ii) and (iii) above is permitted to:

- (i) be connected to a personal computer for the purpose of using digital transmission modes
- (ii) use microphones other than standard microphone provided by the transceiver manufacturer.

The four-character suffix of the Australian Foundation licence callsign format is rare in the world for ordinary station callsigns. Despite a decade's use, along with widespread promotion and education about the callsign format, recognition of Australian Foundation Licence callsigns remains low among the worldwide radio amateur community.

Additionally, a majority of the available range of computer-mediated digital transmission modes cannot accommodate a four-character suffix callsign, which then prevents the use of those digital modes by Australian Foundation licensees. Examples include: Packet / APRS - radio protocol is unable to handle callsigns longer than 6 characters (APRS uses the AX.25 Packet protocol as a transport). Packet has enjoyed worldwide popularity for over 40 years. WSJT (eg, FT8, JT65, JT9, JT4) - protocol uses the minimum bits of entropy to encode callsigns of a set format, which is fixed at 6 characters; presently, FT8 is the most popular mode, worldwide.

If Australian Foundation licensees were permitted the use of digital transmission modes, the present callsign structure would preclude the use of the majority of currently used digital modes.

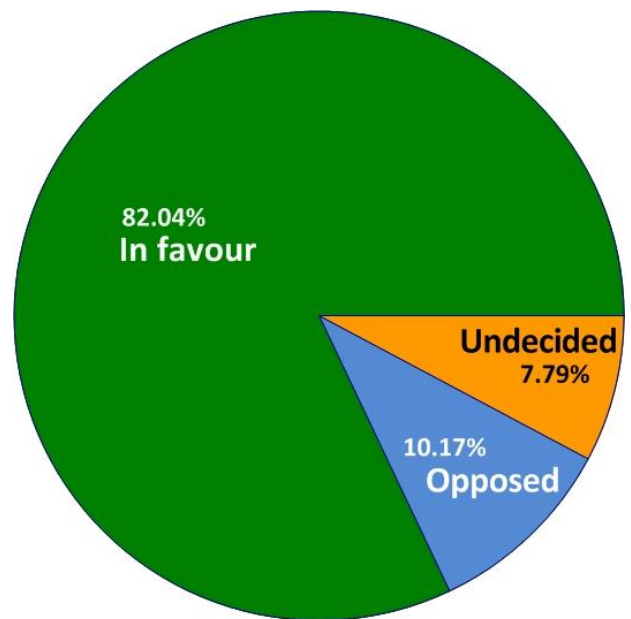
2.6.2 WIA survey - Review of Foundation licence callsigns

A prefix *other than* VK, or the special event prefixes of AX and VI, has been suggested. In the alternative, a three-letter suffix block or blocks with currently little use be identified and adopted.

Foundation Licence – review callsign pattern

| | | | |
|---------|-----------|-----------|---------|
| N = 462 | In Favour | Undecided | Opposed |
| No. | 379 | 36 | 47 |
| % | 82.0 | 7.8 | 10.2 |

Over 82% of respondents favoured a review of the Foundation Licence callsign structure. Among the 10% Opposed, the view was apparently that licensees' grades must be identifiable by their callsign (as currently applies). Respondents selecting Undecided were generally undecided about other propositions, too.



Phase 2: Foundation – review callsign

WIA Recommendation:

That an alternative callsign pattern be identified for use by Foundation licensees.