

Tricks of the Trade

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The recent ToTT series of methods of generating AM by various means is now complete and the descriptions spanned a time from The Millennium back to the mid-1960s with the offshore stations. With the 50th anniversary of their closure on August 14th 2017 fast approaching, G4OYX felt it appropriate to take a (technical) breather and maybe enter into a degree of self-indulgence and wander off-topic a little. He was pleased to hear from a fellow VMARS member and broadcast enthusiast Stuart Craigen G4GTX of his trials and tribulations in the restoration of some ex-BBC studio equipment and even more pleased when G4GTX offered to contribute to ToTT, a welcome change for ToTT to be at the microphone end of the broadcast system rather than at the usual pointed end.

Introduction

2017 marks the 50th anniversary of the introduction of BBC Local Radio. The first of the eight stations to go on air was BBC Radio Leicester on 8th November 1967 and a 50th anniversary exhibition is being planned by the BBC to celebrate the occasion later this year. It is appropriate to add that, at the Radio Leicester opening ceremony, there was a small protest from members of "The Free Radio Movement" who were angry that the Labour Government at the time had asked the BBC to run these services rather than some commercial concerns as of course the loss of the 'pirate' stations was still a very sore point.

Restoring a BBC Local Radio Mk 1 Studio Desk

This Mk 1 studio desk (**Figure 1**), which was originally the Ops Room desk at Radio Nottingham, was passed on to G4GTX a few years ago, minus the base 'woodwork' but with the top cover complete. It had been decommissioned from service a long time ago. It appeared complete with the two peak programme meters (PPM) intact and all faders/switching present and correct. While not a BBC engineer, G4GTX thought he would approach the restoration as an enthusiastic amateur and see how far he could get.



Figure 1. The Mk 1 Studio Desk

The first problem was that the 'desk' had no base. While woodworking skills were not up to the standard required to fabricate a replacement, the services of a local joiner were

engaged and he made a replica plinth into which the wooden top and the 'works' fitted perfectly. With the base in place the control desk started to look much more impressive and fit for purpose.

Overview

The Local Radio Mk 1 studio desk was standard solid-state equipment installed in the first eight BBC local radio stations. It was designed both for studio 'self-op' use and for the 'ops room' (operations room).



Figure 2. One of the preamp modules. Note that each module is labelled: this one is GRAM 1

The front panel consists of nine preamp modules (**Figure 2**) and a main central module. These were made by Messrs. Peto Scott, probably to a BBC engineering design, believed to be in early 1967. The main module (**Figure 3**) has two balanced 600 Ω outputs – the "A" out and the "B" out. The "A" out was "programme out" via the ops room bay to just the VHF transmitter; there were no BBC Local Radio services simulcast on MF until 1973. The "B" out was to provide cue to telephones during 'phone-ins'. Each of these outputs could be controlled by two master faders

beneath the main PPM on the central module.

The desk had various other facilities including a 'Ring Main' rotary switch (**Figure 4**) where the operator could select a number of sources to monitor through the desk. On this example the 'Ring Main' could switch between: Radio 4 (R4), R3, R2, LDS, VHF TX, ST1 "A" out, OPS "A" out, OPS "B" out and Rediffusion. Other studios and sources could be monitored and an off-air check made on the VHF TX output. It is understood that modifications were made after the introduction of the MF service in order that they could be monitored as well.



Figure 3. The main module



Figure 4. Pre-fade PPM and Ring Main switch



Figure 5. Outside selector switch

When local radio had originally been introduced, it was envisaged that these stations would opt in and out of national BBC radio, thereby providing a few hours of daily local news and local programming. The desk was, therefore, equipped with a rebroadcast facility. A rotary

switch would be used to select the outside source; in this case the switch is labelled Radio 2, Radio 3 and Radio 4. The sources were usually from the main VHF/FM station and, for example, for Radio Leicester that would have been Sutton Coldfield.

Once selected, that source would then be faded up on one of the preamp modules and a national service would then be rebroadcast by the station. In order that the desk might be used for local production work, while opting in to a national service, a "Direct to TX" switch was located on the upper part of the desk. It is of a 'pull-out-before-pulling-down' variety, installed so that it could not be triggered accidentally.

The station output could be monitored either by speaker or by headphones and there was switching on the upper left-hand side of the desk to enable the presenter to do this *via* three key switches, the first allowing the headphones to monitor either the Ring Main, the pre-fade output and the studio output. The studio loudspeaker could be set to normal/dim/cut when switched to either "Check TX", pre-fade or studio out.

The modules

The electronics within each of the modules was typical of the time, employing a glass fibre single-sided printed circuit board with newly-introduced silicon transistors, BC108/9 and BCY71, carbon film resistors and axial electrolytic, polystyrene and polyester capacitors. Mu-metal canned transformers were used in signal-critical, low-hum situations.

Unlike most BBC specified and manufactured equipment of the time, there was no back-plane into which the modules were plugged; each module was effectively hard-wired into circuit, the modules themselves being secured by cross-headed 4BA bolts on the front panel.

The nine preamp modules are arranged along the bottom of the desk (**Figure 1**). Each module (**Figure 2**) has a fader and a pre-fade listen key *via* a three-position key locking in the upper position and non-locking in the lower position, which enables the operator to take level on the source (microphone, gram, etc.) *via* headphones using the left hand PPM.

It is believed that it was usual to set music to peak at PPM4 and voice at PPM5. Once set and the key being returned to the central position, the sound level would be set correctly for broadcast when the source was faded up on the module fader. On this example, the nine modules are labelled: Gram 1, Gram 2, Mic 1, Mic 2, RBR (rebroadcast), Spare, Tape 1, Tape 2, Radio Car.

Each studio and 'ops room' were usually equipped with two record turntables (usually Thorens transcription decks) with Mic 1 and Mic 2 inputs possibly for presenter's mic and a table mic. The 'spare' fader was used to select and broadcast a number of possible outside sources. It would seem that the rotary switch above the fader on this desk could select: Cart, Phones, Studio 2, Studio 3, Input, ST1, OB, OB2, AA Roadwatch (**Figure 5**).

"Cart" was a reference to a tape cartridge machine used to play station identifications and jingles which, in the late 1960s, would have been supplied mainly by the BBC Radiophonic Workshop. Each studio was allocated two tape machines used to play interviews and pre-recorded programmes. Again, there were "direct to TX" keys on the

upper panel to allow a taped programme to be sent directly to the transmitter bypassing the desk and allowing the desk to be used for production. Many AA Roadwatch offices had a small studio and microphone so that road traffic announcements could be included in local programmes.

The initial stations were each allocated a radio car. This had a pneumatic mast and was equipped with VHF talkback on 141 MHz to the station and a UHF 470 MHz programme feed from radio car to the station. It was envisaged that the radio car would add flexibility to local programming and news-gathering. The final module was used to rebroadcast the radio car output and, situated above, various keys to enable talkback to the reporter in the radio car.

Evaluation, frustration, illumination and restoration

Whereas the wiring loom was still intact (**Figure 6**), connections to the rear of the preamp modules had been removed previously by others. This wiring would have fed power to the modules and linked these to the main central module giving programme out and pre-fade facilities. The rear connections were of a screw termination variety with twelve unmarked connections per module. At the rear of each module is a three-position attenuator which can be used to switch the gain of each module in three steps, 0 dB, 30 dB or 60 dB. The wiring of these modules looked a fairly hopeless task to attempt and there was no room for guesswork. By a stroke of luck, a BBC local radio engineer was contacted and, whilst sorting through the station engineering archives, he managed to locate a 'dog-eared' but complete Peto Scott manual and wiring diagram for the modules from 1967. There followed next a fairly long and laborious job of rewiring the module connectors to the rear of the main module (**Figure 7**), entailing the cutting of the original loom (**Figure 8**), and connecting one preamp module at a time, checking that it was working as intended. Each module used an XLR connector for input, balanced at 600 Ω . Finally all nine modules were wired and powered up (**Figure 9**).



Figure 6. Original wiring loom

Switch on... it worked once again. Many of the warning lights on the upper panel require a separate 50 VDC supply which are still 'work-in-progress', as is a slight discrepancy between the two PPMs. However, feeding a 1 kHz tone, initially through the XLR connector of each module, showed that output was there on both A/B desk outputs and that each PPM was again functioning and the desk is operational once again as it would have been in the late 1960s.

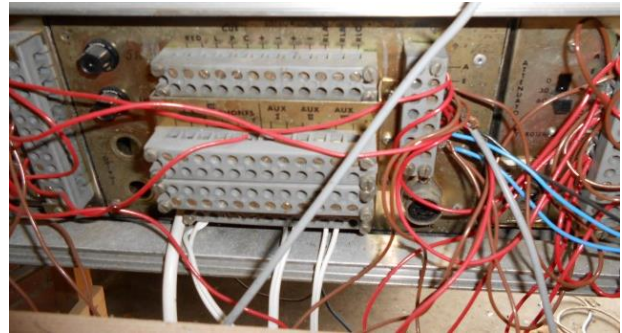


Figure 7. Rear of the main module after rewiring

The ring main, RBR and outside source selectors obviously remain silent but, if connected externally, should operate as intended. The headphone and speaker switching are working.

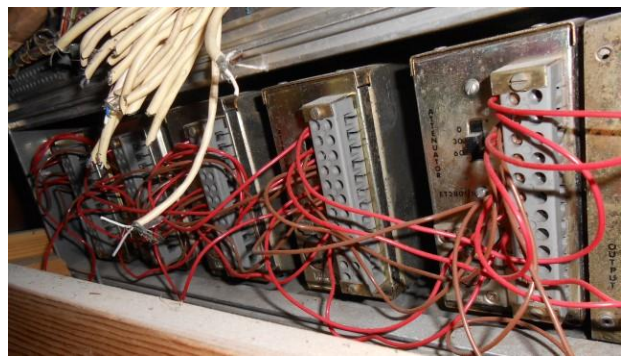


Figure 8. Cut wiring loom

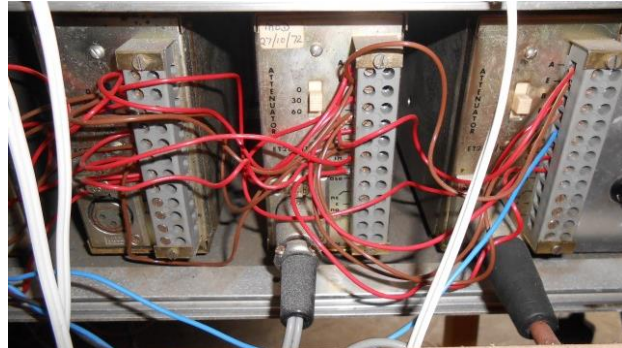


Figure 9. Completed rear wiring of the preamp modules. Note the attenuator switch.

The next fifty years?

With the fiftieth anniversary of BBC Local Radio in November of this year and the planned exhibition to mark this event, G4GTX has already been approached to see if he could lend the desk as part of the exhibition as it is understood that it is the only one remaining in 'captivity'.

Conclusion

The restoration proved very interesting, educational and at times frustrating but, seeing the desk live again, the PPM meters moving and hearing the output from the desk once more was very satisfying indeed. Much has been learnt about local radio engineering and a piece of broadcast history, which could have been decommissioned and finally scrapped, has survived against all the odds and is now working once more.