EME (EARTH-MOON-EARTH)

QSO PROCEDURE

FOR 144 MHz

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Sometimes the signals are sufficiently strong for the standard RST system to be used.

Normally most operators set up on a zero-beat frequency with each other. This is the frequency passed on to the other station involved in the schedule. He will have to make frequency adjustments at his end depending on the audio tone he likes to copy. In addition, the received frequency will change due to the relative motion between the moon and the transmitting and receiving stations. If the moon is at exact apogee, or perigee, there will be no doppler frequency shift when listening to your own echoes as the moon crosses your meridian. At all other times, there will be doppler shift due to the relative motion of the moon around the earth as well as away from, or towards, the earth. When the path between you and the moon is becoming shorter the frequency will shift up. If the moon is going away from you, the frequency will shift down. Until the other station is actually located on your receiver dial, you should tune plus or minus about two kilohertz. Once the signal is found you will notice the frequency will change during a one hour schedule. The change is due to doppler and any equipment drift either station may have.

On 144 MHz the signal reports are given during the last 30 or 45 seconds, with no calls. This is to avoid confusion between the report and the call letters. If no report can be given, then calls are sent during the entire two minute period. After the calls and an "O" have been received, the answering report is sent for two minutes. Just as in meteor scatter, there are many different contact combinations depending upon which operator is "ahead" in the normal QSO sequence. The stronger the signals are, the less regimented the contact becomes. Also, after the twenty-fifth contact with the same station, the contacts tend to be far more relaxed and informal!

The following QSO note sheet is included to show an actual EME contact sequence. This particular schedule started on the hour. If the schedule had started at 0141 GMT, then WA2BIT would have transmitted until 0142. W6PO would be receiving as the sheet indicates. At 0142 W6PO would start calling WA2BIT. The start of the hour is always used as the reference for whether one operator takes the odd, or even, two minute period, no matter when the schedule starts within the hour. The periods 0-2, 4-6, and 8-10 are odd because they are the 1st, 3rd, and 5th period after the start of the hour.

It is useful to have two types of QSO log sheets available. The first shows the receiving times during the odd periods. A second sheet with receiving times during the even periods is also required.

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By: Robert I. Sutherland W6PO

To provide an Operating Aid to the beginning moonbouncer, an example of typical EME contact scheduling will be described.

It is conceivable that in the future, when there is extensive use of the Universal Window, and an agreement as to what part of each VHF/UHF band will be used for EME, schedules will not be required. However, at the present time, almost all contacts are made as a result of a prearranged schedule. First, the operators involved must determine a time when the moon is in the proper place in the sky for each participant. Two of the previous Operating Aids titled "Locating the Moon" and "More on the Moon-bounce Universal Window for 144 MHz" can be used to determine the aiming data. There are several computer printouts that are available that make the job simpler. However, if a computer printout is not at hand, the Nautical Almanac, in conjunction with HO-214, is probably the easiest system. The use of these two Government Printing Office publications is described in the "Locating the Moon" Operating Aid.

In addition to timing, the participants must determine the operating frequency, the calling sequence, and the length of the transmitting period for each station. On six meters, Faraday Rotation is quite fast and as a result the transmitting periods have to be short. On two meters, the typical Faraday Rotation is 20 minutes between maximum signal peaks and the transmitting period is usually two minutes in duration at the present time. Each band uses a different transmitting time period. Be sure to agree with your fellow participant on all details before the schedule starts!

The reporting system currently used on 144 MHz is very similar to the meteor scatter method. The EME system has two more levels of signal report than the MS method in order to communicate to the other operator what the status of the contact is. The system used is as follows:

T - Means a signal is just detectable. Sometimes a signal will sound like "musical" noise.

M - Means portions of calls have been copied. Not enough has been copied to identify the transmitting station or who is being called.

O - Means a complete call set has been received. This is similar to the S2 report in meteor scatter work. The remainder of the reporting system is like meteor scatter.

R - Means both the "O" and call sets have been received.

SK - Means the contact has been completed.

DATE Feb 3, 1974 STATION WAZBIT

TIME 0100-0200 GMT NOISE

0100 -- 2 RECV: Hear musical noise sometimes a dot or dash

30 -- 32 XMIT: WAZBIT DE W6PO (NO ECHO) O report sent.

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2 -- 4 XMIT: WAZBIT DE W6PO T report sent

32 -- 34 RECV: W6PO DE WAZBIT M received

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4 -- 6 RECV: W6PO DE WA - - - - -

34 -- 36 XMIT: WAZBIT DE W6PO O report sent

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6 -- 8 XMIT: WAZBIT DE W6PO (GUD ECHO) M report sent

36 -- 38 RECV: W6PO DE WAZBIT M received

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8 -- 10 RECV: W6 - - - BIT

38 -- 40 XMIT: WAZBIT DE W6PO O report sent

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10 -- 12 XMIT: WAZBIT DE W6PO (GUD ECHO) M report sent

40 -- 42 RECV: W6PO DE WAZBIT M received

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12 -- 14 RECV: W6 AZBIT received T report

42 -- 44 XMIT: WAZBIT DE W6PO O report sent

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14 -- 16 XMIT: WAZBIT DE W6PO M report sent

44 -- 46 RECV: W6PO DE WAZBIT O received

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16 -- 18 RECV: W6PO DE WAZBIT M received

46 -- 48 XMIT: R O sent for 2 minutes

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18 -- 20 XMIT: WAZBIT DE W6PO O report sent

48 -- 50 RECV: R R R R - - - RO's and FB's

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20 -- 22 RECV: W6PO DE WAZBIT M received

50 -- 52 XMIT: Sent R SK 73 FB

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22 -- 24 XMIT: WAZBIT DE W6PO O report sent

52 -- 54 RECV: R R R R

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24 -- 26 RECV: nothing heard

54 -- 56 XMIT: R RSK 73

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26 -- 28 XMIT: WAZBIT DE W6PO O report sent

56 -- 58 RECV:

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28 -- 30 RECV: weak signal in there (VY WK ECHO)

58 -- 60 XMIT: