

# The first five years of 10 metre FM



In the early 1970s, approaching the bottom of the last sunspot cycle, the idea of an FM net was discussed at great length by a group of amateurs in the Harlow (Essex) area. We were already using the band for local contacts, finding it a quieter alternative to Top Band, and easier to get on to than 2 metres. Some of the group members were experiencing TVI and BCI problems when using SSB or AM on 10m. The idea of FM as an answer to this problem came as a result of hearing the late G8SK (Waltham Abbey) using this mode to great effect. Mac's 50 watt NBFM transmitter enabled him to remain active on the band without the interference problems he experienced on AM.

## FM in Soviet Russia

In those pre-2m black-box days the FM mode was all but neglected by the amateur fraternity. The only part of the world where it enjoyed popularity was Soviet Russia. On days when the band was open the whole of the segment between 28.7 and 29.0MHz was cacophony of wobbling carriers, spurious noises and wideband warbles. We were never quite certain if our dear friends Vlad and Yuri were running legitimate FM or just unregulated AM, but if the passband on your receiver was wide enough they could be resolved by slope detection.

*Ten-metre FM operation  
is catching on fast,  
especially now that CB  
transceivers are being  
modified for 29MHz. But  
five years ago, hardly any  
UK amateurs used the  
mode. John Petters  
G3YPZ describes what's  
happened between then  
and now.*

The Harlow FM net never came to fruition. Various group members dropped out either to move away, give up radio all together, get married, or buy one of the new 2m FM rigs. I was one of the latter. The channel operation, the quality of the transmissions and the solitude of the 2m band back in 1972 caused us to abandon our plans for 10m. This remained so until the Spring of 1978, when tuning around the high end of 10m one afternoon, I came across a group of FM sounding signals. My FT101 was not as interested in these signals as I was, and it was with

considerable difficulty that I finally managed to identify them as being a group of Stateside amateurs in a local net. The frequency being used was 29.600MHz. I later discovered that this was the international FM calling channel. Having become disenchanted with 2m and repeaters by this time, 10m FM was again appealing. I had two problems to overcome:

1. No FM rig. 2. No one else to talk to, as the band was due to go into its traditional Summer DX recess any time.

Shelving the idea yet again, with the intention of doing something positive by the beginning of the Autumn season, I turned my radio time to other pursuits, but still keeping an eye on the top end of 10m from time to time. During the Summer months, at the height of a sporadic E opening to Europe I heard an OZ station from Copenhagen talking on that same frequency. Calling him on my FT101 on AM resulted in a very difficult contact, due to my narrow band RX and his FM discriminator. Before abandoning the contact I did learn that there were a number of stations in his city that used 29.6 as a local chat channel.

I was now determined to get on 10 FM as quickly as possible. By the time the band opened up to the States in late September I had the FT101 transmitting the mode. This was achieved by bringing the clarifier into operation on transmit, and feeding the audio output from the mic

amp via a capacitor, onto the clarifier control. This was crude but highly effective. On receive I still had the problem of slope detecting through a very narrow filter. My first Stateside FM contacts were made using this system. The date was Oct 6th 1978. My antenna at this time was a quarter wave ground plane, 20ft above the ground. A contact with WD8BMO, which was confirmed, gave me an 44 report, while his signals at times were peaking S9. I was running about 30 watts output. At the Ohio end the equipment was a modified General Electric base station, with a ground plane antenna. The appearance of my G callsign on 29.6 caused an almighty great pile up, and I was able to work station after station in rapid succession.

## Stateside DX

The only fly in the ointment was my poor receive capabilities. I decided that the easiest way to receive FM signals on the band was to build an up converter, using the 2m rig as an IF. After a period of experimentation the converter, using a BF900 RF amp and mixer, I now had receiver with a sensitivity of 0.2 microvolts for 20dB quieting. At last I could now hear the Stateside DX as clearly as the local 2m repeater. One very surprising characteristic of the FM DX stations was the presence of phase distortion, which was common in the AM days. With the assistance of a fellow enthusiast G3ZEV, it was decided to take a look at the capabilities of the 10m band for local ground wave, or more correctly space wave propagation.

Having acquired a 4ft centre loaded gutter mounted CB antenna, we could now do some serious range tests base to mobile, and on FM. With the FT101 installed in my Renault 12 G3ZEV drove off down the M11 towards London. We had used this route before on 2m with signals dropping out due to a badly obstructed terrain. For this test the TX power was limited to 10 watts output, with a steady carrier radiated all the time. Callsign identification and position was given throughout the journey, whilst the signal was monitored on the converter/2m RX. We found that the signal remained fairly constant with a notable lack of mobile flutter as is the norm on 2m. The usual black spots on 2m did not affect the 10m signal, and in fact the strength did not deteriorate drastically until the junction of the M11 and the North Circular Road, where the road slips down into a concrete gully. From this test we concluded that 10 appeared to have great possibilities for simplex mobile use.

Throughout the 78/79 DX season I had numerous QSOs with Stateside and Soviet FM stations, but found very little interest in the 10 FM mode by other amateurs in the UK. The main reasons for this was firstly that most people were unaware of the FM segment, and secondly there was no equipment available for the mode.

During April 1979 G3ZEV and myself acquired two 80 channel 10m transceivers. These rigs, made by Unicom, were ideal for our 10m local research. On testing the receivers in these rigs we found it essential to replace the RF and Mixer FETs with BF900s in order to get comparable sensitivity to the converter. With these rigs installed in the vehicles, and using identical mobile whips, we were able to have the first FM mobile contacts with the USA. On some of these contacts the power was reduced from 10 watts to only 1 watt, but when conditions were good this was all that was required to cross the pond. We spoke to several other mobile stations on the East Coast of America.

The Summer of 1979 was taken up with various experiments in range with the mobile equipment. One notable series of tests were with LA2PH/MM who was on route from Europe to the Persian Gulf. He would often call in to our local mobile to mobile contacts to give us reports up and down the coast of Africa. On the local front, we decided to try a series of tests to compare the characteristics of 2m and 10m for local simplex use. The 2m rigs used were the Kyokuto Denshi FM144, with BF900s in the front end, and equivalent sensitivity to the 10m rigs. At G3ZEV the 2m base aerials, were a 6dB colinear and an 8 element vertical beam. The 10m antenna was a half-wave vertical tuned against a radial system. All the antennae were mounted on the roof of a block of flats at around 50ft above the ground. The 2m mobile antenna at G3YPZ/M was a quarter wave mag mount, mounted in the middle of the car roof. Driving north from Harlow along the M11, the 2m signal had become unreliable a few miles north of Bishops Stortford, becoming unusable at Saffron Walden. The 1 watt signal from 10m was still fully readable. Switching from the colinear to the beam caused the 2m 10 watt signal to be usable again. At the junction of the A45/M11 about 35 miles north of the base station, the ten watt 10m signal was noisy whilst the 2m signal was comparable with the beam only on hill tops. Following the A45 to the junction of the A14 north-west of Cambridge, there was no signal from 2m while 10m was still audible. The 2m signal did not reappear until we cleared the Barkway ridge just south of Royston. The only difference between the two bands then was the degree of mobile flutter. Further tests were carried out along the A12 to Colchester some 40 miles NE of Harlow, where the 10m signals just faded out as the town was approached, and down to central London where 10m was copyable driving along Oxford St. The 2m signals on both occasions had become unusable long before the 10m signals started to fall off.

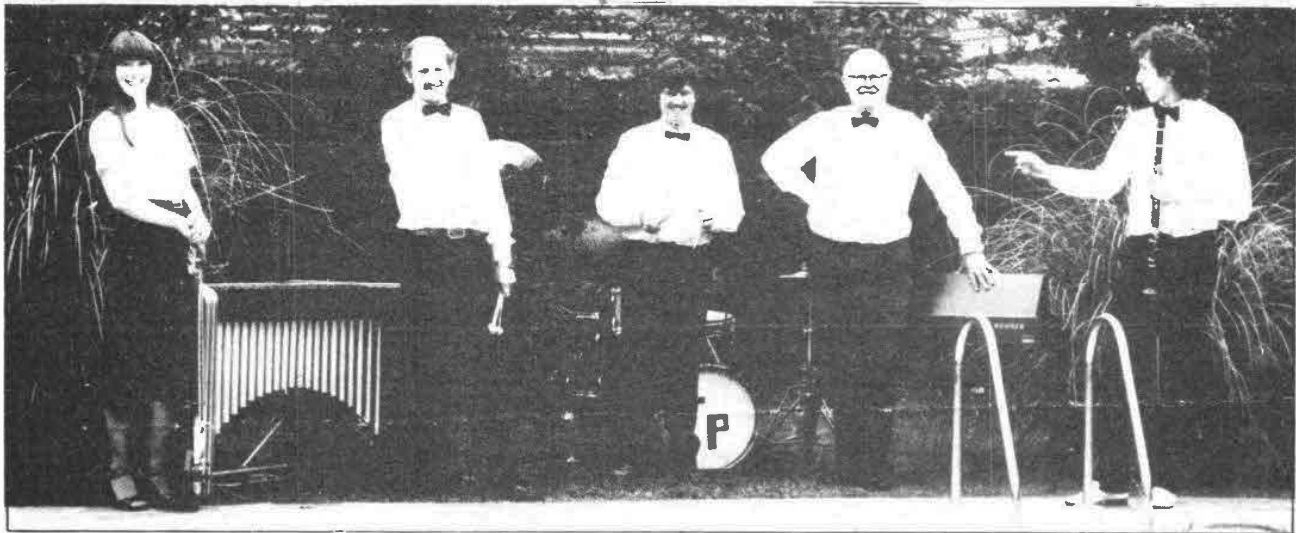
The 79/80 DX season found more Stateside activity, with a noticeable increase in the number of repeaters. My first 10m contact through a repeater was through K2KLN located in New York and New Jersey. This was known as Metroplex, and had inputs and outputs on

both 10m and 2m. The transmitter and receiver were ten miles apart from each other and linked by UHF system. It was fascinating to talk to American 2m mobile and handheld stations from the UK through this machine. It was also quite amusing to work such local friends as G3ZEV and G3STJ the hard way-via New York. Another interesting facet of 10m FM in the States was the remote base station facility. It was commonplace to find amateurs installing crystal controlled equipment on top of mountains or high buildings with good antennae controlled by either 2m or UHF links. Contacts with the West Coast were also plentiful during this season, both from the base station and mobile. The Spring of 1980 also saw the first contacts with Japan. One of the most consistent stations worked was JA2IJV. During the Summer of 1980 we had contacts with Europe on sporadic E, while F layer propagation in August produced PY6SB, 4X6AW, JA2IJV, JA7OWB and a ZS6. The availability of the FT901 with FM caused activity to pick up outside the USA, while in Britain Microwave Modules produced an excellent transceiver with an extremely sensitive front end. The availability of this equipment did much to boost the 10m activity in the UK.

## Local activity

By the beginning of 1981 little pockets of FM activity had begun to spring up in the UK. G3IAG and G4BRB in Suffolk, G4ISG and G4KCS in London, G3STJ and G4GNU in South East Essex with G3LWM, G3ZEV and G3YPZ in North West Essex. A number of amateurs tried 10m FM but gave up soon after due to either a lack of activity or poor results. The latter was almost always due to using the wrong antenna system. There has long been a convention in HF circles that trapped dipoles, G5RVs, trapped verticals, long wires or pieces of wet string were all that was needed to get good results on HF. This is true to a certain extent when working sky wave DX, but for good local results on 28MHz a VHF approach is of paramount importance. Cross polarization on 10m can result in stations only a few miles apart being unable to hear each other. In view of the mobile considerations, vertical polarization was chosen for local FM traffic. We started using quarter wave ground planes for the base stations, up grading to half wave end fed CB antennae or 5/8 wave ground planes with quarter wave radials. The 5/8 antenna gave the best results, having the lowest angle of radiation. Using this type of aerials at 35ft above ground my reliable range for 10 watts was about 35 miles, while 100 watts could give up to 60 miles. The SSB coverage was considerably greater. These ranges were for flat reliable conditions. Under lift or tropospheric conditions the range could be extended, with stations further off displaying slow deep fades.

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The 80/81 DX season produced more activity from the USA and Canada, with the west coast of both countries coming over at good strength. JA contacts were plentiful during the mornings, but the signals were marred by the unwelcome presence of a strong AM carrier on 29.6 and numerous wideband jamming signals sweeping across the band.

## Activity night

To encourage the use of 10m FM an activity night was set up on Monday evenings, which proved popular with the growing number of local stations. The Summer of 82 found more European sporadic E contacts with HB9, OZ, DL, F, SM etc. The following winter season saw the first two way G-VK contacts. Having just completed a contact with a JA station I stood by to hear about 4 or 5 stations calling me. I managed to hear what I thought was a VK prefix. On standing by a second time I was very surprised to hear VK6RO calling me. After moving to a quieter channel a good contact was made. I was running 80 watts to a half-wave CB antenna at 60ft. Signals were varying from full, quieting to very noisy, with any large amount of phase distortion. This was the first of many contacts with VK6RO. The band was not favourable to VK for the mid winter months, but during March 82 I had some excellent contacts with the Australian continent. On the 11th March at 1149 GMT I was sitting in my car in QSO with G4KSD/M who was in the Romford area. My car was parked outside the QTH, a 4 floor block of flats, while opposite stood a 16 storey tower block. During one over I heard a familiar voice calling G3YPZ/M. Thinking it to be another local I asked him to stand by. It turned out to be my old friend Brian G3STJ, but now working as VK4ABZ from Queensland. His signal was fully quieting with me, as mine was at peaks

*Although this photograph has absolutely nothing to do with amateur radio, we couldn't resist printing it. When he's not on the air, John Petters, G3YPZ (centre), plays the drums in the John Petters Swing Band and Dixie Five!*

with him. I was running 80 watts to a 5ft helical 5/8 CB antenna, Brian was using a beam. G4KSD/M just managed to get across with his 8 watt signal. I decided to continue the contact from the base station, as I would have the advantage of the better antenna. The QSO was maintained for 40 minutes. The following day I had my first QSO with New Zealand on FM. ZL1AKW was contacted under severe difficulty between 0900 and 0910 GMT on 29.570MHz. From 1400 to 1430 that day another QSO with VK4ABZ took place, this time while I was mobile between Harlow and Cheshunt, Herts. The following few weeks brought almost daily contacts with Brian and other stations in Australia, notably VK6RO, VK6SM, VK3ADR and VK3WX. An unforgettable contact with VK4ABZ occurred on Sunday 4th April between 1245 and 1405 GMT. The band conditions were really outstanding that afternoon, with Brian's signals running over S9 for most of the contact. G3WFM (Potters Bar) managed a good contact with 5 watts while G4C05 (High Wycombe) got a good report with 10 watts to an indoor antenna. During a peak in the band conditions I reduced the output power to 1 watt, and was received without any difficulty in Queensland. The legalization of FM CB was a mixed blessing to 10m enthusiasts. With the advent of easily modifiable rigs came the dreaded curse of cross mod and dirty synthesisers. Consequently the level of activity has greatly increased, with 29.6 used as a calling channel only, while 29.580 or 570 and others are chosen for QSOs. An enforced close down, due to being in Germany, has meant that activity from G3YPZ has been sparse over the last

year. A new QTH in a tower block has produced antenna problems which have yet to be overcome satisfactorily. Having erected a centre-fed vertical dipole outside my third floor flat in August this year, I was pleasantly surprised to find that the FM activity was so high. Sporadic E brought a full band with very strong signals from EI, GI and GM. Local mobile and base stations can be heard throughout the day and evening. Late September brought the start of maybe the last DX season before the sunspots really fades, with Stateside repeaters roaring in again at good strength.

## Good aerials and sensitive receivers

The use of the 10m band for local contacts is of paramount importance as we travel toward the minimum years. Radio amateurs should find that the band can produce some very exciting and unexpected results if used properly and consistently, with good aerials and sensitive receivers. There will probably be the odd DX contact under freak conditions, but most of the activity will be on ground wave, tropospheric or auroral propagation. Very little serious study has been carried out into these characteristics on 10m. Sporadic E will provide European contacts during the Summer months. With the rising popularity of 10FM it can confidently be assumed that the top end of the band will remain busy.

## Use it or lose it...

I hope that the SSB and CW sections will not remain unpopulated, as there are many other spectrum users who would gladly move up to this band for their own use. There is plenty of room for all modes, so let's not leave it idle for the next 5 years.