



When I Think Back...

by Neville Williams

Readers think back: Electronics maintenance has its drawbacks; Collecting B&W TV sets

A telephone call from a totally unexpected source resolved the problem of the orphan 'Kelvinator' black and white television receiver discussed in the April issue. Other correspondents came up with relevant circuit diagrams. This month I'm also taking the opportunity to acknowledge letters from other readers keen to contribute to this column...

Regrettably, these days, I cannot personally acknowledge each and every letter I receive, but will do my best to respond through the column.

First in the file is a technical tale written by John Rich, who contributed to our article in the last issue on A.C.E. Radio — the latter in the way of information and photos secured at a time when few other visitors would have realised that what they were looking at would one day become electronics history.

When John Rich first contacted us, he enclosed a 'technical tale' as an indication of his background and his interest in the history of radio technology.

As it wasn't directly relevant to an article on A.C.E. Radio, it was set aside. Looking at it again, however, I realised that it could be likened to some of Tom Moffat's free-wheeling observations, except that it was set a little further back in time and on the south coast of Britain, where exposure to Atlantic weather can complicate the maintenance side of electronic sensing and communication.

Granted, the above remark may prompt readers to claim that situations in other parts of the world can be no less

daunting. Even so, I re-read with interest John's word picture of an 'ancient' radar installation dating back to World War II.

Explains John (with editorial abbreviations to conserve space):

In February 1966 I returned to my home town on the SE coast of England from a brief stay at university, brushing up my maths. In so doing, I gained the chance to work on radar weapon systems at a nearby Royal Naval gunnery range.

Initially, I was interviewed by a Naval Officer who seemed to know little about radar, the person who should have interviewed me being absent. From my point of view, it was perhaps just as well!

I arrived for my first day's work at 7am on a freezing February morning. I had no car and it was a long walk in the dark from the bus stop to the range, which was situated on the foreshore, with a bitter wind whipping snow and sleet across the beach.

Not meant to be easy!

The range was primarily a training establishment for gun crews and equipment maintenance personnel.

The training systems were housed in several brick buildings topped by radar directors — involving high quality optics and radar antennas which could tilt and rotate to point at the target. The guns

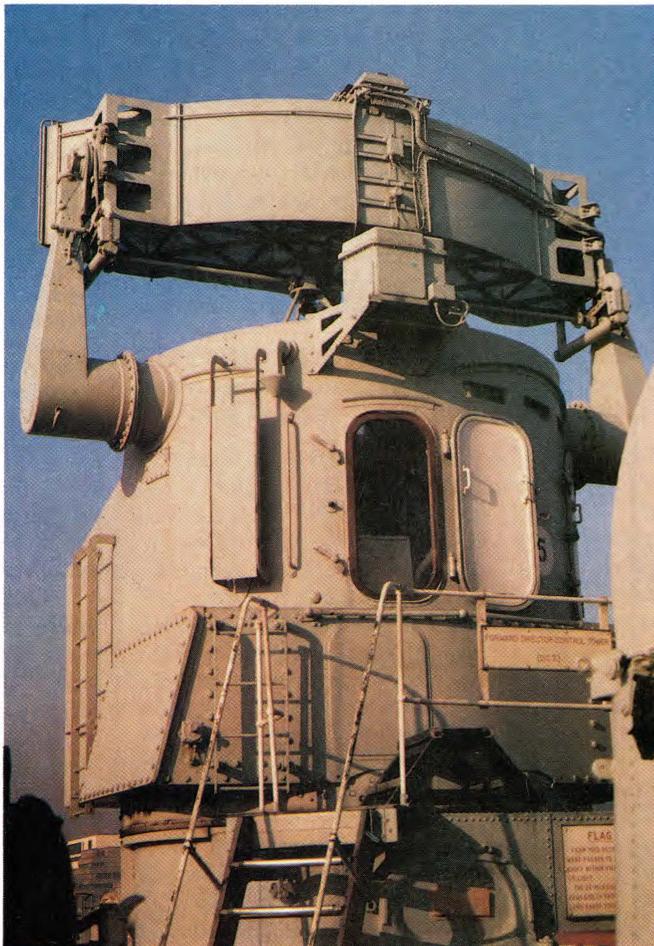


Fig.2: A rear view of the gunnery radar on the HMS Belfast. The curious arms supporting the radar beam originally supported an optical rangefinder.

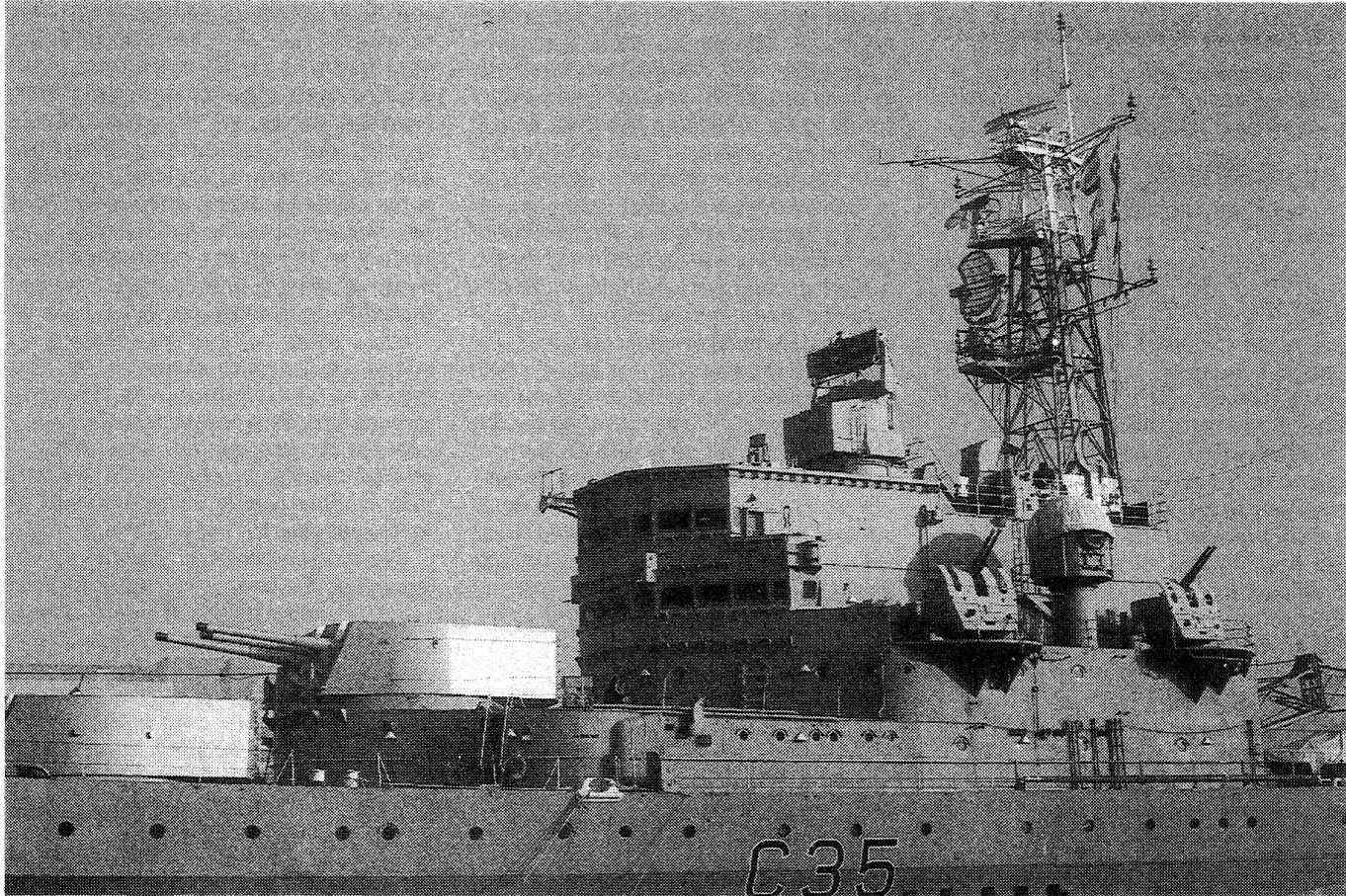


Fig.1: The old cruiser HMS Belfast, on the Thames. The forward gunnery radar, broadly similar to that discussed by John Rich is mounted atop the bridge and forward of the mast. Sailors in the cab acquired the target by optical sighting, while other crew members in the TS (Transmitting Station) below deck manned the radar.

and missile launchers controlled by the systems were ranged in front of the buildings, pointing out to sea.

After preliminary discussion with the Captain, I was shown the equipment on which I was to work. Most of it was modern guided missile gear, with which I was familiar. No problems thus far!

However, at the far end of the range, I was introduced to an ancient S-band gunnery radar, installed towards the end of the war, which would have made it about 20 years old. At its heart was a mechanical computer, characteristic of the era, the whole system being housed in a three-story structure identified as the 'computer building'.

The ground floor contained the transmitting station (TS) and maintenance facilities. Off to one side was a smaller building containing an assortment of motor-generator sets.

The second floor was mainly classrooms for gunnery training. Above these were a couple of penthouses containing spares and training aids. One of these was topped by a huge director, with which was associated the optics, the radar transmitter and receiver.

Out front of the building was a twin barrel 4.5-inch naval gun controlled by the system.

I will never forget being shown the TS that morning — a huge room full of screens and racks of equipment containing EF50's and octal valves. There were no windows, dim lighting and rather basic air conditioning — the idea being to simulate battle conditions.

Easy if you know how!

The Chief Petty Officer (CPO) led me to the centre of the room and said: "You know all about this stuff; I'll leave you to it". With that he walked out!

In fact, I had never seen it before in my life, but I couldn't admit to the fact without losing face. I was supposedly the 'expert' from the dockyard... and I didn't even know how to switch it on!

For the next couple of days I searched for manuals. There were plenty to do with maintenance, but nothing about operating procedure. However, I did learn that the previous maintenance man had retired some months earlier, and that the CPO had been switching it on

ever since. That offered me a possible way out of my dilemma.

Would he show me the order in which he had been switching on the equipment, before I arrived?

Why, something wrong?

Nothing, really — just a couple of minor inconsistencies!

Sure, he'd be glad to help...

I grabbed a notebook and we headed for the Computer Building. The first surprise came when he turned into the shed which held the rotating machinery — motor generators and frequency converters. One big unit supplied 220V DC for the systems motors; others supplied 33Hz for the gyros, 400Hz for the radar, 60Hz for the American control system, and so on.

Suddenly it hit me why there had been no 'power available' indicators on in the TS. This time, when we headed there, the place was aglow and alive with the gentle buzz of transformers, etc. To this was added the song of gyros and fans as he switched things on — and as I diligently scribbled notes!

We then climbed onto the roof, where he demonstrated the gun director in ac-

tion. It spun easily under his control, the Amplicdyne motor control system moving the many tons effortlessly.

The job ahead

Finally he asked: 'Did I do it correctly?'

"Just fine", I replied, "I'll take it from there". With that, we went off to lunch, leaving the system running. I came back after lunch to ponder the contents of the computer building; then, guided by my scribbled notes, I closed the system down in reverse sequence.

Part of my job would be to keep this system in working order for training purposes. It was manifestly very old, probably lacked spares, and most likely had been subjected to undocumented modifications. To cap it all, the previous supervisor had retired and was no longer accessible.

I figured that I had better initiate a planned familiarity and maintenance procedure, and see how I fared. Each day, I started up the system and noted voltages and currents in a book. I would then track aircraft from a nearby RAF base, out to 20-odd miles until the blip disappeared into the noise and the system began to lose lock.

Considering its age and condition, it was surprising how well the old system performed, the precision mechanical computer and rate gyros compensating well for the somewhat erratic transmitter.

The transmitter used a crude spark gap modulator, rendered all the more temperamental by the damp, salt air. This type of modulator, I gathered, had been replaced by more reliable gas thyratrons, but the trainees had to become familiar with the older system.

It was February; very cold, with snow. Some mornings the system was required early, so when I arrived at 7am, I would turn everything on to warm things up.

If the director was covered with snow, I turned on the blowers and heaters. But if they didn't work, I would have to climb up on top in the freezing darkness and scrape off as much as I could. I would then direct a fire hose on it to remove the rest.

The best of it

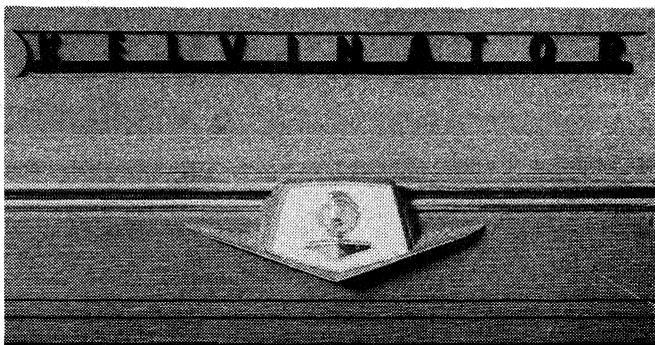
This procedure worked but it was an awful job — particularly if sea spray had been breaking over the building

during the night and salt spray had frozen into salt ice.

Spring arrived, but the memory of this de-icing procedure lingered and I determined to do something positive about it before next winter. I was also fed up with my bus ride and the long walk, so in 1967, I bought my first car — an old Austin Somerset. It was the subject of much tinkering during the lunch break, with plenty of advice from the sailors.

In the meantime, whenever I got the chance, I would attend class with the petty officers and learned much about gunnery theory and weapon systems.

Once during a class, I detailed the Sea Cat missile to the group. The Chief was uneasy, because it was supposedly classified. He was even more so when I showed him the same information in the 'Observers Book of Missiles', available from the local newsagent!



What all the fuss has been about: a 'Kelvinator' logo on a 1950's style 21 inch B&W TV receiver. Kelvinator (Aust) seem to have forgotten they existed, but in fact they were rebadged models manufactured by HMV/EMI.

Being a civilian, young sailors who were dissatisfied with the Navy would often approach me for advice when it came time to re-enlist.

I figured that they had a better life than they realised, and my routine answer was to suggest that they check through the local paper for suitable civvy jobs before making up their mind. They usually saw the point.

The range, like most naval establishments, hosted its share of semi-wild cats. At the outset, I enjoyed watching mother cats tending their kittens in the warm spring sunshine. I became less tolerant when the fire alarm was triggered by feline piddle, on/in the EHT system. Or when the place stank for a fortnight, until we located a feline corpse deep inside the complex of air conditioning ducts.

Nor were the pussies consistently friendly, as another maintenance man discovered when one attacked his groping hand!

With the arrival of summer, it was time to check out the heating and air conditioning, with navy personnel detailed to check mechanics, gearboxes, bearings, wiring, etc. It transpired that seabirds had been nesting behind the control panel, and while some ratings were rebuilding and rewiring the resulting mess, others were re-facing the motor commutators — many of which, upon inspection, had looked more like walnuts.

One group of sailors seemed to spend an inordinate amount of time checking and cleaning the powerful director tracking telescopes. Curious, I checked the bearing they were using — to find that it coincided with a sandy beach about a mile away, favoured by nude sunbathers!

On another occasion, high above the ground on the radar system, I was showing a couple of sailors how to tune the receiver to the transmitter to optimise the tracking. The final pulse to the magnetron, via a pulse transformer, ended up at about 37,000 volts at 40-odd amps, to generate the required 1.5 megawatt peak.

The system was enclosed by a metal cage, with an access door fitted with an interlock to cut the power immediately it was opened. When I attempted to demonstrate as much to the sailors, the singing sound of the pulse transformer persisted. On checking, I found that the interlock had been bypassed by a long loop of wire.

I considered myself lucky to be alive. If the shock had not killed me, a fall to the ground from that height might have had a similar result!

Safety first?

Alerted, I checked all the other interlocks and found that many of them had been bypassed — presumably by my predecessors, to expedite servicing.

I chose to take an opposite view of personnel safety a few months later, when I noticed that tradesmen were ignoring my advice to avoid exposure to the radar beam when the power indicator was on. They had neither seen nor felt any effect and had obviously decided I had been 'having them on'.

At the next opportunity, I made it my business to join them, neon tube in hand. When the indicator light went on I held it in the invisible radar beam and it lit

up — with no wires attached. They got the message!

My stint at the range ended in August 1967, when I got the chance to move the London. But one Christmas, a few years back, I found myself in the UK on holidays and able to visit the old site. Yes, it was a grey afternoon with a chilly wind and light snow, and the memories came flooding back.

But the old system was gone, replaced by modern high tech magic. The guns were still there.

Back in London, I visited the cruiser HMS Belfast, on the Thames. It carried an old gunnery radar, similar to the one I had worked on. Down below was the TS with the fire control table — all of it forming part of a museum.

Nowdays I sit in an air conditioned office — with sealed windows — designing computer gadgetry you can hardly see, and recall the times, long ago, when I earned ten quid a week, plus overtime, for clearing snow and ice and filling a small role in naval radar history — but I'm glad I did it!

Thanks, John, for sharing your experience with us. Now for a complete change of subject matter.

Kelvinator TV set

In the April issue, prompted by Alan Barrow of Aspendale in Victoria, I raised the question of whether B&W (black & white) TV sets could logically be regarded as 'collectable' by electronics history buffs. Alan had been offered a well preserved, 30+ year old Australian-made Kelvinator model, but was puzzled because a spokesman for Kelvinator, a few weeks back, had denied that the company had ever been involved in television!

In the circumstances, I could only suggest that the set had been manufactured for Kelvinator by another company, and hope that one or other of our readers might be able to nominate the supplier and even come up with an appropriate circuit. Considering the lapse of time, it seemed a rather long shot.

Imagine my surprise when I received a phone call from a long-time friend, before I had even sighted the April issue, identifying the set and claiming it as 'one of his babies' when he was engineer in charge of TV set production at EMI's Homebush (Sydney) factory. His name: Neville Thiele — the same Neville Thiele who later resolved the problems surrounding vented loudspeaker enclosures.

Even though Neville lives only a couple of kilometres from my home, his copy of the April issue had arrived in the

post a day ahead of mine and on recognising his 'baby' on page 36, he simply reached for the phone. He followed up with a letter the next day, after consulting his lab notes.

Neville recalled that EMI (Australia)'s first B&W TV had conformed to a 'gentleman's agreement' within the local radio industry, to launch into TV using a 17-inch 70° picture tube. In EMI's case, far from being conservative, it meant 'sticking their neck out' because, in the mid 1950's, their parent company in the UK regarded 14-inch picture tubes as the appropriate choice for domestic TV sets.

In short, the first TV chassis from EMI (Aust), released in August 1956 in time for the Olympic Games, used a 17-inch picture tube. Identified as the 'E' series, it was not the receiver pictured in the April issue.

Kelvinator became involved because they wanted to market TV receivers, but lacked the facility to manufacture them. Conversely, EMI faced the same problem with refrigerators. So the two companies reached an agreement: Kelvinator would supply EMI with suitably branded refrigerators; EMI, in turn, would supply TV receivers carrying the Kelvinator logo and the prefix 'K' added to the chassis number.

(I refer to 'EMI' in the above, because that is how Neville Thiele speaks of the company that paid his salary. To the trade and the public at large, they were more commonly referred to as HMV — His Master's Voice — distributors of radio & TV sets, sundry record labels and an implied associate of RCA, in the joint use of the 'Little Dog' logo.)

The 21-inch TV era

The first EMI/HMV 21-inch model was released about June 1957, which conflicts with Alan Barrow's assumption that the original owner had bought the set in question to watch the Olympic Games. By the time EMI/HMV 21-inch models appeared on the market, the games would have been history.

Neville Thiele recalls that EMI sought a quality image for their 21-inch, or 'F-series' TV chassis. I still recall the emphasis he/they placed on the phase linearity of the IF channel, in the interest of picture quality. What I had forgotten — or hadn't known — was that their 21-inch cabinets were also lined with aluminium foil, to restrict radiation into nearby radio receivers of the 15,625Hz sawtooth horizontal deflection signal.

For the same reason, they used a specially wound power transformer, to limit penetration of the horizontal sawtooth

into the power mains. I quote Neville here: "We were trying to be environmentally responsible!"

Neville Thiele said that, in planning the receiver, they realised that they could provide a push-pull audio system for little more than the price of an extra valve, thereby virtually doubling the available output power to six watts. They could also enhance the audio performance by fitting twin 7x5-inch elliptical loudspeakers, one on each side of the cabinet.

The one hassle they had with the circuit was that the total HT current drain added up to 360mA, equal to the maximum rated current of twin 6N3 half-wave rectifier diodes — the only option available in the Philips range, to which EMI were committed. That the valves didn't like it was evident from their sometimes limited service life — this despite the fact that the circuit included thermistors to limit peak warm-up current.

Fortunately, Bill Brear, EMI's Chief Design Engineer, managed to negotiate heavy duty full-wave 5AS4 Radiotrons from AWV, for sixpence each under the Philips price. So in the later models, F2 to F5, two 5AS4's operating in parallel handled the load easily, each with its own 5V filament winding and its own peak limiting thermistor.

Remote control

One other point of note was a socket at the rear for a remote control. With little in common with modern infra-red remotes, its main functions were to quieten the sound during advertisements and to adjust the black level, which was subject to variation in transmissions and receivers of the day.

EMI technical staff made up their own remote controls, but the Sales Department flatly refused to list the device as an available extra until 1960, when they were casting around for another feature to advertise...

Neville said that the basic design of the F1 chassis was repeated in the F3, F4 and F5 models which, gratifyingly, found their way into television stations as off-air monitors and even for re-broadcasting links for country transmitters.

He says that, from what he can determine from the picture in the April issue, Alan Barrow's receiver is an F2 consolette, missing from the above list. The F2, developed for release in 1958, had a simplified but still effective IF channel and a single-ended audio system. Its tar-



Fig.4: From an advertisement in a Sydney suburban paper ('Northern District Times') in November 1957, the HMV and Kelvinator sets looked almost identical.

geted retail price was 209 guineas, as compared to 245 guineas for the 'up-market' equivalent.

(The 'guinea', a distortion of the Imperial monetary system and beloved by lawyers, medicos, dentists and other professionals, was equivalent to 21 shillings. It camouflaged the charge, as expressed in pounds, but in so doing added an effective 5% surcharge...)

Other correspondents

If Neville Thiele's response was immediate, it didn't take long for other readers to react to Alan Barrow's letter. From Springwood in Queensland, Ray Dixon VK4ZLX says that he

commenced work at HMV, Homebush, in 1954 and worked in the industry for 25 years before retiring due to ill health. He has been a long term, regular reader of *EA*.

Ray remembers the HMV factory as a place where they produced a wide range of components, including transformers, coils, chasses, metalwork, plating and elliptical loudspeakers as fitted to Alan Barrow's receiver. HMV later became EMI (Aust). He describes the arrangement between HMV and Kelvinator as follows:

In the early 50's the companies supplied each other with their respective badges, on a business agreement that a percentage of Kelvinator whitegoods be identified with an 'His Master's Voice' badge. Likewise, batches of HMV radio and television sets would sport the 'Kelvinator' logo. Apart from the badges, the equipment was identical in every way.

Ray Dixon suggests that Ray Barrow's receiver could be an HMV F1 chassis. Whether it is, rather than Neville Thiele's F2, could be deduced from whether it employs a single 6BM8 output valve or two in push-pull. Thanks for your letter, Ray!

Whereas Ray Dixon apologises for his inability to supply a circuit, the gap is filled by a letter from Reg Davis, of R.J. Davis Electronic Services in Yarra Glen, Victoria. Enclosed with the letter is a circuit photostat of an HMV chassis type F1, for which I also express my appreciation.

Without seeking to digest the circuit in detail, it did cause me to re-think my somewhat casual observation on page 37 of the April issue, about an enthusiast/collector needing to work out the how and why of B&W TV receiver circuitry. For sure, vintage B&W receivers have more in common with vintage radios than do modern colour sets, but there's still a heck of a lot of extra circuitry to digest!

As expected, the F1 circuit quite clearly shows twin 6N3 rectifiers and twin 6BM8 audio output valves.

Similar data on the F1 through F5 HMV/Kelvinator models is to hand from Les Whittle of Oxley, in Queensland; this time as a fax to the *EA* office. The diagrams are acknowledged to the *JR Manual* for 1967, and include the circuit of the tuner and remote control. Again, thanks Les.

'Very reliable set'

From Alan Birmingham, Service Manager of Unit TV Pty Ltd in Baulkham Hills NSW, comes a brief

note identifying the set as an F2 and enclosing a circuit diagram. It shows twin 5AS4 rectifiers, both wired as full-wave rectifiers with separate 5V heater windings and each feeding the HT filter through separate thermistors. In the event of one rectifier failing, the other would probably battle on for a while...

Alan describes the set as 'very reliable in its day, and one of the first to do without a front panel horizontal hold control, because of its remarkable pull-in range'.

Another fax arrived via Melbourne Airport, from Phil — (name obscured). Phil has opted for the F4 circuit, again showing push-pull 6BM8 output valves and twin 5AS4 rectifiers.

Last but not least, at the time of writing, I'll acknowledge letters from other helpful readers.

D.E. Liddicoat (VK5ADC) confirms that Alan Barrow's receiver is an HMV/EMI product, and then deviates to talk about public address amplifiers and the use of 32-volt soldering irons in the National Radio Factory in Adelaide.

Back to NSW, J.E. (Peter) Hughes of Hughes TV & Antenna Service in Vincentia mentions the arrangement between Kelvinator and HMV.

He adds that AWA had a similar arrangement with the Email (Westinghouse)

Group, under which it supplied 'Airzone' badged TV receivers. As well, STC supplied the BGE brand.

On the general subject of collectability, he believes that B&W receivers will become rare quite rapidly and may be difficult to restore, due to a shortage of valves and especially picture tubes. Thank you, Peter.

And thanks also to Athol J. Manning (VK7LR), Eric G. Vidler of Birrong NSW and W.R. Beveridge of Berowra Qld; also to John Carr of Weetangwerra ACT, and Des Mills of Kurri Kurri NSW, whose letters landed on my table just as I was completing this article.

A happy ending!

Finally, there is an odd twist to this story. In thanking Neville Thiele for his first-hand background information, I mentioned that Alan Barrow's picture could as easily have been mistaken for a 17-inch screen, with its markedly rounded corners. That obviously stirred another memory, relating to a later period when the 90° 'F' series were to be superseded by G-series chasses using the new 110° picture tubes.

From first principles, Neville knew that a TV picture should be rectangular, with a 4:3 aspect ratio. He had accord-

ingly designed a new mask that would fulfill those requirements — but the sales section wouldn't have a bar of it. Their view was that viewers were very conscious of picture size and that HMV could not afford to offer what might look like a marginally smaller picture, no matter how valid the technical arguments in its favour.

I gather that the confrontation climaxed an element of dissent between the Sales Department and technical purists in the lab. EMI Management's answer was to appoint another engineer to head up the team responsible for the new series.

Neville Thiele was accordingly 'promoted sideways', to the position of engineer in charge of the Company's research — much to his delight. He had paid his dues to TV receiver technology and said he, with a chuckle: "The move made it possible for me to pursue my research into loudspeaker enclosure technology".

I, for one, am happy that we could sort out Alan Barrow's B&W TV problem. But I'm positively delighted that EMI management unwittingly made it possible for Neville Thiele to replace the guesswork and empirical guidelines on loudspeaker enclosures, with rigorous data. ♦