

American Radio Relay League



USA RULES FOR AMATEUR RADIO DIRECTION FINDING

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ARDF Rules Subcommittee

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Rules for USA Championship & Ranking Events In Amateur Radio Direction Finding

Rules highlighted in light blue are required for Championships and recommended for Ranking events. Rules highlighted in light yellow are specific to Ranking events. Rules without highlights are consistent across both Championship and Ranking rules.

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Organizational Rules

2. General Provisions

- 2.1 These rules are valid for and shall be used in connection with USA-ARDF Championship and Ranking events in ARDF organized in the United States of America.
- 2.3 These rules are binding for all persons engaged in ARDF Championship and Ranking events organized under these rules.
- 2.4 In all cases these rules should be interpreted so as to maximize fairness.
- 2.5 Any ARDF event shall equally challenge the technical (direction finding), orienteering and physical skills of a competitor.
- 2.6 All technical (direction finding) and orienteering tasks must be solvable by means of the direction finding receiver and an appropriate map of the competition area.
- 2.7 Changes to these Rules are subject to approval by the ARRL ARDF Committee
- 2.8 The Committee will review these rules at least annually and consider all proposals that have come from the USA ARDF community.
- 2.9 Not more than one month after approval in any part of these rules the full text of the updated rules must be published by the ARRL ARDF Committee
- 2.10 If not stated otherwise, any change in any part of these rules shall be in force from the beginning of the year succeeding the year of the decision (or approval if needed).

3. Event Program

- 3.1 USA-ARDF Championships should be held every year
- 3.2 The event dates and the program are proposed by the organizer. They require approval by the ARRL ARDF Committee.

4. Event Preparations

- 4.1 An organization technically competent in both amateur radio and orienteering may apply to the ARRL ARDF Rules Subcommittee to organize a ranking event.
 1. Applications to organize an event shall be emailed to:
arri-ardf-committee@googlegroups.com
 2. Distribution of the application by googlegroups will confirm delivery to the committee.
 3. Ranking events are held at the discretion of the organizer and do not require prior sanctioning.
- 4.2 Applications to host a Ranking event under these rules shall include the following information (*Championship event application procedures will be added as they are developed*):
 1. Organization hosting the event
 - a. Event Director & email address
 - b. Registrar & email address
 - c. Course Designer(s)
 2. Dates of the Event
 3. Maps to be used, the date of their last update, frequency of use in the last 5 years
 4. Nearby town, city & airport
 5. Expected entry cost to competitors.

6. Competitions and practices that may be included in the event
7. Type / Manufacturer of the transmitter equipment

4.3 *Sanctioning procedures for Championship and Ranking events will be located here as they are developed.*

5. Participation

5.1 Competitors eligible for USA ARDF Champion shall be citizens of the USA, Green Card holders, or have lived in the USA for the previous year.

5.3 Competitors participate at their own risk. Insurance against accidents shall be their own responsibility.

5.6 Foreign Competitors

1. Competitors not eligible for USA ARDF Champion may take part in USA-ARDF Ranking events.

5.7 All organizers and participants shall abide by IARU Child Protection Policy.

1. Event organizers and organizing volunteers shall read and understand the Child Protection Policy and sign to say that they will operate to its requirements.
2. Team officials shall read and understand the Child Protection Principles and sign to say that they agree to abide by the requirements set out therein.
3. The IARU Child Protection Policy is available at
http://www.ardf-r1.org/files/ CPP/IARU_Region_1_Child_Protection_Policy_Feb2016.pdf

6. Costs

6.1 The costs of organizing an event are the responsibility of the organizer. To cover the costs of the competition(s), the organizer may charge an entry fee for competitors.

6.7 The participants shall bear the entry fees, the travelling costs to and from the place(s) of the Event and the costs of accommodation and board during the event.

7. Entries

7.2 The organizer may set deadlines for entries and may adjust the entry fee based on the registration date or date of the receipt of funds from the competitor

7.4 The organizer may exclude competitors if their entry fee is not paid and no agreement has been reached about payment.

10. Protests & Jury

10.1 Protests against infringements of the rules by the organizers or a competitor or accompanying parties shall be made in writing to the organizer as soon as possible.

1. The organizer adjudicates a protest.
2. The complainant and any other affected parties shall be informed about the decision immediately.

10.2 Protests shall be made within one hour of the previously announced time of closure of the Finish, or of the actual closure of the Finish, whichever is later. Protests received after this time limit shall only be considered if there are valid exceptional circumstances, which must be explained in the protest.

10.3 If a protest is against a provisional result it shall be raised within one hour of the results being posted.

10.4 The decision of the organizer is final.

10.4 Protests against the decision of the organizer shall be made in writing to the organizer within one hour of the announcement of the protest decision.

10.5 The Jury shall deal with all protests filed before the event has disbanded.

10.6 No fee shall be charged to file a protest.

10.7 The Event Director shall appoint a Jury of at least three people from widely separated clubs. Jury members shall not be competitors whose results could be affected by their decision.

10.8 The duties of the Jury shall be to deal with infringements of the rules and any other questions arising out of protests.

10.9 The basis for the decisions by the Jury shall be these USA-ARDF Rules of competition.

10.10 In the event of a protest the Organizer and Jury shall interpret these rules with regard to the specific situation surrounding the protest to determine whether the fairness of the event has been compromised and conditions requiring the disqualification of a competitor or course exist.

10.11 A representative of the organizers may attend and participate at Jury meetings, but shall have no vote.

10.12 The Jury forms a quorum when all members are present. If a member is prevented from attending, the organizer shall nominate a substitute member.

10.13 When in response to a protest the organizer or Jury determines that any of the following conditions have existed for and affected a substantial group of competitors in a class, then the class or course shall be voided.

1. A control flag is missing.
2. The Start, or the Finish is not within the marked circle or triangle.
3. A transmitter has been off for 5 minutes or longer.
4. Incorrect and confusing identifying markings at a control.
5. Unfair conditions that probably had an impact on the results

10.14 When in response to a protest, the organizer or Jury determines that a competitor has violated these rules it may disqualify the competitor.

10.15 When in response to a protest the organizer or Jury determines that a rule has been broken and the effect on the results is minor and only a few competitors have been affected, then the organizer or Jury may allow, request or require a Sporting Withdrawal (SPW) by the affected competitors. Competitors may not elect a Sporting Withdrawal (as used in this rule) without the consent of the organizer or Jury.

10.6 If a gross infringement in these rules is discovered after an event has disbanded the protest shall be filed directly with the ARRL ARDF Committee, and the Committee shall take whatever action it deems necessary.

10.7 Decisions of the Organizer or Jury may be appealed in writing to the ARRL ARDF Committee within seven days after the ruling.

12. Event Reports

12.1 Not more than one month after the event, the organizer shall submit a report to the ARRL ARDF Committee containing:

1. Results of each competition
2. Master map with the Start, Finish & transmitter locations for each competition

- a. Transmitter assignments for each category for each competition
- b. Course lengths for each category for each competition
- c. Climb for each category for each competition
3. Composition of the Jury if one is appointed
4. Decision of the Organizer or Jury regarding a protest
5. Any deviations from these rules
6. Comments about the event including what worked, what didn't and how future events could be improved.

Technical Rules

13 Event Information

- 13.1 Official rules, bulletins and announcements shall be written and distributed in English. Only the official English text shall be used to decide any disputes. Official information may be given orally in response to questions at official meetings.
- 13.2 Information from the organizer shall be published on the event website.
- 13.3 The initial event information shall be published no later than 1 week after sanctioning is approved.
- 13.4 The initial event information shall include:
1. Name of the Event Director and Registrar
 2. Organizer's physical mail and e-mail address
 3. General location for the event (near-by city or county)
 4. Dates and types of competitions
 5. The Categories for the competitions
- 13.5 The organizer shall include the following information no later than four weeks before the event:
1. Entry fee for competitors.
 2. Event center or hotel.
 3. Address of the closest hospital and/or Urgent Care center and the phone number to call in an emergency.
 4. Details for payments and latest date for funds to be received to avoid late payment fees.
 5. Latest date for acceptance of entries.
 6. Description and type of any transport offered, if any.
 7. Event schedule.
 8. Any deviations from the rules (must be approved by the ARRL ARDF Committee).
 9. Information about obtaining visas and official invitations from the organizer.
 10. Description of terrain, climate and any hazards specific to the venues.
 11. Opportunities for training.
 12. Type of control registering devices to be used (e.g. SI, pin punch, RFID card).
 13. The frequencies and Radiated Power of transmitters to be used for each competition.
 14. Any requirements or restrictions for competition clothing (e.g. long sleeves or pants, no metal cleats).
 15. Current map(s) of the Competition Areas that have been made public or used in a previous event.
 16. Number of entries in each category or names & category of each competitor and date the data was updated.
 17. Time and location for official meetings.
 18. An explanation and diagram of the Sprint Start, spectator, and Finish area.

13.8 Information to be published on the website under a heading for each competition:

1. Time limit
2. List of transmitter and band assignments for each category.
3. Size of the map paper and the size area used in each competition (i.e. when extraneous area are folded for use on a smaller map board), scales and vertical contour intervals of the maps for each competition.
4. The parking or staging location of the Start and Finish for each competition.
5. Restricted areas.
6. The frequencies and Radiated Power of transmitters to be used for each competition.
7. Start list.
8. Any additional pertinent information about the event or venue.

14 Competition Formats

14.1 Championship ARDF competitions shall include the following formats:

14.1 Ranking events shall include at least one of the following formats:

1. 80-Meter Classic (80m band)
2. 2-Meter Classic (2m band)
3. Sprint (80m band)
4. Foxoring (80m band)

14.2 There shall be only one competition per day for a competitor.

14.4 Rules specific to the different formats are located in the Appendix section for that format

15 Categories

15.1 Competitors shall be divided into at least the following age and gender categories:.

Women (W)	Men (M)	Age
W19	M19	19 and younger
W21	M21	regardless of age
W35	M40	35/40 and older
W45	M50	45/50 and older
W55	M60	55/60 and older
W65	M70	65/70 and older

15.3 Competitors belong to the M19 or W19 category up to the end of the calendar year in which they reach the age of 19.

15.4 Men competitors aged 40 or older or women competitors aged 35 or older belong to each category from the beginning of the calendar year in which they reach the given age.

15.5. A competitor may compete in any single age-and-gender category for which he/she qualifies in a given competition, and may compete under different categories for different competitions in a given Event.

16 Equipment Check

16.1 There shall be an Equipment Check on the day prior to or the day of each competition to demonstrate the transmitter features, the set-up of transmitters and antennas, the registering devices etc. which will be used in the competition. If practical, the terrain type and map quality shall also be similar to the competitions.

16.2 The Equipment Check shall be open to anyone.

16.4 Transmitters, antennas, flags and registering devices used in the Equipment Check, their installation and setting shall be identical to those used in the competitions.

17 Starting Order

17.1 The organizer shall set the starting order.

17.1 The organizer may allow competitors to start at their convenience at the beginning of a cycle.

17.2 The start list shall be published no later than the day before the competition.

17.6 Competitors from the same category or running the same course (needing to locate the exact same transmitters) may not start at the same time.

17.7 As much as practical, the start times of competitors within the same category shall be spaced at equal time intervals.

17.8 All competitors of a particular category shall start in the same start corridor and at the same part of the cycle: usually at the start of transmitter #1.

18 Competitor Meeting

18.1 The organizer shall hold a meeting to which all competitors will be invited before the first competition

18.2 All competition material (start number bibs, start lists, transport schedules, latest information, etc.) shall be handed out at the meeting.

18.3 Competitors and others may ask questions of the organizers

19 Terrain

19.1 The terrain shall be suitable for setting competitive ARDF courses without any serious hazards to competitors and avoiding man-made objects which could interfere with direction finding activities.

19.3 If the venue has been used in an ARDF or Orienteering competition less than 5 years prior to the Championship event, then competitors may visit the venue until control markings have been placed in the terrain.

1. If the venue has not been used for an ARDF or Orienteering event in the 5 years prior to the Championship event, the area is Embargoed.
2. The organizers, competitors, and their associates shall obey all the rules and regulations of the land owners, and shall obtain permission from the land owners to hold the event.

20 Courses

20.1 The Principles for ARDF Course Planning found in the appendices shall be followed.

20.2 The radio direction finding skills, navigational skills, and running ability of the competitors shall all be tested.

20.4 Course lengths shall be given as the length in meters of the shortest viable route from the start line via the transmitters in optimum order to the finish line.

20.5 Total climb along the shortest viable route shall not exceed 6% of the course length.

21. Time Limit

21.1 Competitors whose time exceeds the time limit shall be disqualified as Overtime (OT).

22 Restricted Areas and Routes

22.2 Out-of-bounds or dangerous areas, forbidden routes, line features that shall not be crossed etc. shall be marked on the map. If the feature is not obvious on the map (i.e. roads, river, marked boundary), they shall also be marked in the terrain with flagging tape. Competitors may not enter, follow or cross such areas, routes or features.

1. When a course has above areas it shall be posted both on the event website and on a map at the Start with the specific information about the course.

22.3 Compulsory routes and crossing points shall be indicated clearly on the map and marked in the terrain with flagging tape. Competitors shall follow the entire length of any marked section of their course.

1. Registering Devices identical to those used at transmitters or official observers shall be positioned at each end of compulsory routes and crossing points.
2. When a course has above routes it shall be posted both on the event website and on a map at the start with the specific information about the course.

22.4 The use of official transport, such as to a previously undisclosed start area, during the Championship may be declared mandatory by the organizer.

23 Maps

23.1 Maps and additional overprinting shall be drawn and printed according to the IOF International Specification for Orienteering Maps (ISOM or ISSOM as appropriate).

1. When available, sprint maps should use the ISSOM orienteering specification.

23.2 Corrections for map errors and changes which have occurred in the terrain since the map was printed shall be *overprinted on the competitors maps* if they have a bearing on the event.

23.2 Corrections for map errors and changes which have occurred in the terrain since the map was printed shall be *displayed on a map at the start* if they have a bearing on the event.

23.3 The competition map shall cover the whole Competition Area including Start, Finish and all transmitters. The Start, Finish Beacon(s), finish corridor, and Finish Line shall be clearly marked on the map. The Start is marked by a triangle (symbol 701), the Finish Beacon by a circle (symbol 702), the finish corridor by a dashed line (symbol 705) and the Finish by two concentric circles (symbol 706).

23.4 Unless otherwise noted, the area covered by the map issued by the organizer shall define the Competition Area.

24 Equipment Used by Competitors

24.1 Every competitor shall have a direction finding receiver for the relevant band. The receivers shall meet the Technical Specifications for ARDF Equipment (see Appendix 1, section 1).

24.2 The organizers may require competitors to wear identifying numbers on a bib on the

chest and/or back. The competitor shall not conceal any information on the bib. The bib shall not be larger than 20cm by 24cm. The numerals shall be at least 12cm high.

24.3 As long as the rules of the organizer do not specify otherwise, the choice of clothing and footwear shall be at the competitor's discretion.

24.4 Any equipment, not specifically permitted by these rules, may be carried provided that it is not used for navigation or communication. (e.g. phones for safety, GPS devices for tracking and post-race analysis).

25 Control Cards and Registering Devices

25.1 See Appendix 2 for a list of acceptable registering devices.

25.3 Competitors shall be responsible for registering at each transmitter using the registering device provided. They are responsible for correct markings which must be clearly identifiable.

1. If the Registering Device fails to respond, the competitor shall use the backup device as defined in the event information to prove his or her presence at the control.

25.4 Missing or unidentifiable control marks shall not be considered, unless it can be established with certainty that the competitor visited the transmitter.

25.5 Competitors without recorded results shall be classified as Did Not Finish (DNF).

1. Competitors are not required to visit all the controls on their course.

26 Start

26.1 Competitors may pre-position spare receivers and components, clearly marked as property of a particular competitor, at a location designated by the organizer just beyond the starting line beside the start corridor.

26.2 When the organizer supplies transportation, all competitors shall have at least 30 minutes for undisturbed preparation and warm-up at the Start area. Only competitors who have not started and organizers shall be allowed to enter the warm-up area.

26.3 The following information shall be shown at the Start area:

1. Time limit
2. Transmitter frequencies
3. List of transmitter and band assignments for each category.
4. Start list
5. Sample of the flag and registering device
6. The competition map without overprints
7. Clock showing the official time of the competition

26.4 The organizer shall call up competitors before their start time as specified for the particular event form in the Appendix

26.6 The Start shall be organized so that later competitors cannot see the maps and the route choices of the starters.

26.7 When the starting signal is given, competitors shall move along the start corridor without stopping except to return to the designated area with backup receivers because of a receiver malfunction.

26.8 Competitors, whose receivers fail, or take an incorrect map, etc. may return to the start line and take their spare receiver or parts from the organizer.

1. It is strictly forbidden to give or take any assistance to or from any person except the

organizer.

2. If the competitor returns within the first minute or the return is due to the fault of the organizer, the competitor can be given a new start time.
3. For all competitors returning to the Start for any reason the organizer shall keep a record of both their original start time and the time they return to the course.

26.9 Start corridors shall be provided by the organizer. The end of each corridor shall not be visible either from the Start area or from any part of another corridor. The end of the start corridor shall be clearly marked. If a start corridor is along a mapped trail it need not be flagged along its length.

26.10 Competitors who are late for their start time shall be permitted to start. The organizer shall determine at which time they may start which shall be as soon as possible but taking into consideration possible influence on other competitors. If the late start is the fault of the competitor, the organizer may use either their originally assigned start time or the time of their actual start, however all such late starters shall be treated equally.

26.11 Competitors who are late for their start time because of a fault of the organizer shall be given a new start time.

27 Transmitters

27.1 Transmitters shall meet the Technical Specifications for ARDF Equipment in the Appendix

27.2 The antenna installation shall not be changed during the competition.

27.3 All transmitters shall be clearly audible during the whole competition from the Start.

1. The Finish Beacons shall be clearly audible throughout the whole Competition Area

27.4 Transmitters shall begin operating before the first start and shall be checked before the first start. Transmitters shall remain operating until the end of the time limit of the last competitor or until the final competitor has finished their course, whichever is later. The Finish Beacon transmitter(s) shall remain operating until all competitors have finished.

27.5 In the event that organizers decide to prematurely end a competition, all transmitters except for the Finish Beacon(s) will be switched off. Finish Beacon(s) remain in operation until all competitors reach the Finish.

27.6 Station call signs should be sent as required by the FCC, during a transmitter's normal transmit interval.

27.7 The Finish Beacon, shall be registered as the last transmitter.

27.8 The Finish Beacon(s) shall be placed at the entrance of the finish corridor. They shall be registered in the same way as other transmitters. If two bands are running simultaneously, Finish Beacons for both bands shall share one flag and one set of registering devices.

27.12 Each transmitter must be easily recognizable by its code number and frequency band, which shall be fixed to the flag or to the registering device.

27.13 All transmissions from the transmitters must be monitored by the organizer during the competition.

28 Transmitters Arrangement

28.1 The transmitter arrangement for each competition format is defined in the course sections of the appendix.

29 Finish and Time-Keeping

- 29.1 The competition ends for a competitor when the competitor crosses the finish line and the finish time is recorded according to the specifications announced by the organizer.
- 29.2 The finish corridor begins at the Finish Beacon and ends at the finish line. It shall be clearly marked by uninterrupted marking (i.e. tape, flagging, etc.).
1. If a finish corridor is along a mapped trail it need not be flagged along its length.
- 29.3 The finish line shall be at least 3 m wide and shall be at a right angle to the direction of the run-in. The exact position of the finish line shall be obvious to approaching competitors. Competitors in the finish corridor may run only in the direction from the beacon towards the finish line.
1. There shall be space for a competitor to run outside the finish corridor on either side of the finish corridor when it is marked on both sides.
 2. If the finish corridor is not flagged, or marked on a single side then competitors may run in either direction.
- 29.4 Times shall be rounded down to whole seconds. Times shall be given in either hours, minutes and seconds, or in minutes and seconds.
- 29.5 Having completed the competition, a competitor may not re-enter the Competition Area before everyone has finished without the permission of the organizer. A competitor who finishes or stops competing before arriving at the Finish shall in no way influence the competition nor help another competitor and shall report to the Finish as soon as possible.
- 29.6 There shall be first-aid supplies and transportation to a hospital available at the Finish.
- 29.7 The time-keeping system shall meet the Technical Specifications in the Appendix.

30 Results

- 30.1 The place of an individual competitor depends on (first) the number of transmitters found and (second) his or her running time. Only transmitters which are scored for the particular category are considered.
1. Competitors who have failed either to find any transmitter assigned to their course other than the Finish Beacon shall be classified as Did Not Finish (DNF).
 2. Competitors who have exceeded the time limit shall be classified Overtime (OVT).
 3. Competitors who have stopped competing to assist an injured person shall be classified Sporting Withdrawal (SPW).
- 30.3 Two or more competitors having the same result shall be given the same placing in the results list. The position(s) following the tie shall remain vacant.
- 30.4 Provisional results shall be displayed in the Finish area during the competition.
1. A map with the locations of the transmitters shall be posted at the Finish.
 2. When competitors who haven't started yet are at the Finish, the above map shall not be posted until all competitors have been started.
- 30.5 The official results, including split times, shall be published on the event website as soon as possible and shall include all participating competitors. Competitors' names shall be associated with their bib numbers either in the results or in a separate list.

31 Awards

- 31.1 The title of USA Champion and/or Overall as appropriate for the event shall be

awarded for each competition and for each official category separately.

31.2 Awards shall be given for 1st through 3rd place positions.

31.5 The organizer shall arrange a dignified prize-giving ceremony.

32 Fair play

32.1 All persons taking part in an ARDF event shall behave with fairness and honesty. They shall have a sporting attitude and a spirit of friendship. Competitors shall show respect for each other, for officials, journalists, spectators and the inhabitants of the Competition Area. The competitors shall be as quiet as possible in the terrain.

32.2 It is forbidden to give assistance to any competitor, take assistance from any person, or to utilize any means of transport, except:

1. Assistance provided by the organizer within the scope of their defined duties, as long as that assistance is equally available to all competitors.
2. It is the duty of all competitors to help injured runners. Competitors withdrawing from the event because of helping an injured competitor shall be classified Sporting Withdrawal (SPW).
3. Competitors may continue their competition after helping an injured competitor, however they will not have their time adjusted. They may, however, elect to have SPW included with their time in the official results.

32.3 The use of drugs prohibited by the World Anti-Doping Agency (WADA) is forbidden.

1. These rules are published at <https://www.wada-ama.org/>

32.4 Secrecy regarding the courses, Finish and start areas shall be maintained until published by the organizer.

32.5 Surveying or training in the area declared embargoed by the organizer is not allowed. Attempts to gain any information related to the courses, beyond that provided by the organizer, are not permitted before and during the competition.

32.6 Coaches, competitors, media representatives and spectators shall remain in the areas assigned to them as specified by the organizer.

32.7 Organizers in the Competition Area shall neither disturb, detain, nor supply any information to a competitor.. They shall remain quiet and shall not help competitors approaching a transmitter.

32.8 A competitor who breaks any rule, or who benefits from the breaking of any rule, shall be disqualified.

32.9 The organizer may conduct or require testing of any competitor's receiver or other equipment used by a competitor during an event to ascertain that it meets the requirements in these rules.

Appendix 1: Technical Specifications for ARDF Equipment

T1. Receivers

- T1.1 Receivers and antennas of any type may be used by the competitors.
- T1.2 Any receiver producing audible interference or radio frequency interference in the 80m or 2m band at a distance of 10 meters or more shall not be used in the competitions.
1. To accomplish this test the organizer shall tune in a transmitter at approximately the distance of the farthest transmitter on the course and then the receiver being tested shall be turned on at a distance of 10 meters from the testing organizer. The organizer will then decide if there is interference from the receiver that would interfere with another competitor.
 2. At the organizers option this test may be conducted either at the Equipment Test or at the Start.
- T1.3 The organizer may require tests on any competitor's receiver and other equipment prior to or after its use in a competition.

T2. Transmitters

- T2.1 All transmitters must comply with FCC regulations.
- T2.2 All transmitters excluding the beacon(s) within one competition shall have the same parameters and the same antenna installation.
- T2.4 When not scheduled to be transmitting, neither the transmitter nor its antenna may radiate detectible RF energy in the competition band(s) in use.
- T2.5 Antennas shall provide omnidirectional radiation patterns.
- T2.6 Specifications for the 80m band transmitters including transmitters used for beacons:
1. Carrier frequency * 3.510 - 3.600 MHz (3510 - 3600 kHz)
 2. Frequency stability better than 50 ppm
 3. Spurious emissions conforming to FCC regulations
 4. Mode
A1A (keyed unmodulated carrier)
 5. Antenna polarization vertical
 6. Frequency separation between simultaneously working transmitters
See format specific specifications
 7. Radiated Power See format specific specifications
 8. Keying speed See format specific specifications
- T2.8 Specifications for the 2m band transmitters including transmitters used for beacons:
1. Carrier frequency * 144.500 - 144.800 MHz (144500 - 144900 kHz) (avoid local repeater inputs) and 145.500 - 145.800 MHz (145500 - 145800 kHz).
 2. Frequency stability better than 50 ppm
 3. Frequency separation between simultaneously working transmitters
200 kHz (0.2 MHz)
 4. Spurious emissions conforming to the FCC regulations
 5. Radiated Power See format specifications
 6. Mode
A2A keyed carrier
modulated by AF tone
 7. Modulation depth 70 - 80 %
 8. Keying speed 8 - 15 WPM

9. Antenna polarization

See format specifications

10. Antenna height

See format specifications

T2.9 Measuring Transmitter Radiated Power

Transmitters, their antenna systems and any feedline shall be considered when estimating radiated power. Any reasonable method for estimating radiated power may be used. Estimates should be accurate to within +/- 3 dB of actual radiated power whenever practical.

T3. Time-Keeping System

T3.1 The official competition time shall correspond to the official local time.

T3.2 The maximum deviation of the clocks at the Start and Finish line is ONE SECOND against the official time during the whole competition.

T4. Other Equipment

T4.1 Any other equipment used by the organizer (service radio net, time-keeping system, computers, electronic Registering Devices etc.) shall not cause audible interference or RF interference to competitors' receivers.

T4.2 The use of satellite positioning devices for navigation purposes is allowed provided that no map is displayed.

Appendix 2: Registering Devices

R1. Approved Devices

R1.1 The only electronic approved control registering system is the SPORTident classic system.

1. The SI-Station is near the transmitter.
2. The SI-Card is carried by the competitor.

R1.2 SPORTident AIR+ system is not approved.

R2. Registering

R2.1 It is the competitor's responsibility to ensure that the SI-card is held in the SI-station until the feedback signal has been received.

R2.2 A pin punch backup shall be at each transmitter. The competitor may punch either the map or number bib. The competitor is responsible for the correct mark which must be clearly identifiable at the finish.

R3. Alternate Registration Systems

R3.1 If a different system is used, the organizer must get approval from the ARRL ARDF Committee.

Appendix 4: Youth Rules for the USA ARDF Championships

The following rules are changed for the Youth Championships. All other rules remain the same.

Y15 Categories:

Y15.2 Youth Categories

Women (W)	Men (M)	Age
W12	M12	12 and younger
W14	M14	14 and younger
W16	M16	16 and younger

Y15.3 Competitors belong to the particular category up to the end of the calendar year in which they reach the given age.

Y20. Courses

Y20.3 Transmitters including the Finish Beacon shall be located not less than 400 meters apart. The transmitter nearest to the Start shall be located not less than 500 meters from the Start.

Y20.7 Number of transmitters and course lengths assigned to particular categories:

Category	number of transmitters	Effective Course Length
W12	3 + Finish Beacon	2-3 km
W14	4 + Finish Beacon	2.5-3 km
W16	5 + Finish Beacon	3.5-4 km
M12	3 + Finish Beacon	2-3 km
M14	4 + Finish Beacon	2.5-3 km
M16	5 + Finish Beacon	3.5-4 km

Appendix 5: Sprint Rules for the ARDF Competition

S1. General Provisions

S1.1 The sprint event shall be organized in a forest or preferably in a complex open park easily accessible by the public.

S2. Race System

S2.1 The competition shall be run as two loops which can be overlapped.. The Spectator Control, which connects the two loops, and the Finish, will be in the same area to accommodate spectators.

S2.2 Each competitor runs through the start corridor, which leads to the area with transmitters No.1 to No.5 (slow keying). After finding all the required transmitters from this loop, the competitor runs to the spectator control and through the spectator corridor to the area with transmitters No.1F to No.5F (fast keying). After finding all the required transmitters from this loop, the competitor runs to the Finish Beacon and through the finish corridor to the finish line.

S2.3 The transmitters searched for on each of the loops may be visited in any order. All transmitters searched for on each loop shall be on the same frequency.

S2.4 The Finish Beacon and the spectator control may be at the same place. In this case, there is no spectator control transmitter.

S3. Corridors

S3.1 The start corridor is a marked corridor that runs away from the Start. The end shall be clearly marked and only after this point can the competitor stop.. The start corridor shall not be longer than 400 meters.

S3.2 When leaving the spectator control, competitors shall run along the spectator corridor. The spectator corridor shall not be longer than 300 meters. The spectator control shall be placed at the entrance to the spectator corridor.

S3.3 The finish corridor is the corridor that shall be run from the Finish Beacon to the finish line. The Finish Beacon shall be placed at the entrance to the finish corridor. The finish corridor shall not be longer than 400 meters.

S17. Starting order

S17.7 The competitors within one category start at equal start intervals.

1. Minimum start interval is 2 minutes.
2. When possible, competitors from the same category should not start consecutively.

S20. Courses

S20.3 The transmitters shall be located not less than 100 meters apart and not less than 100 meters from the Start.

- The Finish Beacon (B) and the spectator control (S), if this differs from the Finish Beacon, could be located less than 100 meters from the Start.

S20.7 The courses shall be planned for an expected winning time of 15 minutes for an elite competitor in all categories.

- The number of transmitters assigned to each age category will normally be twice the number given in C20.7.

S21 Time Limit

S21.2 The time limit shall be 1 hour.

S23 Maps

S23.1 The map for the sprint event shall be made at the scale 1:5000 or 1:4000

S23.3 The Start, Finish Beacon, spectator control, if this differs from the Finish Beacon, finish corridor and finish line shall be clearly marked on the map. The Start is marked by a triangle (symbol 701), the Finish Beacon and spectator control by a circle (symbol 702), the finish corridor by a dashed line (symbol 705) and the Finish by two concentric circles (symbol 706).

S26. Start

S26.3 The organization of the Start, spectator, and Finish areas shall be explained and diagramed for the competitors in advance and posted at the Start.

S26.5 The competitor receives the map along with the receiver in the pre-start area 2 minutes before the start.

S27 Transmitters

S27.9 Field transmitters have no flags and their registering devices stands are marked with red and white stripes,

S27.10 The Registering Devices must be no more than 1m from the antenna and be clearly visible from the antenna.

S27.8 The spectator control and the Finish Beacon are equipped with control flags.

1. The Finish Beacon shall be equipped with at least two registering devices. The organizer should consider additional registering devices if the Finish Beacon is acting as the Spectator Control as well.
2. The Finish Beacon (B) and the spectator control (S), if this differs from the Finish Beacon, are registered as any other transmitter.
3. Registering devices shall be clearly visible and placed not more than 1 m away from the antenna.

S27.13 The antenna, and grounding system, if used, shall be deployed so that it can not be inadvertently disconnected by a competitor.

S28. Transmitters Arrangement

S-T2.6 Sprint specific specifications for the 80m band transmitters

1. Radiated Power 0.3 - 5 W
 2. All the transmitters must be clearly heard over the whole Competition Area
 3. Radiated Power for Finish Beacon & spectator control 1-5W
 4. Frequency spacing between simultaneously working transmitters ≥ 20 kHz (0.02 MHz)
- Two sets of five transmitters shall be used in the sprint event. Transmitters groups 1 to 5 and 1F to 5F shall operate with different keying speeds.
 - Example of frequency and keying speed assignment:

Frequency	Function	Code	Speed
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3.530 MHz	TX 1-5	MOE-MO5	10 WPM
3.550 MHz	Spectator Control	S	10 WPM
3.570 MHz	TX 1F (fast)-5F	MOE-MO5	15 WPM
3.600 MHz	Finish Beacon	MO	10 WPM

S28.2 Transmitters operate in the following sequence:

No. 1 and 1F	sending code MOE in seconds 0 to 12
No. 2 and 2F	sending code MOI in seconds 12 to 24
No. 3 and 3F	sending code MOS in seconds 24 to 36
No. 4 and 4F	sending code MOH in seconds 36 to 48
No. 5 and 5F	sending code MO5 in seconds 48 to 60
	– of a 1-minute cycle starting at 0:00
Timing	The maximum overlap for any two transmitters is 3 seconds

S32.6 Fairness

S8.1 Competitors waiting for the start shall be well separated from any other people (spectators and competitors who already finished their races) once the first competitor has started.

Appendix 6: Foxoring Rules for the ARDF Competition

F1. Race System

F1.1 Its main features are as follows:

1. At the Start, competitors get competition map with marked Start, Finish Beacon and nominal positions of the transmitters.
2. Transmitters, except for the Finish Beacon, are placed close to their nominal positions marked on the maps.
3. All transmitters except for the Finish Beacon are very weak and therefore audible only at the close vicinity of the antenna. All transmitters operate continuously.

F1.2 The RF field strength of each transmitter is adjusted so that :

1. The transmitter is clearly audible from the center of the circle that is marked on the map AND at a minimum distance of 30m from its actual position in the terrain.
2. The transmitter is NOT audible at a distance of 250m from its real position.
3. Adjusting the field strength so the signal can just barely be tuned in at 100m is a recommended strength that will allow poor quality receivers to receive it at 30m and high quality receivers not to receive it at 250m

F1.3 Competitors navigate to the vicinity of the transmitters by means of the map and then complete the final approach by means of the direction finding receiver.

F16. Equipment Check

F16.1 One Foxoring transmitter on each frequency shall be operating at the Start until the last competitor has started.

F17. Starting order

F17.7 The competitors within one category start at equal start intervals. Minimum start interval is 2 minutes.

1. Competitors receive their map at their start time
2. Receivers are not impounded prior to the start

F20. Courses

F20.3 The organizer may define the order in which the controls must be taken, allow the controls to be taken in any order, or combine the two in one course.

1. If the order of the controls is defined, then a line must connect the control circles on the map and this option clearly stated on the website in the course information, posted at the Start, and delivered orally at the Start.

F20.4 Transmitters including the Finish Beacon shall be located not less than 250 meters apart. The transmitter nearest to the Start shall be located not less than 250 meters from the Start.

F20.5 Number of transmitters and course lengths recommended for particular categories:

Category	number of transmitters	Effective Course Length
W19	5-8 + Finish Beacon	4-6 km
W21	6-10 + Finish Beacon	5-7 km
W35	5-8 + Finish Beacon	4-6 km
W45	4-7 + Finish Beacon	4-6 km
W55	4-7 + Finish Beacon	3-5 km

W65	4-7 + Finish Beacon	3-5 km
M19	6-8 + Finish Beacon	6-8 km
M21	8-10+ Finish Beacon	7-9 km
M40	6-8 + Finish Beacon	6-8 km
M50	5-8 + Finish Beacon	5-7 km
M60	5-8 + Finish Beacon	4-6 km
M70	4-7 + Finish Beacon	3-5 km

F21 Time Limit

F21.1 The time limit shall be 3 hours.

F23. Maps

F23.3 The competition map shall cover the whole Competition Area including Start, Finish Beacon and all transmitters. The map Start (the point where competitors obtain the maps), nominal positions of transmitters assigned to the particular category, Finish Beacon and the finish corridor shall be clearly marked on the map. The Start is marked by a triangle (symbol 701), all transmitters by a circle (symbol 702), the finish corridor by a dashed line (symbol 705) and the Finish by two concentric circles (symbol 706).

F26. Start

F26.1 On arrival at the Competition Area, competitors shall keep their receivers..

F26.5 Competitors shall enter the pre-start area not earlier than FIVE MINUTES before their own start. Competitors receive maps after their start, at the starting line or at the indicated point within the starting corridor.

- A table with map bags, tape, and waterproof pens is available immediately after receiving the map.

F27. Transmitters

F27.3 Each Foxoring transmitter shall be clearly audible during the whole competition at its nominal position marked on the map AND at a distance of 30m from its real position. Transmitters shall NOT be audible at a distance of 250 m from their real positions.

- The Finish Beacon operates at normal power and therefore shall be clearly audible during the whole competition from everywhere on the map.

F27.9 The Foxoring transmitters have no flags. Registering devices shall be placed no more than one meter from each transmitter antenna and shall be clearly visible from the transmitter antenna.

F28. Transmitters Arrangement

F28.2 Transmitters shall operate continuously.

F29 Technical Specifications for ARDF Foxoring Transmitters

FT2.6 Foxoring specific Specifications for the 80m band transmitters:

1. Frequency spacing between the Finish Beacon and other transmitters ≥ 30 kHz (0.03 MHz)
2. Frequency spacing between FoxOring transmitters ≥ 20 kHz (0.02 MHz)
3. Keying speed for FoxOring transmitters Continuous
4. Keying speed for Finish Beacon 8-15 WPM

USA Rules for ARDF

5. Radiated Power (Finish Beacon) 1 - 5 W
6. Radiated Power (Foxoring transmitters) to be heard >30m & <250m

FT2.9 field transmitters may operate at different frequencies.

- Note: this removes the interference between nearby transmitters. In addition, it calls for better technical skill of competitors (foxoring on a single frequency is very easy, easier than orienteering itself).

Appendix 7: Classic Competitions

C1. General Provisions

C1.1 This format tests skill in direction finding, navigating on a map, and running such that all are critically important. Making strategic decisions regarding route choice and transmitter order is integral to this form.

C20 Courses

C20.3 Transmitters including the Finish Beacon shall be located not less than 400 meters apart. The transmitter nearest to the Start shall be located not less than 750 meters from the Start. Transmitters on different bands shall be located not less than 200 m apart. When both 80m and 2m bands are used in the same competition area the beacons for both bands will be located at the entrance to the Finish Corridor.

- Transmitters may be taken in any order

C20.7 Number of transmitters and course lengths assigned to particular categories:

Category	Number of transmitters	Effective Course Length
W19	4 + Finish Beacon	6-8 km
W21	4 + Finish Beacon	7-9 km
W35	4-5 + Finish Beacon	6-8 km
W45	3-4 + Finish Beacon	5-7 km
W55	3-4 + Finish Beacon	4-6 km
W65	3-4 + Finish Beacon	4-6 km
M19	4 + Finish Beacon	8-10 km
M21	5 + Finish Beacon	9-12 km
M40	4 + Finish Beacon	8-10 km
M50	4-5 + Finish Beacon	6-8 km
M60	3-4 + Finish Beacon	5-7 km
M70	3-4 + Finish Beacon	4-6 km

C21 Time Limit

C21.1 The time limit shall be 3 hours.

C23 Maps

C23.3 The segments of the exclusion zones that are in the competition area shall be clearly marked on the map.

C26 Start

C26.1 On arrival at the Competition Area, competitors shall place their receivers in the impound area as indicated to them by the organizers.

C26.5 Competitors shall enter the pre-start area TEN MINUTES before their start time. At that time they shall be given their receivers and maps.

C26.7 Competitors may not switch on their receivers until the start signal is given

C26.9 The start corridors shall not be longer than 250 meters.

C27. Transmitters

C27.1 The flag shall be less than 4 meters from the transmitter antenna. The flag shall be clearly visible to competitors when they are within 1 meter in any direction from the transmitter antenna.

- The registering device shall be within 1 meter of the flag and clearly visible.
- It is recommended that the registering device be attached to the flag or the pole supporting the flag.

C2.6 Classic Specific Specifications for the 80m band transmitters

- Radiated power 1 - 5 W
- Keying speed 8 - 15 WPM
- Frequency separation between simultaneously working transmitters ≥ 20 kHz (0.02 MHz)

C2.7 Classic Specific Specifications for the 2m band transmitters

1. Keying speed 8 - 15 WPM
2. Antenna polarization horizontal
3. Antenna height 2 - 3 meters above ground level
4. Channel spacing between simultaneously working transmitters more than 200 kHz
5. Radiated power 0.25 - 1 W

C27.4 Transmitters begin to operate after all receivers have been impounded at the Start, or earlier if other arrangements have been made by the organizer to prevent competitors from listening to the transmitters.

C27.9 All transmitters shall be marked by a flag consisting of three squares 30 x 30 cm arranged in a triangular form. Each square shall be divided diagonally, one half being white and the other orange.

C28 Transmitters Arrangement

C28.1 Classic competitions may be organized on either the 80m or 2m band, or both simultaneously. If both bands are used simultaneously, then the Categories are divided into two groups: one group contains categories M19, M21, M40, W19, and W21, the other group contains categories M50, M60, M70, W35, W45, W55, and W65. On the first classic competition day, one group runs on the 80m band and the other group on the 2m band. On the second classic competition day, the bands are swapped.

C28.2 There are 12 transmitters in the Competition Area, 6 on each band. Transmitters shall operate on each band in the following sequence:

Transmitter	Code Sent	Frequency	Operating Period of the 5-minute cycle, starting at
Finish Beacon	MO	A	continuously

USA Rules for ARDF

Transmitter No.1	MOE	B	in the first minute
Transmitter No.2	MOI	B	in the second minute
Transmitter No.3	MOS	B	in the third minute
Transmitter No.4	MOH	B	in the fourth minute
Transmitter No.5	MO5	B	in the fifth minute
The maximum overlap of any two transmitters is 5 seconds			

Appendix 8: Principles for ARDF Course Planning

P1 Purpose

P1.1 These principles aim at establishing common standards for the planning of ARDF courses in order to ensure fair competitions and to safeguard the unique character of ARDF.

P2. Principles

Courses in all Championship ARRL-sanctioned ARDF events shall be planned in accordance with these principles. They should also serve as general guidelines for the planning of other competitive ARDF events.

P2.1 The aim of good course planning is to offer competitors courses correctly designed for their expected abilities. Results shall reflect the competitors' technical and physical ability.

P2.2 The unique character of ARDF is to find a number of transmitters located in unknown terrain against the clock. This demands the following skills:

1. Handling of the direction finding receiver and interpreting measurements.
2. Accurate map reading.
3. Route choice evaluation.
4. Concentration under stress.
5. Quick decision making.
6. Running in natural terrain.
7. Physical ability.

P3. Fairness

P3.1 Fairness is a basic requirement in competitive sport. Unless the greatest care is taken at each step of course planning and transmitter placing, luck can easily become significant in ARDF competitions. The organizers shall consider all such factors to ensure that the contest is fair and that all competitors face the same conditions during every part of the course.

P4 Appropriate Courses

P4.1 The popularity of ARDF can only be enhanced if competitors are satisfied with the courses they are given. Careful course planning is therefore necessary to ensure that courses are appropriate in terms of length, physical and technical difficulty, transmitters sitting, etc. In this respect it is particularly important that each course is suitable for the competitors doing that course.

P4 Environment

P4.2 The environment is sensitive: wildlife may be disturbed and the ground as well as the vegetation may suffer from overuse. The environment also includes people living in the Competition Area, walls, fences, cultivated land, buildings and other constructions, etc. It is usually possible to find ways to avoid interference with the most sensitive areas without damage.

P4.3 Experience and research have shown that even large events can be organized in sensitive areas without permanent damage if the correct precautions are taken and the courses are well planned. It is very important that the organizer ensures that there is access to the chosen terrain and that any sensitive areas in the terrain are discovered in advance.

P5. Public

P5.1 The organization of the Event and competitions should take into account the media and spectators.

Appendix 9 Definitions

1. Definitions

Amateur Radio Direction Finding: (ARDF) is an amateur radio sport in which competitors by means of a direction finding receiver and a map are to find a number of transmitters in previously undisclosed locations in the competition area in the shortest possible time.

Antenna Installation: A transmit antenna's location and position with reference to its environment, and any other parameters that could affect the strength or polarization of the signals it radiates.

ARRL ARDF Committee:The committee under the jurisdiction of the ARRL that manages ARDF in the United States.

Band: A segment of Amateur Radio Service spectrum used by ARDF transmitters and receivers.

Beacon: A transmitter which sends a continuous radio signal strong enough to be received at all points on the competition area.

Category: Age and gender grouping of competitors

Championship: ARDF Championship - A sanctioned ARDF competition held for the purpose of determining one or more ARDF champions in one or more categories.

Control Mark: A physical or electronic pattern that is recorded to prove that a competitor visited a specific transmitter location.

Competition Area: The area covered by the map issued by the organizer, unless otherwise defined by the organizer.

Competition: ARDF competition - An ARDF competition is a single competitive ARDF contest type held on a particular course over a certain period of time. "2m Classic" is one format of an ARDF competition.

Control Card: A sheet or card used to record control marks.

Corridor: A narrow belt of land, marked by ribbons or tape, along or through which competitors are required to pass.

Course Length: The length of the shortest route from the start line via the transmitters with optimum route choice to the finish line as determined by the course designer.

Direction Finding Receiver: A radio receiver along with a directional antenna designed for use on one or more bands.

Effective Course Length: The course length + 10 times the total climb along it.

Embargo: An area that a Competitor may not enter for a designated period of time immediately prior to an ARDF event, so as to ensure that no competitor has an unfair advantage in familiarity with the terrain or course when not competing

Equipment Check: An activity in which competition equipment is set up to demonstrate its operation and characteristics. An Equipment Check is conducted to allow competitors to familiarize themselves with event hardware and confirm that their receivers and registering devices are compatible.

Event: ARDF Event - A series of one or more ARDF competitions held for the purpose of determining one or more winning contestants. ARDF Events might be held over a period of one or more days. Differs from ARDF practices, which are training exercises that might not be competitive in nature.

USA Rules for ARDF

Event Director: The person with ultimate responsibility for ensuring that an event is successful and is conducted in accordance with these rules.

Event Schedule: A written statement of event details that includes the dates and times of all practice sessions, Equipment Checks, competitions, meetings, ceremonies and other planned activities.

Flag: A three-sided construct consisting of three squares 30 x 30 cm arranged in a triangular form. Each square is divided diagonally, one half being white and the other orange. Flags are hung vertically, so that the openings are above and below.

Format: the type of competition i.e.classic, sprint or foxoring

Frequency Stability: The degree to which a transmitter's output frequency drifts during a competition.

Ideal time: The shortest time a course could be completed by an elite runner in their category

ISOM: International Specification Orienteering Maps from the International Orienteering Federation (IOF)

ISSOM: International Specification Sprint Orienteering Maps from the IOF

Jury: One or more individuals assigned to adjudicate Protests or settle matters related to an event.

Keying Speed: Morse code speed expressed in words per minute (WPM) in accordance with https://en.wikipedia.org/wiki/Morse_code#Speed_in_words_per_minute using the "PARIS" standard.

Mode: the modulation method employed by a transmitter.

Out-of-Bounds: A location where a competitor may not enter or cross *during* a competition.

Organizer: The event director and persons authorized by the event director to assist with the event.

Radiated Power: the amount of power a radio transmitter and antenna radiates specified in Watts. In ARDF, it is an approximate value that may be measured or calculated based on transmitter, feedline, and antenna system properties.

Ranking Event: An event in which the organizer affirms that it has followed the Ranking Rules and the ARRL-ARDF Committee may use the data from the event as part of the USA Team selection process.

Registrar: the person or entity responsible for collecting fees and recording competitor registrations for an event.

Registering Devices: Equipment that records evidence of a competitor's arrival at a transmitter. (SPORTident equipment and pin punches)

Shortest Viable Route: A path between two locations that, in the judgement of the course designer, is the quickest route for a runner to follow.

SI-Stations: Approved equipment located at the Control for recording a competitor's arrival at the transmitter. (Manufactured by SPORTident)

SI-Cards: Approved equipment carried by a competitor to record the competitor's arrival at the transmitter. (Manufactured by SPORTident)

Sporting Withdrawal (SPW): A disqualification because of helping an injured person or to avoid disqualifying a whole course when only a few people are affected.

Spurious Emissions: see Electronic Code of Federal Regulations (e-CFR) 47 CFR § 97.3 (a)

(43) and § 97.307 Emission standards.

Start List: A printed series of competitor names, bib numbers, and starting times ordered chronologically by start time for a specific competition. In addition it may also be ordered by competitor name or category

Technical Level: As applied to competitions. Youth, Adult, Master

Time Limit: The period in which a competitor must complete the race or be given the result of OVT (Overtime)

Transmitter: A set of equipment used to generate and transmit electromagnetic waves, placed at control or beacon locations.

Transmitter Arrangement: The total number, distance of separation, and other placement constraints imposed on transmitters by competition format rules.