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**EME COMMUNICATIONS: HISTORY AND EVOLUTIONS**  
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**with the kind help from Peter G3LTF, Al K2UYH, Matej OK1TEH, Al**  
**W5LUA, Barry VE4MA, Luis CT1DMK**

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This paper was written in tribute to Marius Cousin F8DO and Philippe Pierrat F2TU

## 1. Introduction

We will first give some milestones in the history of EME communications that are spread on the 60 last years.

In a second part, we analyse the results of the ARRL EME contests of the last 25 years to grasp what have been the evolutions in this mode of traffic and also to try to foresee what could be the future of the EME community.

## 2. History of EME

Some Important Dates :

- **1944** : First echoes received from Moon on 514MHz by the German Würzmann Radar
- **1946** : US Army Signal Corps Lt Colonel John De Witt Jr , W4ERI , tried to receive his own echoes from the Moon using a 8 kW Radar modified transmitter on 111.5 MHz.
- **1950** :W4AO and W3GKP try to make the first EME QSO on 144 MHz using the USAF Diana Project 1 kW transmitter
- **April 1953** : W3GKP and W3LZD receive the first echoes from W4AO on 144 MHz
- **September 1953** : Herbert Johnson , W3QKI (W6QKI) receive his own echoes using 700 watts transmitter and a 104 éléments Yagi
- **Some months before** : Collins Radio Company made a contact via the Moon between Iowa and Washington DC on 418 MHz using a 20 kW transmitter
- **1960 July 21th** : W1BU and W6HB make the first bilateral contact via the Moon on 1296 MHz
- **1964 April 11th** : W6DNG and OH1NL make the first ever EME contact on 144 MHz between USA and Europe
- **1964 May 20th** : first EME contact on 432 MHz between KP4BPZ and W1BU
- **1964 June 13th** : First EME contact on 432 MHz between KP4BPZ and HB9RG
- **1964 September 27th** : first EME contact on 1296 MHz between USA and Europe by W1BU and HB9RF
- **1967 January 27th**: F8DO and W6DNG made the first ever contact via the Moon on 144 MHz between France/Europe and USA (see paper on DVD)
- **1970 October 19th** : first EME contact on 2304 MHz between W4HHK and W3GKP
- **1972 July 30th** : first EME contact on 50 MHz between W5SXD, WA5HNK and K5WAX (see attached files on DVD)
- **1984 May 5th** : first EME contact on 2320 MHz between OK1KIR and OE9XXI
- **1987 April 7th**: first EME contact on 3.4 GHz between KD5RO and W7CNK
- **1987 April 24th** : first EME contact on 5.7 GHz between WA5TNY and W7CNK

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- **1988 January 22** : first EME contact on 902 MHz between K5JL and WA5ETV
- **1988 August 27th** : first EME contact on 10 GHz between WA7CJO and WA5VJB
- **1994 December 11th** : first NA to EU EME contact on 5760 MHz between VE4MA and OE9PMJ
- **1995 May 2nd** : first NA to EU EME contact on 3400 MHz between VE4MA and DL9EBL
- **2001 August 18th** : first EME contact on 24 GHz between Barry VE4MA and Al W5LUA
- **2003** : JT digital modes created by Joe Taylor K1JT making easier contacts via Moon !
- **2005 January 23th** : first EME contact on 47 GHz between AD6FP and Sergueï RW3BP
- **2005 April 16th** : 47 GHz EME contacts between AD6FP, W5LUA, VE4MA and RW3BP
- **2013 February 25th** : Sergueï RW3BP received his own echoes from the Moon on 77,5GHz
- **2013 June 12th** : W5LUA successfully received a very weak 77184.1 MHz signal from RW3BP using the MMCW decoder program

Note : All these informations came from :

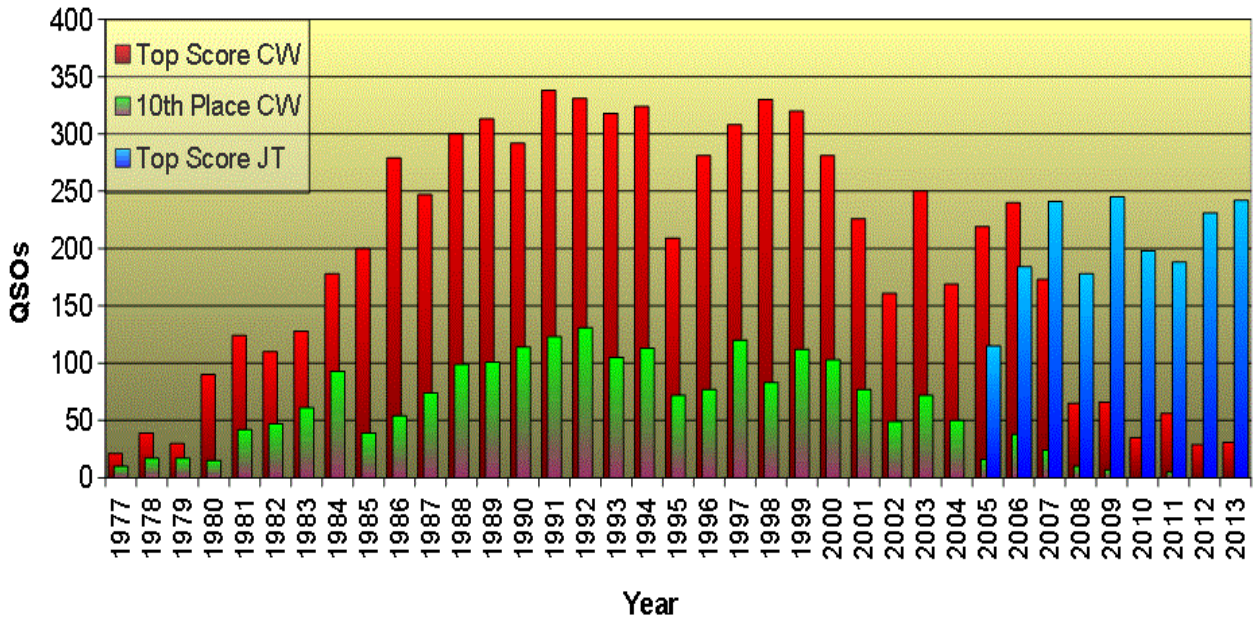
- « VHF handbook » 1956 first publication, written by the wellknown W. I.. ORR W6SAI and H.G. Johnson W6QKI and in the second publication in 1972 by ARRL written by Ed Tilton W1HDQ (QST VHF editor).
- QST magazine
- 432 and above newsletter (Al K2UYH)
- 144 MHz EME newsletter (Rolf DK2ZF)
- Dubus magazine
- OK2KKW website
- W7GJ website
- F1EHN website

### 3. Evolution of the EME traffic

The following is an analysis of the ARRL EME contest, starting from 1977, on 2m, 70cm and 23cm by Luis from CT1DMK.

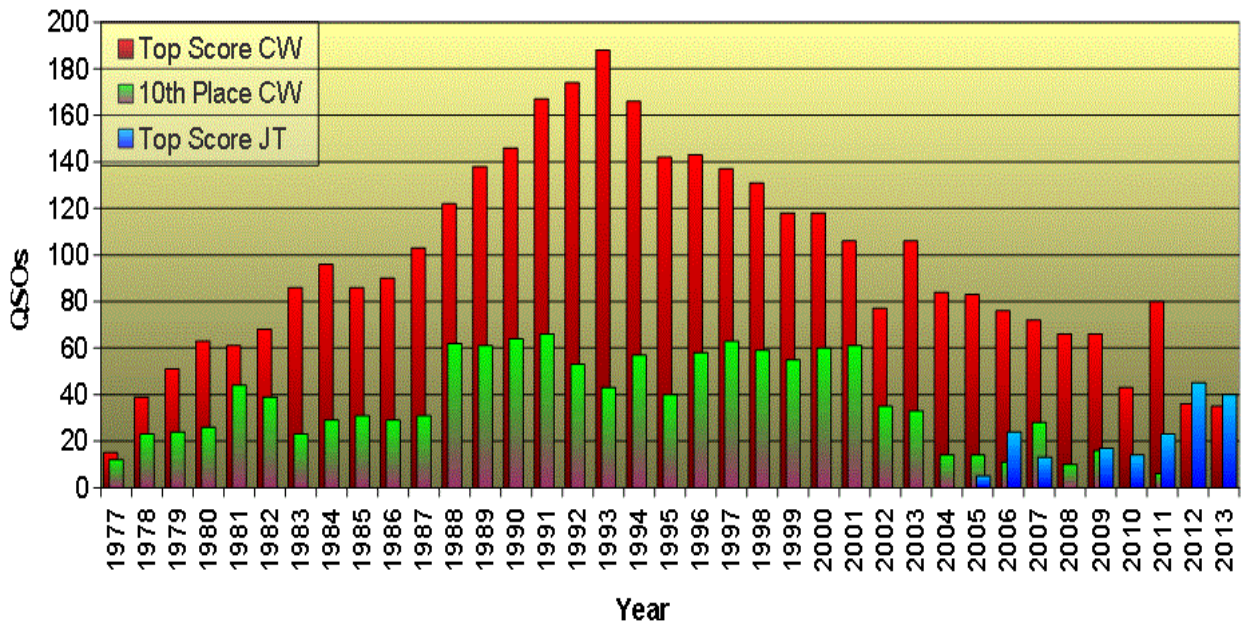
- The top score does reflect nearly the total active stations while the performance of the 10<sup>th</sup> place gives an indication for how a medium station would have felt the activity.
- Monoband top score station was considered.
- ARRL presented the results (without per band breakdown after 2003). I may have listed lower number of QSO's.
- In the recent years where Assisted and Unassisted categories existed the Unassisted category was considered. It would make little sense to have 30+ Years of unassisted EME compared with anything else.
- Year 2003 CW score on 2m is probably wrong since there was no distinct digital and CW categories. It is likely that it is however correct on 70cm and 23cm since not many digital QSO's hapenned and certainly not by the top score stations.
- After year 2011 10th place values are estimates.

### 144MHz ARRL EME



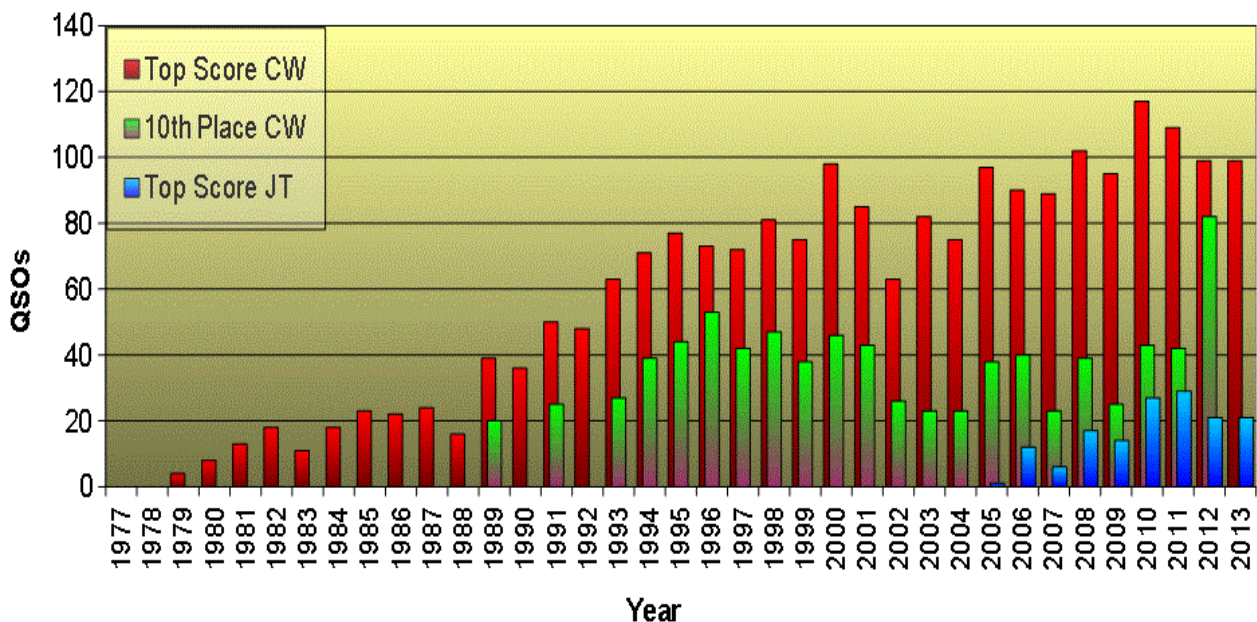
Year 2003 CW score is probably inaccurate since there was no distinct digital and CW categories.

### 432MHz ARRL EME



Year 2008 digital score is probably buried in a multiband station score. Impossible to tell from the listing the scheme ARRL used that year.

## 1296MHz ARRL EME



*2000-2003 CW scores here at 23cm is probably correct albeit no distinct digital and CW categories. I do believe that all QSO's were CW.*

#### 4. Conclusions

These results show a decrease of the number of EMEers on 2m and 70cm after the mid 90s. In the opposite, the slope is always upward on 23cm, with a more pronounced increase with the new century. This evolution is coherent with the switch by more and more OMs from the large Yagi arrays to dish antennas, taking in the same time advantage of decreasing noise factors in UHF and SHF.

However, after 2005, the number of 2m and 70cm EMEers seems to bounce back, with the opportunity to use more modest Yagi antennas combined with digital modulations to perform EME contacts.

It seems that the number of operational stations on 10 GHz EME worldwide is less than 50 in 2014. The contribution of PA0EHG in this conference shows that in a near future it could be possible, with the help of signal processing, to operate a digital EME station on 3cm using a dish as modest as one for digital TV satellite reception. No doubt that the future of EMEers is to grasp this opportunity and to move to the upper bands.

Go on accompanying the progress of radio technologies and be precursors by always exploring new challenges !

#### Material available on the attached DVD :

- QST March 1967 about first USA/France EME contact between F8DO and W6DNG
- QST September 1972, pictures and sound recordings of the 1st 50 MHz EME QSO
- DXCC Records from french OMs on 2m and 70cm
- ARRL EME Contest 2013 Results by Rick Rosen K1DS
- Some sound recordings of EME QSOs from TM8PB station at 5.7 GHz