As agreed at the:

EME Operating Guide for 432MHz and Above

Notes

This 2002 version replaces the previous 'Sked Procedures' last published in 1992.

It has been rewritten as an 'Operating Guide' with more advice and background information for beginners, and a stronger focus on random QSOs. There are very few changes to the existing Sked Procedures.

1. Why?

EME signals are often weak and fading, so we cannot always hear each other. To help us to make more QSOs, we need some agreed operating procedures.

2. Minimum QSO

The definition of a minimum valid QSO is that **both** stations have copied **all** of the following:

1. Both callsigns from the other station
2. Signal report from the other station (**or** some other previously unknown piece of information, e.g. the other station's Locator grid)
3. **R** from the other station, to acknowledge complete copy of 1 and 2.

This has been the standard definition of a minimum EME QSO for many years.

3. CW speeds

The recommended sending speed on 432MHz and above is a **letter** speed of 15-20 words/minute, but with extra space between letters so the **word** speed is only 12-15 words/minute. This helps to prevent individual letters of Morse code being broken up by rapid libration fading.

Leave clear pauses between letters, and also between words or callsigns. Do not change speed. **Do not send very slowly** – it is harder to copy!

These recommendations are what most people find effective.

4. Signal Reports

This section is divided into **Valid reports for a QSO** and **Other signals**.

4.1 Valid reports for a QSO

On EME, do not send a signal report until you have copied **both** callsigns **completely**!

Valid signal reports for a QSO on 432MHz and above are:

M Very weak, marginal copy but **both callsigns complete** (**M** is valid for a QSO on 432MHz and above)

O Weak, but **both callsigns complete**

Leave clear pauses between letters, so there is no possibility of mistaking **M** and **O**.

RST – not the same as on HF. Typical EME RST reports include:

339 Stronger than O but still quite weak and difficult copy

449 Stronger than 339, almost complete copy

559 Very strong (for an EME signal), complete copy.

Other combinations are of course possible, for example:

549 Complete copy but not "S5"

349 "S4" but difficult to copy

etc...

Remember that **RST** is more difficult to copy than **M** or **O**, so using **RST** can be a risk in skeds and initial QSOs. Some stations do not like to use **RST** in contests because it takes more time.

4.2 Other signals

T Receiving something, but no complete callsigns. Note that a **T** report is not valid for a QSO – it is only used to help keep a sked going.

The **T** report is not often used, because with very weak signals there is a risk that the other station will copy it as **M** or **O**, and then the QSO will fail.

QRZ, **YYY** etc – procedural signals for random QSOs, more useful than **T** (see $$$ below).

5. Skeds

5.1 Skeds co-ordination service

Most beginners start with skeds, and there is a highly effective world-wide skeds co-ordination service to arrange skeds for people who want to work new stations.

If you want skeds, contact one of the skeds co-ordinators via the 14.345MHz EME Net or at the e-mail addresses at the top of every Newsletter.

Skeds are usually arranged on the monthly Skeds Weekends published in the Newsletter. **Please be sure to send your sked requests no later than 3 weeks before the next Skeds Weekend**.

You can of course arrange your own skeds, but do not use frequencies on or below 432.070MHz and 1296.070MHz. Reason: these frequencies are used for co-ordinated skeds, and there may be extra skeds that are not in the Newsletter.

5.2 Frequency

The first-named station in the skeds list transmits first, exactly on the agreed frequency for the sked.

The second-named station also transmits exactly on the agreed frequency for the sked.

5.3 Time periods

Time periods are used for skeds, because the other station may not be copying at the end of a transmission, and may not know when to change over.

For skeds on 432MHz and above, time periods are **2.5** minutes for each transmission, **synchronized to UTC** (+/- 2 sec maximum error).

5.4 Example sked QSO

Skeds list says:

```
432.045
2300   DL9KR   K2UYH
```

DL9KR sets his TX frequency to exactly 432.045 (using an accurate external frequency counter, not the frequency display on the rig). K2UYH does the same.

Initial transmission

Precisely at 2300:00UTC, DL9KR starts to transmit:

K2UYH DE DL9KR (pause) **K2UYH DE DL9KR K2UYH**...

This continues until 2302:30 ... **DE DL9KR K**.

Further transmissions – procedure depends on what has been copied.

- **Copied nothing at all**

  First 2 minutes – transmit both callsigns.

  Last 30 seconds – do **not** transmit!

- **Copied something, but not copied both callsigns complete**

  First 2 minutes – transmit both callsigns.

  Last 30 seconds – optionally transmit **T T T** – but note the warning in Section 4.2!

- **Copied both callsigns COMPLETE, but no report**

  First 2 minutes – transmit both callsigns.

  Last 30 seconds – transmit report: **M M M** = difficult copy, or **O O O** = easier copy.

  Do not change report during a sked period.

  Do not mix report with callsigns.

  Do not use RST reports in initial skeds, unless you are very confident about signal strengths in both directions.

- **Copied both callsigns + report**

  Full 2.5 minutes - transmit only **MRMR** or **ORORO**

- **Copied both callsigns + report + R confirmation**

  Full 2.5 minutes - transmit only **R R R**.

- **Copied R**

  If you have copied one **R** from the **R R R**... transmission, **the QSO is now complete**. To confirm this to the other station, it is usual to transmit **R R R, 73 TNX GL SK** etc.

5.5 Incomplete sked QSOs

Co-ordinated skeds are of 30 minutes duration. If the QSO is incomplete at the end of the 30-minute sked period, you should generally abandon the sked – someone else will probably need the frequency.

'Private' skeds may continue longer, but should not be on frequencies used for co-ordinated skeds.

6. Random QSOs

Most QSOs on 432MHz and 1296MHz are 'random' – not by skeds. Usually there are no fixed time periods because both stations can hear when to change from RX to TX.

The basic format for a random QSO is the same as for a sked, except that one station has either called CQ, or has signed out of a previous QSO on 'his' frequency.

Example

K1RQG has called CQ. **DL4EBY** is going to call him for a random QSO.

6.1 Calling a station

Frequency

Set your RX clarifier (RIT) so that your echoes are at the same audio pitch as K1RQG's signal. Then he will hear you on exactly the same frequency as *his* own echoes.

You may not want to call exactly on that echo frequency, because it may be the center of a pile-up!

If you cannot hear your own echos, calculate your echo offset using software such as VK3UM, Nova etc, and set your clarifier to that. Take care to set the offset in the correct direction – HF for rising moon, LF for setting moon.

Sending callsigns

Send **both** callsigns – remember that **both** stations **must** copy **both** callsigns for a valid QSO. However, it may be useful to give more repeats of your own callsign to help K1RQG to identify it, e.g:

K1RQG DE DL4EBY DL4EBY K1RQG DE DL4EBY DL4EBY...

The optimum format and length of the call is a matter of operating skill and judgement.

6.2 Answering a call

If you copy both callsigns –

You already know that the other station has copied your callsign. Your answer must make sure that he copies **his** own callsign from **you**.

Reply with both callsigns, with extra repeats of the calling station, e.g:

DL4EBY DL4EBY DE K1RQG DL4EBY DL4EBY DE K1RQG...

Then send a report. The rest of the QSO continues as described in the sked example above.

If you have not copied either callsign for sure –

Transmit **QRZ? QRZ? QRZ? DE K1RQG**... several times. DL4EBY should reply with both callsigns, for **1 minute or more**. If K1RQG replies with **QRZ?** again, call him for even longer!

Note to other stations: **QRZ? is NOT an invitation to break in!**

If you have copied your own callsign –

Often you copy your own callsign easily, but have difficulty in identifying the unknown callsign. You have two choices:

a) Call **QRZ?** as above.

b) Send **Y Y Y Y Y Y Y DE K1RQG**...

Y Y Y means "I need **Y**our callsign only. I have already copied my own callsign." DL4EBY should reply with his own callsign **only**, for **1 minute or more**. After a second **Y Y Y**, call for even longer!

Y Y Y is very effective, but it needs more use and more publicity!

Sending your own callsign

Only you can decide the most effective way to send your own callsign, when responding to **Y Y Y**. Most people simply transmit their callsigns many times, for example:

GM4JJJ GM4JJJ GM4JJJ GM4JJJ GM4JJJ...

This is the pattern that most people will expect to hear, and will be listening for.

An alternative pattern is to repeat each letter 5 times, for example:

OOOOO KKKKK 11111 DDDDD FFFFF CCCCC

This may be effective for some callsigns... but clearly not for GM4JJJ!

7. ARRL VHF/UHF contest procedure

Some stations in the USA operate EME during ARRL VHF/UHF contests. These use large grid squares (e.g. FN32) as multipliers, but do not require exchange of a signal report. On EME, the procedure is the same as described above, but send your grid square instead of the report.

G G G means "I need your grid square for ARRL contest."

8. Polarization switching / rotation

The EME Directory lists stations with linear rotatable (rot.) and linear switchable (h/v) polarisation capability.

If only one station can change polarization, he should optimize polarizations in both periods, and should transmit second in skeds.

If both stations can change polarization, both stations should transmit horizontal and switch/rotate to receive.

9. Breaking the rules!

For a newcomer, it often seems that people do not use the procedures described here – but this is only partly true.

Stations who have worked each other many times, and have strong signals, may decide to have a more 'normal' amateur radio QSO without using these special EME procedures. Even so, the basic QSO format is still there as a framework .

If signals become difficult to read, good EME operators should move back toward the standard procedures:

- Reduce high speeds, send more clearly
- Use **M**/**O** reports instead of RST
- Do not change frequency or TX polarization
- Change back to standard TX/RX periods synchronized to UTC.

Please send any comments and corrections to:

g3sek@ifwtech.co.uk