

OPERATING PROCEDURES FOR METEOR SCATTER QSO'S

Note. These procedures were adopted at the IARU Region 1 Conference in Miskolc-Tapolca (1978), later slightly amended at the IARU Region 1 Conference in Noordwijkerhout (1987), Torremolinos (1990), de Haan (1993) and San Marino (2002). The meeting in Vienna 2004 accepted a slightly reworded version.

1. INTRODUCTION

The goal of the procedures described is to enable contacts to be made by meteor scatter (MS) reflection as quickly and easily as possible. Meteor scatter is unlike most other propagation modes, in that neither station can hear the other until an ionised meteor trail exists to scatter or reflect the signals. As the reflections are often of very short duration the normal QSO procedure is not readily applicable and specialised operating techniques must be taken to ensure that a maximum of correct and unmistakable information is received. The two stations have to take turns to transmit and receive information in a defined format, following the procedures as detailed below. Some meteor showers are strong enough to make some of these measures unnecessary but to encourage use of all generally listed showers there is no reason why the suggested procedures should not always be used. As with operating procedures in general, the virtues of the MS operating procedures are mainly that they are standard and are widely understood throughout IARU Region 1.

2. SCHEDULED and RANDOM CONTACTS

Two types of MS contacts, arranged in different ways, may be distinguished:

- a. A scheduled contact, where two interested stations arrange in advance the frequency, timing and duration of the test, as well as the transmission mode (e.g. Telegraphy, SSB or FSK441) and call signs to be used. Scheduling may be carried out, for example, by exchange of letters or e-mail, by radio via the European VHF Net on 14.345MHz, by Internet chat-rooms or packet-radio.
- b. A non-scheduled contact, where a station calls CQ or responds to a CQ call. Such contacts are often called "random MS". Random contacts are far more difficult and because you're starting entirely from scratch, it's particularly important for both stations to follow the standard IARU meteor scatter QSO procedures.

3. TIMING

Accurate timing of transmit and receive periods is important for two reasons: to maximise the chances of hearing the other station, and to avoid interference between local stations.

The recommended time period for random contacts is,

- a. Telegraphy - 2.5 minute periods,
- b. SSB - 1 minute periods,
- c. FSK441 - 30 second periods.

This practice gives quite satisfactory results. However growing technical standards make it possible to use much shorter periods and amateurs may wish to arrange 1-minute schedules for Telegraphy and shorter periods for SSB especially during major showers. If non-standard time periods are used the first priority is to avoid causing interference to local stations that are using the standard periods.

The recommended standard period for both random and scheduled SSB contacts is 1-minute. However time periods shorter than this are encouraged during major meteor showers. Quick-break procedures within SSB contacts can be very effective. This could involve, for example, taking a break every 15 seconds in case the QSO can be completed within one long burst.

Prior to any MS activity it is absolutely vital that clocks need to be set to better than two seconds of standard time. This can be accomplished, for example, by using TV Teletext, telephone 'speaking-clock' or GPS time signals. Any clock inaccuracy will result in wasted time and will cause unnecessary interference to other MS stations.

4. TRANSMIT PERIODS

- a. All MS operators living in the same area should, as far as possible, agree to transmit simultaneously in order to avoid mutual interference.
- b. If possible, northbound and westbound transmissions should be made in periods 1, 3, 5 etc. counting from the full hour. Southbound and eastbound transmissions should be made in periods 2, 4, 6 etc.

5. SCHEDULED DURATION

- a. Every uninterrupted scheduled period must be considered as a separate trial. This means that it is not permissible to break off and then continue the contact at a later time.
- b. Scheduled contacts using Telegraphy or SSB are usually arranged for up to 1-hour duration although during shower periods this can be significantly reduced. Operators using the more efficient FSK441 transmission mode often use 30-minutes or less.

6. FREQUENCIES

Scheduled Contacts:

These contacts may be arranged on any frequency, taking into consideration the mode and band plan. Scheduled contacts should avoid using known popular frequencies and the random MS frequencies.

Non-Scheduled Contacts:

For non-scheduled contacts reference should be made to the relevant IARU Region 1 band plan.

7. QSY FREQUENCIES

To avoid continent-wide interference, which results from a large number of stations attempting to complete contacts on the various MS calling frequencies, a QSY method is recommended. The procedure for moving a beginning QSO off the calling frequency without losing contact is as follows.

a. Telegraphy:

During the CQ the caller indicates on which frequency he/she will listen for a reply and carry out any subsequent QSO. Refer to the relevant band plan for QSY frequencies.

- i) Select the frequency to be used for a QSO by checking whether it is clear of traffic and QRM.

- ii) In the call, immediately following the letters "CQ", a letter is inserted to indicate the frequency that will be used for reception when the CQ call finishes. This letter indicates the frequency offset from the actual calling frequency used. For instance, CQE would indicate that the operator will listen on the calling frequency + 5kHz.

A = 1kHz	(CQA)	N = 14kHz	(CQN)
B = 2kHz	(CQB)	O = 15kHz	(CQO)
C = 3kHz	(CQC)	P = 16kHz	(CQP)
D = 4kHz	(CQD)	Q = 17kHz	(CQQ)
E = 5kHz	(CQE)	R = 18kHz	(CQR)
F = 6kHz	(CQF)	S = 19kHz	(CQS)
G = 7kHz	(CQG)	T = 20kHz	(CQT)
H = 8kHz	(CQH)	U = 21kHz	(CQU)
I = 9kHz	(CQI)	V = 22kHz	(CQV)
J = 10kHz	(CQJ)	W = 23kHz	(CQW)
K = 11kHz	(CQK)	X = 24kHz	(CQX)
L = 12kHz	(CQL)	Y = 25kHz	(CQY)
M = 13kHz	(CQM)	Z = 26kHz	(CQZ)

In all cases the letter used indicates a frequency higher than the CQ frequency.

- iii) At the end of the transmitting period the receiver should be tuned to the frequency indicated by the letter used in the CQ call.
- iv) If a signal is heard on this frequency it may well be a reply from a station who has heard the CQ call and replies on the frequency calculated from the letter used during this call.
- v) When the caller receives a signal on the frequency indicated during the call and identifies the reply as an answer on his CQ, the transmitter is moved to the same frequency and the whole QSO procedure takes place there.

b. FSK441:

A similar QSY procedure to that of Telegraphy is used by operators using FSK441 transmissions. However instead of using a letter system, operators should use a number system.

Users of FSK441 should indicate the frequency they intend to carry out the QSO by adding the three digits of the nominated frequency. For example CQ383 indicates that the station will listen on 144.383 MHz for a subsequent contact.

c. SSB:

The letter system should not be used for SSB contacts!

8. QSO PROCEDURE FOR SCHEDULED CONTACTS AND RANDOM OPERATION

a. Calling

The contact starts with one station calling the other, e.g. "G4ASR OH5LK G4ASR".

b. Reporting system

The report consists of two numbers:

First number (burst duration)	Second number (signal strength)
2 : up to 5 sec.	6 : up to S3
3 : 5 - 20 sec.	7 : S4 - S5
4 : 20 - 120 sec.	8 : S6 - S7
5 : longer than 120 sec.	9 : S8 and stronger

c. Reporting procedure

A report is sent when the operator has positive evidence of having received the correspondent's or his own callsign or parts of them.

The report is given as follows: "G4ASR OH5LK 37 37 G4ASR OH5LK 37 37".

The report should be sent between each set of call signs: three times for Telegraphy, twice for SSB and twice for FSK441.

The report must not be changed during a contact even though signal strength or duration might well justify it.

d. Confirmation procedure

- i) As soon as either operator copies both callsigns and a report he may start sending a confirmation. This means that all letters and figures have been correctly received.

You are allowed to piece the message together from fragments received over a period of bursts and pings, but it's up to the operator to ensure that it's done correctly and unambiguously.

Confirmation is given by inserting an R before the report: "G4ASR OH5LK R37 R37 OH5LK ...". A station with an R at the end of the call sign could send "SM7FJE G4ASR RR26 RR26 ...".

- ii) When either operator receives a confirmation message, such as "R27", and all required information is complete he must confirm with a string of R's, inserting his own call sign after each eighth R: "RRRRRRRR HG5AIR RRRR". When the other operator has received R's the contact is complete and he may respond in the same manner, usually for three periods.

e. Requirements for a complete QSO

Both operators must have copied both callsigns, the report and a confirmation that the other operator has done the same. This confirmation can either be an "R" preceding the report or a string of "RRRR..."s as explained in paragraph 8.d.ii.

Contacts using SSB are conducted in the same way as Telegraphy or FSK441. When attempting random contacts, speak the letters clearly, using phonetics where appropriate. It may not be necessary to use phonetics during a scheduled SSB contact, but still speak clearly.

9. MISSING INFORMATION

If a confirmation report (R**) is received it means that the other operator has copied both call signs

and the report, yet you may still need something from that station. At that stage, you can try to ask for the information needed by sending a missing information code string.

The following strings may be utilised by operators using Telegraphy to ask for missing information:

BBB....	both callsigns missing
MMM....	my callsign missing
YYY....	your callsign missing
SSS....	duration and signal strength missing
OOO....	all information complete
UUU....	faulty keying or unreadable

The other operator shall respond by sending only the required information. This approach must be used with great caution to prevent confusion.

Note

These procedures were adopted at the IARU Region 1 Conference in Miskolc-Tapolca (1978), later slightly amended at the IARU Region 1 Conference in Noordwijkerhout (1987), Torremolinos (1990), de Haan (1993), San Marino (2002). Due to significant advances and usage of machine generated modes (such as FSK441) these procedures were updated at the interim meeting, Vienna (2004).