

There's a Moose Loose

Les Lawry-Johns

HOW I got the name confused I don't know. She phoned to say that her Bush had lost its sound and picture. She also seemed to know us well, which was a mystery to me as I couldn't recall her or the set. She said her name was Loose, which I took to be the surname, and when I sounded vague she gave the other name, which was Pretty. So I wrote down Pretty Loose.

In fact it turned out to be Lucy Pretty, but I couldn't be expected to know that at the time. When I got there it all became clear, because I'd known Lucy from way back. But she'd married again, and now had the name Pretty and a TV which we didn't know.

The set turned out to be a Bush model fitted with the Z179 chassis. This is one I've yet to get on really familiar terms with. There was a raster on the screen, but precious little else. With the rear cover off we pondered upon the possibilities. With the voltage supplies intact but no sound or vision signals, it seemed likely that the fault would be in the i.f. strip. This is a plug-in panel on the left side main frame, which can be withdrawn when the bottom runner is pulled round.

The TBA750 intercarrier sound i.c. is at the top, and using a finger as a test probe we found plenty of life at the input to this, with some fellow talking to me in a language I didn't understand. This i.c. is fed from the SC9503P video detector i.c., and the fellow chatted away when we touched its output but had nothing to say at the input. So it seemed likely that this i.c. could be the culprit. Did we have one? No, but we did have an MC1330P which does the same job. Take out the i.f. unit, whip off the little chip with a wave of the desoldering braid, and plonk in the MC1330P with eight deft dobs. Slide the i.f. unit back in and check. Now it talks in my own language and there's a picture.

Now there's a bit of luck we thought, viewing the rest of the chassis with some trepidation.

"Done it already?" cooed Mrs. Pretty. "It must be a much easier set than the one we had years ago that you took so long to get right. You must remember. The Philips with the big flat screen."

I remembered. Well. As a matter of fact, I still have the projection unit, slightly rusted, to remind me.

Mind you, Lucy was a cracker in those days. Still quite nice, albeit a little weather beaten you might say. Who isn't?

With a short exchange of pleasantries I prepared to leave, but at the moment of departure Mrs. Pretty remembered that her neighbour had asked her if her man would pop in to have a look at their set?

"Would you pop next door to look at Mrs. Moose before you go? Their set is playing about."

A Visit to Mrs. Moose

So that is how I came to be ringing the bell next door. A pleasant woman opened the door, and I heard a voice call from inside the house "who is it?"

"It's the telly man dear."

"The tally man? Oh my Gawd." There was a sound of someone beating a rapid retreat.

"Not the tally man, the television man, stupid. Come

back." I never did find out why Mr. Moose didn't want to meet the tally man.

The set was a Thorn 3000 which couldn't be tuned. The push bar and spring from the tuner were at the bottom of the cabinet. It didn't take long to reassemble it and solder up.

The programme could then be tuned in, but apart from a few faint bars the colour was absent. This responded to a tweak of L302 (reference oscillator output coil) and the colour appeared to be fine through a mirror – until the snooker table came on that is.

It was red. I thought snooker tables were all green, except when they are blue. Then I noticed the player's face. He didn't look at all well. Someone's changed over the tube leads I mused quietly to myself. They hadn't, and for the life of me I couldn't think of a reason for this reversal. As I crouched behind the set, crying my heart out so that the bitter tears hissed on to the hot dropper at the rear of the power board, I heard Mrs. Moose mumbling something about lovely colour.

I looked up and the table was green, with faces a nice bright orange. It transpired that the normal sequence of events was that the picture would come on with no colour, then some bars would appear for about five minutes, then the colour would come on with reversed reds and greens, and then all would be well. What I'd done was to tune in the reference oscillator so that the colour would be there from switch on, but the reversal remained, for a few minutes only, after which normal service would resume.

"We only wanted you to get the tuning right. The colour doesn't worry us. We thought it was supposed to be like that until it warmed up. I hope the bill is not going to be too much, only my husband is a little short this week so we can afford only bare essentials."

Which is why I didn't find out what really was happening, and I still don't know. I've seen plenty of out-of-phase conditions which usually respond to adjustment, but not a complete reversal that rectifies itself so suddenly (which shows just how ignorant I am).

Returning to the pad, footsore and weary, I was greeted with the usual smarty pants remark.

"Where have you been? Playing fast and loose no doubt."

"Fast and moose you mean," and I related the sorry tale to the disbelief of her highness who flounced off upstairs and shortly began to sing her bitter song of hatred and resentment.

"I'm a little prairie flower

Growing wilder by the hour.

No one cares to cultivate me,

So I'm as wild as wild can be."

I could tell she was a bit mad by the way she banged things about. I don't know why, but then I never could understand the wonderful workings of a woman's mind. It's a good job we are so logical and placid, so understanding and reasonable. No one can accuse us of doing unreasonable things, even when we are faced with insurmountable obstacles and impossible tasks (as we are every day, as you know only too well). I sometimes feel we

are not given the credit that is our just due.

Trouble rarely comes singly. If you get one horror there's bound to be another close behind.

A Brace of Bushes

I was just finishing off a Pye 697 which had had just about everything wrong with it, including an open-circuit reservoir electrolytic, an open-circuit 10M Ω resistor in the width circuit, an open-circuit 12k Ω red output pentode load resistor, open-circuit print to the blue ditto, open-circuit line sync discriminator diodes due to the 47k Ω reference pulse feed/integrating resistor going low before disintegrating, plus a few less trying teasers, when a couple popped in to ask if they could bring in their 22in. Bush colour set which had popped off. I said they could, so off they went to get it.

In the tussle with the Pye the enthralled owner had been watching each and every move. He'd come from way out of town, and was quite happy to wait for it. For my part I don't mind people watching me suffer provided it's a set I know. If it's a set I don't know, I don't like it at all as I wallow around trying to find where to start, conscious of the pitying glances.

"Wouldn't be so bad if he knew his job, would it?"

For the Pyes and the Philips etc. we don't mind an audience, provided they applaud every time we pull a rabbit out of the hat, and gasp with sheer admiration at the wonderful works taking place under their very eyes.

So off went the owner of the Pye, back to the back woods from whence he came. And in came the Bush.

"Our son had someone in to look at it while we were away, but as the chappie said it was going to cost quite a bit to repair he left it until we came back. So we thought we'd see what you had to say about it."

Fortunately it wasn't one of those Z179 ones, but one of the more familiar A823 type. The h.t. line fuse at the top of the power panel was a nasty black colour, denoting that it had died a violent death, probably due to something over on the line output side. We checked the resistance to chassis. The needle flicked over and climbed back towards infinity.

What devil's work was this? Infinity meant no circuit through the smoothing resistors etc. Both the 68 Ω and 56 Ω wire-wounds in the h.t. circuit were open-circuit (see Fig. 1). Killed no doubt by someone bunging in a heavy fuse or some other blunt instrument. Check at the other end of the 56 Ω resistor. Still no reading, except for a faint suspicion of a movement. Look over to the scan panel. All three plugs out.

Put them back in and now record the low resistance reading expected. So we pronounced our verdict.

"This is a clear cut case of the Howling Heebie Jeebies. It's never an easy thing to cure, and it'll have to stay overnight."

Left alone it didn't take us long to establish that the line output transistors were short-circuit. So some patience and a fair bit of time were going to be needed, as replacing these in this set is not our favourite occupation.

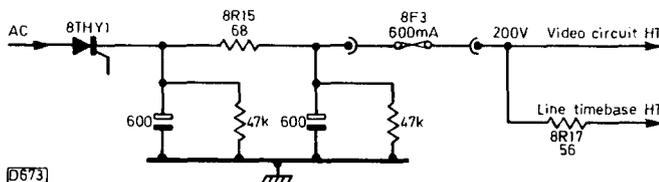


Fig. 1: H.T. feed circuit, Rank A823 chassis. The h.t. fuse 8F3 and the two resistors 8R15 (smoothing) and 8R17 (anti-breathing) were all open-circuit.

I'd just removed the right side assembly from the main frame when a mini drew up outside. Incredibly, there was a 26in. colour set strapped on top of it, giving the little car a decidedly top heavy appearance. How it had stayed put I just don't know.

"Hallo" said Mr. Sparks. "It wouldn't go inside. Could you give me a hand to lift it off?"

The spindly luggage rack groaned as we unstrapped the set, and I'm sure the little car rose a foot when we lifted the big Bush free.

"One thing's for sure Mr. Sparks. It won't go back home like that. I'll deliver it for you."

"Don't worry" said the indomitable Mr. Sparks. "I had one arm out of the window supporting it when we went round corners."

So now we had two.

Back at the bench we wrestled with the first one. In went the transistors, back went the tripler (leaving the input out, just in case this was the original cause of the trouble) and the unit was reassembled. Both the wire-wound resistors were replaced and all seemed ready. We wound down the "set H.T." control and connected a meter switched to the 1A range in place of the h.t. fuse.

On switching the set on, the meter hardly moved. This was not encouraging, so we put a 630mA fuse in and checked the h.t. voltage. It was under 200V, and this was also present at the line output unit.

We next checked the line driver transistor and found it had no 20V supply. Back to the power unit, where the 6.8 Ω resistor (8R2) was found to be open-circuit. In went another resistor and the timebase now started working.

We next had to check the tripler, so out came the h.t. fuse and the meter was again connected in its place. It read under 400mA, so the tripler was reconnected and the e.h.t. rustled up nicely and the meter showed only a small increase. Back went the fuse and all was well.

There were a few questions for which there seemed no answers. If the 6.8 Ω resistor supplying the 20V line went first, the line timebase would have been inoperative, drawing no current. Could the line output transistors short under these conditions - h.t. high maybe? How come the two h.t. wire-wound resistors were both open-circuit if the correct fuse was fitted? Why were the plugs left out on the scan panel? Could it be that the two black ones had been interchanged by the first intrepid explorer? The answers to these and many other questions will not be revealed in the next instalment.

Mr. Sparks' Bush

Up on the bench Mr. Sparks' Bush was coaxed into giving up its secrets. You'll never guess, but the 600mA h.t. was blown. Oh no, not again. Please not again.

I raised the convergence panel to check the condition of the front smoothing resistors, and was immediately confronted with a nice big hole where 7RV3 (7 Ω R/G horizontal tilt control) had been. The remains of 7RV3 were found laying at the bottom of the cabinet.

Did it die or was it killed? Hope it died, but proceed as though it has been killed. Fit a new control of a more robust type. Check for shorts at the fuse holder and at the h.t. resistors, which both seemed intact. Connect the meter across the fuse holder and switch on. Two amps. Switch off quick.

Disconnect the input to the tripler. Switch on. Now 400mA. Fit another tripler and 630mA fuse. Check h.t. and reduce to 200V. Tidy up convergence and prepare report for Mr. Sparks.

Oh Dear What Can the Matter Be?

Les Lawry-Johns

ONCE upon a time there was a chap who was quite good at his job. When sets came in for repair he would have bets with himself that he could not only diagnose the cause of the trouble from the customer's description of the symptoms, he could also rectify the fault before the set was switched on for test. No longer. Now he has a furtive air about him, and is evasive and wary, hedging his bets with "ifs" and "buts". Now and again some of his old confidence returns, after a day of bull's-eyes or near misses, but it doesn't last long and the next day brings the usual catalogue of minor disasters, wrong conclusions and general cock ups.

Widely Varying Colours

For example. A Pye CT222. The 725 chassis – solid-state with vertical panels. Customer's complaint: widely varying colours. Sometimes red, sometimes green, sometimes blue, with combinations of each. Diagnosis: a faulty thick-film unit (R428 etc). Voltage tests revealed wide variations at the collectors and bases of the three RGB output transistors.

We turned to the pile of thick-film units, only to find that they all had five legs (Thorn 3500 type). We then remembered that all recent invoices have said that the Pye units are out of stock. The fool is nothing if not stubborn, and decided to make up the unit himself with wire wounds and carbon resistors – patiently and with infinite care. In they went, one after the other, until the circuit was complete. But the colour variations continued.

It was mainly red now and checks directed suspicion to the TBA530Q matrixing i.c. In went another. Now mainly green. In went another. Perfect colour. The first two i.c.s went into the bin. Tap the panel to make sure. Colour mainly blue, then a combination of variations. Retrieved i.c.s from bin. Carefully tapping around brought us to the TBA990. Remove it from its holder and refit it. Trouble cleared and no amount of tapping would bring back the variations. Why didn't we do this in the first place?

Loud Arcing and Spitting Noises

Next a GEC C2111. Customer's complaint: loud arcing and spitting noises. Diagnosis: excessive e.h.t. due to high h.t. Probably a faulty thyristor. In fact the h.t. was high at the top right side droppers – 230V instead of 190V. Change

SCR701 (see Fig. 1). No difference. Check setting of P701. Little variation. Cannot leave set on with high h.t. as there's a risk to the tripler, line output transformer, transistor etc. (remembering recent expensive losses).

Check components cold. All read right, including all resistors. Change diac D701, BC147 and 7.5V zener (just in case). Fit 33Ω dropper section in place of fuse FS1. H.T. now below 180V, as expected, but P701 still not producing the variation it should. Experiment with values of resistors in series with P701. Find single 820Ω resistor works better.

Remove 33Ω resistor and fit fuse. H.T. can now be set correctly, and there's no discharge. Check grey scale and suddenly e.h.t. starts to spit viciously. Excessive width and h.t. up to 240V. Back to square one, and P701 now has minimal effect.

Squirt P701 with freezer. No effect. Squirt R706. No effect. Squirt R709 and h.t. drops to correct figure. R709 (270kΩ) going high when mains applied, had read correctly when checked cold. Replace with 1W type to be sure. Panic over and now remember that we had had similar trouble, with an open-circuit R709, a couple of years previously. Had forgotten of course.

No Results with Plasticity Smell

Next a Bush T20A. This is the current Bush chassis, with the centre field timebase etc. swing-down panel. Set only just out of guarantee, but not one we'd sold. Customer's complaint: no results with plasticity smell. Diagnosis: faulty tripler. The warm line output transformer overwinding seemed to confirm this. Fit new tripler. No change. Fit new line output transformer and all is well. Faulty line output transformers not uncommon on this chassis. Ponder. The earlier A823 series used a lovely transformer, never any trouble. The monochrome TV161, TV181 etc. series transformer, murder.

Shopping list for line output transformers. Monochrome: Bush-Murphy all models TV161 on; Philips 210, 300 series; Indesit T24. Colour: Philips G8; Thorn 3000/3500 e.h.t. transformer T503 (usually killed by tripler); now add Bush T20.

Varying Focus

Next a Bush Z718 chassis. Continue in our bumbling

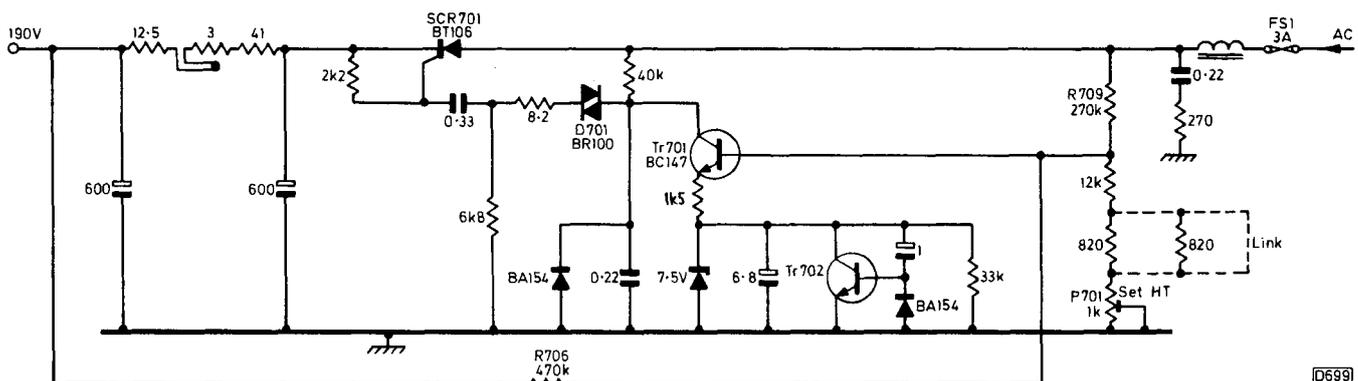


Fig. 1: H.T. supply circuit, GECC2110 series. Early versions differ in several ways.

way. Customer's complaint: very poor focus for the first half hour, gradually improving; no variation in picture size. Diagnosis: faulty thick-film focus unit.

Now it should be pointed out that there's no tripler in this chassis. Instead, a large overwinding feeds a single stick rectifier (see Fig. 2). The full e.h.t. is applied to the focus unit, which reduces it to the 4-5kV required at pin 9 of the tube. There are two 100kΩ resistors in the circuit, but both seemed to be in order. A meter check confirmed that the voltage at pin 9 of the c.r.t. was low, while fully advancing the focus knob produced little improvement. So a new focus unit was fitted. No improvement.

We wept bitter tears until we recalled our friend Ray moaning and groaning about the type of tube base socket used in these sets. "Makes you think the bloody tube has clapped out" he'd said, "until you take the tube base off and find the tube's pins pitted and corroded." So we removed the base socket and found pin 9 pitted. The quick meter check had not taken into consideration the very high resistance of the thick-film unit, and the 3kV in fact was some 5kV.

Carefully cleaning the pin and fitting a new tube base socket restored normal focus, and we resolved to write it down so that others would not be similarly fooled.

A Thorn 1590 with No Results

A Thorn 1590. Now any fool can diagnose the faults that occur on these well known portables. Only an idiot could get mixed up. We did.

"It doesn't come on" said the customer.

"Blown l.t. fuse" we correctly diagnosed, in a blinding glimpse of the obvious.

Cold checks on the line output transistor and the associated diodes and electrolytics revealed nothing amiss, and we didn't even notice the spidery black lines across the top of the line output transformer. A meter in place of the fuse read 3A when the set was switched on, with pretty blue arcing across the top of said transformer. Now we didn't immediately condemn the transformer to the rubbish bin: it occurred to us that the set was probably used in the kitchen, and that the top insulating material had probably suffered as a result. The conductive paths were scraped away therefore, and the fresh surface treated to a dose of silicone. A 2.5A fuse was fitted, and the set switched on. Pop went the fuse, after only a very brief period. The meter was brought back and showed 3A as before, but there was no sign of life around the line output transformer.

"It must be bugged after all" we thought. It wasn't of course, but we touched it to see if it was warm and were struck by the warmth coming from the e.h.t. stick. "Well I never" we said. "Either the stick is faulty or the 1kpF disc e.h.t. reservoir capacitor is short-circuit (C115, 1590 chassis only). So we disconnected the capacitor and found it short-circuit. "Oh well" we said, "if it's left out of the 1591 it can be left out of this one too."

In went another fuse, and we switched on. Pop went the fuse, just as before. "Goodness gracious me" we murmured, "the stick is still sick." So we changed this and the 1590 lived happily ever after, because before we wrapped it up we checked the supply line and found it a little high, resetting the regulator to reduce the supply to 11.5V.

VHFOK, No AM

A Fidelity radio, type 23. Just for a change we thought we'd tackle a radio. "V.H.F. o.k., no a.m." said the customer. The diagnosis was swift and wrong: faulty a.m.

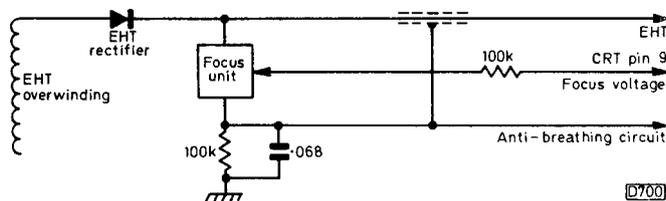


Fig. 2: Focus circuit, Rank T20 chassis.

mixer-oscillator transistor (BF194).

The back was off in a trice, but the panel took a little longer because when we took out all the screws the tuning dial fell off. Eventually the panel was in one piece and out.

Sure enough, touching the base of the BF194 restored medium and long wave reception, so the suspect was removed and a new one fitted – without melting the dial cord (our usual forte). The a.m. reception was now good, so the panel was manfully refitted and secured, together with the rear cover. Recheck to be sure. No a.m. Remove rear cover and explore area of the BF194. The 4.7kpF capacitor at the top of the panel was tapped and the signals returned. As we fitted a new capacitor the cat watched intently, probably wondering why we seem to have to do everything twice.

The Day the VAT man Came

On the morning the VAT man came to check the books and figures the daily comedy was already in progress. We were on the phone trying to find out if there should be some form of tube guarantee form with the new Pye/Philips colour portables (KT3 series) with the 14in. tube. As the 16in. version comes complete with said form or card, it seemed reasonable that there should also be one with the 14in. version – at least it did to our befuddled mind.

We were put through to one department after another of the mighty Philips organisation.

Service: "We don't know. Try new sales."

New sales: "We don't know. Do you want a card sent to you?"

"No, I only want to know if there should be one or not."

"We don't know. Hang on, we'll put you through to P.R." (I think that's what he said).

On it went, from pillar to post, all for the want of a yes or no. Finally it must have been the managing director who said "we'll ring you back." But he never did. We now know that there's no separate guarantee card with the 14in. version, simply because none have had one.

The Vatman sat with the books and found all the mistakes we've made over the past couple of years, whilst we attended to the customers.

Small boy. "Can you mend my torch?"

Tall man with pointed teeth. "I put the battery you sold me in my clock but it doesn't work, so I've brought the clock in for you to look at."

Local vet. "The auto-pilot on my boat keeps sending me round in circles. I think it's this 12 to 24V power unit. Can you check it at 100mA?"

Local vicar. "This slide projector isn't working properly. Just have a quick look will you?"

And so the morning passed. "Can you come and look at the telly, all the buttons get ITV." The frustration built up and the Vatman looked on pityingly. "No wonder you make mistakes in the books. If I'd to contend with that lot I'd be barmy too. When are you going to put some money in the till?"

Smarting under this, we decided to vent our spite on a

dear little old lady who crept quietly in and stood hesitantly, looking from me to the Vatman.

"Television" she said in a very small voice. Thinking she'd come to ask daft questions about her no doubt clapped out old set, we started an imitation John Cleese/Basil Fawlty tirade.

"Television, television. Of course television. No doubt you want to buy a nice new one. How about a splendid new 22in. colour set with all the trimmings?"

"Yes please" she murmured. "How did you know what I wanted?"

The Vatman collapsed with laughter, while we were made to look dafter than ever.

Solly, Velly Solly

Finally an apology. Apparently one or two readers wrote to say they found our far eastern adventures (December issue) vulgar and offensive (and probably dull too). We're sorry, and to prove it we cut out the succeeding account of our adventures in the frozen north, where we travelled to meet Solo Joe and Eskimo Nell. We try to have our bit of fun, but apparently it doesn't always come off.

Computerised TV

Part 1

David K. Matthewson, B.Sc., Ph.D.

MICROPROCESSOR and microcomputer i.c.s seem to be cropping up everywhere nowadays. It's hardly surprising therefore that TV manufacturers have found uses for them. First, what's the difference? Well, they both enable a great deal of digital signal processing to be carried out in a single chip. The differences relate to the internal memory arrangements. Clearly the chips require memories so that they can remember what they're supposed to do and how to do it, and to store data as necessary during the processing operations. A microprocessor's memory is of the ROM (read-only memory) type, i.e. it provides outputs as required but you can't feed data in and get it back later. Typical examples of ROMs are the character and graphics generator i.c.s used in VDUs and teletext decoders. A microcomputer is more flexible because it also incorporates a RAM (random-access memory) which will hold and release data as instructed. The data store in a VDU and the page memory device in a teletext decoder are of the RAM variety.

The use of digital techniques in domestic TV sets started a few years back – with a rather expensive, up-market Barco colour receiver. This had an automatic tuning system – similar to the arrangement used in the Grundig SVR videocassette recorder, described in these pages last July. Digital tuning and remote control systems are becoming increasingly common in TV sets, and are also found in the latest VCRs. Once you start using digital control systems, it's logical to employ a microcomputer i.c. to control the system. Both Philips and ITT have published details of microcomputer TV receiver control systems recently, and we shall doubtless find these in the more complex TV sets featuring teletext and viewdata facilities before long.

One of the first items of domestic TV equipment I've had an opportunity to examine using a microcomputer chip is the Sanyo VTC9300P, a Beta format VCR. This uses a microcomputer to act as an off-air timer and tape counter. In other VCRs these functions are carried out by a mixture of special-purpose i.c.s, standard TTL i.c.s and electromechanical devices.

It's worth taking a look at the techniques used in the VTC9300P, since the microcomputer system Sanyo use is fairly simple yet has all the features found in more complex systems. In fact it provides a good introduction to the microcomputer.

The microcomputer chip itself is the Texas TMS1070, a variant of the TMS1000. Before delving into it however, let's briefly outline what a microcomputer is and can do. It's a simple computer of course, and has been described as a

very large-scale integrated circuit (VLSIC) which, by performing a sequence of programmable (in manufacture) operations, can fulfil a wide range of different electronic functions. The advantages of using a microcomputer are its low cost (less than £5), the low component count achieved, and the ease with which the instructions (and thus the functions the device will perform) can be changed by the i.c. manufacturer to cater for different applications.

The TMS1070

Like the other microcomputers in the TMS1000 series, the TMS1070 is basically intended for calculator applications, use in cash registers, and to control microwave ovens and simple industrial processes. The TMS1070 contains all the essential elements of a microcomputer in a single 28-pin package. Fig. 1 shows the basic elements of a microcomputer. The data enters via the input/output interface, is modified or acted upon in the central processing unit in accordance with the programme held in the memory (ROM), and is then fed out. The microprocessor is basically the same, with the omission of the store (RAM) which increases the flexibility of the processing system. The TMS1070 is a p-channel MOS device and is equivalent to some 125–150 TTL i.c.s.

A block diagram of the TMS1070 is shown in Fig. 2. The following is a simplified account of what goes on in it.

Programme Memory

The ROM holds the basic programme material, i.e. the operating instructions. It's constructed in accordance with the basic specification for the device, using a single-level masking technique. Once programmed therefore the TMS1070 cannot be altered. In other microprocessor/microcomputer systems an external instruction ROM can be used to increase system flexibility.

The ROM in the TMS1070 can contain up to one thousand and twenty four instructions, arranged in eighteen pages, i.e. sixty four instructions per page. The microcomputer can take any one of these instructions from the ROM and carry it out in twice ten to the minus six seconds – pretty fast!

Each instruction consists of eight bits (binary digits). So the ROM contains eight thousand one hundred and ninety two bits. Why these rather odd numbers especially as, in Fig. 2, the ROM is labelled one k but contains one thousand and twenty four instructions? The answer is that since this

I'll See You Again

Les Lawry-Johns

I was singing away to myself and to (the annoyance of) the cat and dog when a rather familiar car drew up outside. It was the car of the scatterbrained blonde from one of the shops in the town (I can't be more explicit for fear of libel). She came crashing in through the door.

"Oh dear, you'll never guess. It's gone again, right in the middle of the film last night. Isn't it terrible? Just about everything that can go wrong has done. Now this. I was only saying to my daughter last night, the sooner your father comes home the better. He's only been away three months, and literally everything's gone wrong. If it isn't the car it's the central heating, and if it isn't that it's something else. Now the telly. My dear you'd never believe it. Men have no right to leave us for more than a few hours. It's all left to me. My daughter put her coat on and went out as soon as I started to tell her about the freezer going soft because the vacuum cleaner had knocked the switch up the day before."

I reeled before the onslaught as she paused to draw breath, and was relieved to see my wife appear on the scene to find out what all the fuss was about. She had to listen while I escaped to get the set out of the car.

Mrs. Brashley got her second wind, and continued her tale of woe. Apparently she'd knocked the wing of her car, and whilst it was being repaired she'd got her husband's car out in order to keep it in good running order and just as she was in a stream of cars approaching some traffic lights she happened to glance down at the birthday card her husband had sent her and consequently she didn't notice the cars in front slowing down as the lights changed and this was how her husband's car had a nasty dent in the front. It was all pure bad luck and there seemed no end to it.

It'd Gone Pop

By this time I had the set up on the bench and the rear cover off. It was a 26in. Pye of the 741 ilk (725-731, with vertical panels and all that). By the time Mrs. Brashley had related the sad tale about the water dripping through the bedroom ceiling, I had the filter capacitor replaced, a new fuse fitted, the set tested and had put it back in the car. She hadn't noticed any of this and finally remembered why she's come.

"Would you be kind enough to get the set out of the car for me? I'll call for it later."

"It was your set I was doing while you were chatting dear. I put it back in the car so you won't have to call back later." I was wrong, so wrong.

An Elusive Hum

Although this next one concerns a unit audio, it could well concern a TV set – and not only from an audio hum point of view. It was a Ferguson unit, using the 78S chassis. The complaint was severe hum on one channel only. This was confirmed on test, and the hum remained severe at minimum volume setting.

Since the other channel was not affected, the power supply and smoothing were assumed to be in order. Some time was spent identifying the relevant components etc. in

the defective channel, and it was found that the hum was getting in at the base of the preamplifier transistor immediately following the volume control. This was rather disconcerting, since the control was at minimum and the only components between it and the transistor's base are an 0.1 μ F capacitor in series with a 1k Ω resistor. The base is biased by a couple of resistors between the negative supply and the positive return, the supply lines being common to the other channel.

A test electrolytic from the transistor's base to the positive line removed the hum, thus proving that it was not entering the circuit later. The transistor was removed and proved faultless. The resistors were unhooked from the base contact and proved correct, as were the small correction capacitors in the circuit. When these items were refitted and the unit was switched on again the hum could hardly be heard. This seemed strange, since nothing had been found at fault.

Not wishing to quarrel with our luck, the unit was reassembled and when the last screw had been refitted it was tried again. The hum was there, buzzing away like an angry bee on one side while the other side maintained a discreet silence until the volume was advanced when it related how it spent a lovely day at Bangor.

Out came the screws, out came the unit, and we started all over again. Voltages tested, capacitors checked, even when they couldn't be at fault. At last we removed all the components from the base circuit of the suspect preamplifier transistor. It was only then that we saw it. The end of one resistor (the 1k Ω one from the base to the 0.1 μ F capacitor) had a greenish tinge, with more green on the lead out. It was close up on the panel to the main smoother, and a bright light directed on to the component side of the panel showed a damp area. It was only when the electrolytic smoothing capacitor was removed that we were able to see where it had been leaking.

A clean up and a new capacitor restored hum-free operation, but we were not quite able to see why the hum had been so severe, with the voltages apparently not affected. But then there are many things we don't understand. For example . . .

This Time it went Bang

Mrs. Brashley phoned later to say that the set had functioned beautifully for a couple of hours and then gone bang (not pop). Back it came, and when we looked at the print side of the power board there was a blackened area on the lower right side where one tag of the input choke had been dry-jointed and had been sparking. The glass of the 3.15A mains fuse was missing, leaving only the end caps, so as she said it must have been a pretty hefty bang.

With the connections properly made and the panel cleaned up, it remained to find out what else had suffered. The items next to the explosion area provide over-voltage protection (see Fig. 1): the BC147 transistor VT881 was shorted, also the 7.5V emitter zener (D884). These were replaced and the set tried, but the h.t. wouldn't come to life. Checking the circuit showed that the collector of VT881 is connected directly to the trigger diac D892 and diode

next month in

TELEVISION

● WIDEBAND RF PREAMPLIFIER

The readily available Mullard thin-film hybrid r.f. amplifier i.c. enables an extremely simple but effective r.f. amplifier to be constructed. All that's required in addition to the i.c. is a power supply and a PCB. The device covers the v.h.f. and u.h.f. bands, with a typical gain of 27dB and typical noise figure of 5.5dB. Full constructional details will be given, including a suitable PCB and power supply, so that a first class preamplifier can be built for use as a mast-head booster, a preamplifier for MATV systems, or a general purpose wideband amplifier.

● TELETEXT THE PHILIPS WAY

The Mullard/Philips range of teletext decoder i.c.s is used in the current Pye and Philips ranges of teletext receivers. Harold Peters describes how the Philips type teletext decoder is arranged and works, and the way in which it's incorporated in the Pye/Philips teletext models. Servicing notes will be included.

● THE VIDEO DISC SCENE

Several video disc systems have been announced and are due to arrive on the domestic market in the next year or so. There's likely to be a major battle to decide which system gets accepted as the standard for the home user. David Matthewson outlines the present situation.

● SERVICING FEATURES

Steve Beeching with some more VCR troubles, more on the Zanussi BR1026, and all the usual servicing features.

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Mr. Jackson who had bought a 22in. Pye hybrid set from us some years ago.

"Can I bring the set up Lawry?" he enquired.

"Certainly Mr. Jackson. At your convenience, so long as it's at mine as well."

"O.K. Lawry" said the bonny Scots laddie. "See you soon. And by the way, give that wife of yours a kiss and cuddle for me will ye?"

"Do your own dirty work" I retorted, mortally offended. I put the phone down and turned to Delilah.

"It makes me sick the way you flirt with all the customers" I complained. "And under my very eyes too. No one seems to be afraid of me any more. You just wait till Jacko comes in."

Well Jacko came. Brought the set in. Put it down and by chance my honey bunny happened to be passing through at that moment and received the kiss and hug he had threatened. It's a good job I was busy at the time I can tell you. There are going to be some changes around here.

"Mr. Jackson" I said icily. "Now that we have exchanged greetings perhaps you can tell me what you want."

Actually it turned out to be nothing more than the line sync, which was put right by fitting a new 4.7M Ω base bias resistor (R33) in the sync separator stage on the i.f. unit. He was ready to go and looked round.

"I'd better say goodbye to the wee lassie."

"Oh no you don't" I said, fed up with this hanky-panky. "You just put your set in your car and hop it. All you Scotsmen are the same. Every day is new year's eve."

So off went Jacko and the wife came in through the front door.

Guess Who Popped Back?

"I said cheerio to Mr. Jackson" she said. "But I was speaking to that nice artist fellow who lives up the road. I thought it would be nice if he could paint a picture of Pekey for us."

We have an elderly Pekinese in the family. He's not expected to be with us for much longer, but the thought of retaining an artist to paint the irritable little blighter (he bites me) seemed a little lavish, particularly since we had just paid our income tax, VAT, rates, etc.

"Oh well. We'd better think about that" I demurred.

"Well you'd better think of something, Mrs. Brashley's coming."

Oh no. What a day. What a terrible day. In danced Mrs. Brashley.

"Isn't it incredible? Just too incredible."

"Too incredible" I echoed.

"The sound's gone off. One minute it was there, next minute puff!" So while she related the rest of the day's good news to my honey pot, I once again took the back cover off the hated Pye. Good job it had only four turn keys and not ten thousand screws as on the Dynatron.

The audio output circuit is on the left side i.f. panel, and the supply to it comes via an 18 Ω resistor (R249). This is a small wirewound on the upper corner. It was open-circuit through no fault of the BD131 output transistors, a new resistor restoring normal operation.

Ask a Silly Question

"What can we do with this terrible set?" enquired Mr. B.

"Why don't you leave it here and pop up every time you want to see something" I suggested, receiving a kick on the ankle from my lotus blossom.

more sophisticated of the two. The smooth discs allow the pickup head to move freely across the surface, making still frame, fast and slow motion etc. facilities possible. The technical details are as yet somewhat obscure – even to JVC in the UK! It's known however that each frame can be individually located, as with the Philips VLP system, and that stereo sound is available. The disc itself has been refined, and now lives in a caddy which is posted into the player. JVC claim that conventional disc pressing techniques can be used to produce the discs, and this should help to keep the cost down. No date for a UK launch has so far been set, nor has any price been suggested.

Summary

The present position then seems to be that Philips are ahead with their high-technology VLP system, and having joined forces with Grundig and Sony could see their system adopted as an international standard. I recently had an opportunity to examine a Philips/MCA player purchased in the US, and was interested to note that many of the components are marked "made in Holland". It seems that

Magnavox (Philips' US subsidiary) are assembling the players from kits of parts shipped in from Holland. It's rumoured incidentally that the relatively expensive helium-neon laser may in future VLP players be replaced by a solid-state version. This would help in bringing the price down and make the player more robust.

No definite date for the launch of the Philips system in the UK has been decided upon, but Philips are considering the use of the Mullard Blackburn factory as a disc pressing plant – it's expected to be brought into operation later this year. So VLP could well be in the shops here late next year.

Selectavision is scheduled for nationwide distribution in the USA next year, and RCA hope to sell around 200,000 players at about £250 each during the first year. An impressive number of deals with software houses have already been signed, including Disney, 20th Century Fox, MGM, Rank and Paramount. No date for a UK launch has been suggested, and there are no plans yet for a PAL version of the player.

Detailed accounts of the Teldec and VLP systems appeared in the December 1971 and June 1974 issues of *Television* respectively. ■

The Gypsy's Warning

Les Lawry-Johns

SOME years ago we were at the seaside. I think it was Margate, but then again it could have been Ramsgate. Since it was drizzling with rain or something, we couldn't stay on the beach. So we went into the amusement arcade, where we rolled pennies down pieces of wood on to a flat surface where they were collected by a nice lady who smiled. She seemed to collect a lot more pennies than she handed back, so I suppose that's why she smiled.

A Visit to Madame Martine

Having lost all our pennies we ambled around until we came to a hut which had a big notice outside reading: "Clairvoyant. Madame Martine can look into your past and foretell your future." Amazing. Why live in doubt?

Well, I was only forty or so at the time but I seemed to have been in doubt for most of my life and what with all the funny things that were happening it seemed likely that I would remain so. Funny things like dual-standard TVs and radio sets that didn't need to warm up. Things that took a lot of thinking about. So I thought it was time I got myself straightened out by an expert. I'd tried self hypnosis, but every time I told myself to relax I went to sleep. So that was no good.

It wasn't easy to enter the dim interior of the hut and face a woman who not only knew all about my past but also knew what I was going to get up to in the future. But I did, and there she was sitting at a small table which had some playing cards and a piece of round glass on it. I suppose she played patience while waiting for uncertain people like me to pluck up courage and come in. She had a scarf round her head, so presumably she'd just washed her hair – but there was plenty of it hanging down and it looked dry enough. She fixed me with a piercing look from her black eyes. Perhaps she'd told someone something they didn't want to hear.

"Sit down my dear. You have a lucky face so you'll want

the full reading which is an extra two and six pence. It'll be well worth your while hearing about all the nice things that are going to happen to you."

"Do you know the lady on the penny roll stall?" I asked cautiously.

"Of course I do my dear. But do you want the full reading?"

"Not really. Don't bother about my past. Just give me a quick look into the future."

She didn't look very pleased to give me only the basic reading, and grabbed my left hand, opening it out and tracing lines upon it. Suddenly her eyes widened and she looked confused.

"What is it?" I asked in fear and trepidation.

"You're not sure of yourself, are you? In fact you're nervous of what might come." This was hardly astounding, since my hand was shaking like a jellyfish.

"What's to come?" I quavered. "Is it bad?"

"I can't reveal all" said the secretive bitch. "But beware."

"Beware?" I whispered. "Beware of what?"

"Beware the blue tants" she said mysteriously. "And that's all."

Years Later

Bob was an insurance broker whom I'd known for years. A very conservative type, rarely ready to make any sort of change to his well ordered life. Until last week that is. He came into the shop and gave one of his rare smiles.

"Leslie" he said firmly. "I've decided to bring a bit of colour into my life. To make the golf more interesting, you see."

The upshot was that we unpacked a nice new Ultra 22in. colour set, fitted with the Thorn 9600 chassis, checked it and delivered it to Bob that same evening.

Now we've sold lots of these sets, and have rarely had cause to complain. Of course it had to be the one that

played about a bit we took out to Bob, and of course he had to live way out in the country up a dark lane and it had to be raining.

We found our way up the drive and installed the set which then worked perfectly. As it happened, and much to Bob's delight, golf was in progress. So we had a couple of glasses and dallied a while. It was as well we did, because after about fifteen minutes the colour gently faded out to leave a beautiful black and white picture with admirable grey scale. Believe it or not, Bob didn't even notice. His hero was in a bunker.

"Look at that" he said. "No trouble at all. I wish I could get out of trouble that easy."

"So do I" I concurred, with conviction, having lost all interest in golf.

I couldn't do anything until Bob had seen his fill. I then found that switching off, waiting for a few moments and then switching on again produced normal colour for a very short period.

Access is really good on these models. The left side i.f. panel can be swung up, allowing the decoder panel to be swung out. The print is beautifully marked (other makers please copy), and components can be located and identified without hesitation.

The decoder panel is a direct descendant of the one used in the 8000, 8500 and 9000 series, so we were on familiar ground. A quick check on voltages showed that the 8.8V which should have been present at pin 2 (supply pin) of the TBA395 reference oscillator i.c. (IC5) quickly fell to 3V or so, thus directing suspicion to the decoupling capacitor C186 (6.8 μ F). Unhooking one end immediately restored the correct voltage and the colour (thus proving that its value is hardly critical). The nearest value we had was 10 μ F, so in this went and harmony was restored.

"Part of the installation procedure" I explained.

Checked on a meter C186 gave no sign of leakage, but it was most definitely at fault. Oh yes: it was a blue tant.

We also found a blue tantalum responsible for low tuner selector voltages on another model, causing the programme numbers to flicker from one to another like a demented MOSFET i.c. would.

So remember, when you're up a dark lane and it's raining, beware the blue tant.

Socket to me Baby

This chappie came in to buy a radio. After a bit of humming and hahing he decided upon one. Mains and battery.

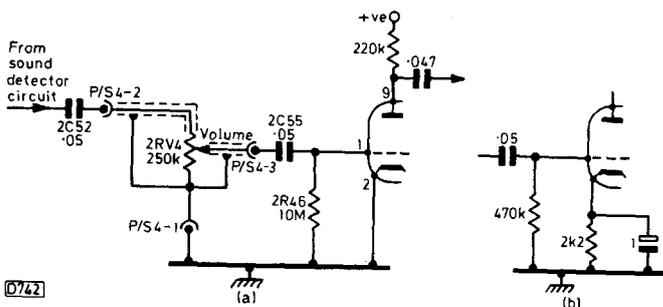


Fig. 1: Triode audio amplifier stage used in the Rank A774 chassis (a). A difficult case of hum on sound could only be cured by decoupling the triode's control grid (pin 1). The only workable cure we could find was to introduce selective negative feedback in the triode's cathode circuit (b). The 1 μ F cathode bypass capacitor provides negligible decoupling at 50Hz. Introducing the 2.2k Ω cathode bias resistor makes it necessary to reduce the value of the grid leak resistor to about 470k Ω .

"Would you like me to put a plug on the lead for you sir?"

"No no, we've plenty of plugs in the house, but please put a socket on it for me."

So we put a plug on and away he went quite happily.

It's Gorn Again

When the 24in. Bush monochrome set came in (A774 chassis) we thought it would be another line output transformer job. It wasn't. The tube was flat – just a dim grey, with silver highlights.

"Is it the picture valve?"

"No. It's the tube and that costs a little more."

"Can you put one in?" So we did, and the picture was lovely. Until the next day that is.

"It's gorn again. That new tube couldn't have been much good."

A new PL504 line output valve restored normal conditions and better relations. Until two days later.

About a year earlier we'd fitted a new line output transformer. This had now chosen to develop shorted turns. Fit new transformer. Nice picture. "Hope it lasts a bit longer this time."

It didn't. Back it came with overloaded video. A.G.C. checked, and suspect preset control plus suspect i.f. amplifier transistor replaced.

"I'm fed up with carting this thing down every few days. Will you come up to us if it gives any more trouble?"

"Certainly. But I shouldn't think it'll play around any more." It did, and I went. Nasty hum on the sound.

Change PCL86 audio valve. No difference. Check electrolytics as hum worse with the volume turned down. Electrolytics not at fault. Hum vanishes when triode's grid is shunted to earth. Check volume control, wiring, screening, plug and socket, valveholder, and finally suspect panel insulation. Cut away here and there but hum remains. Desperate. Fit 2.2k Ω resistor in series with triode cathode, shunted by small electrolytic, and reduce value of grid leak resistor from 10M Ω to 470k Ω (see Fig. 1). Hum now faint buzz, hardly discernible, but I know it's there and I don't know why. Could it be panel leakage, or is there a more subtle reason for the hum (and instability)?

Anyway, there've been no more complaints regarding the sound. Two days later however there was a call because it didn't work at all. Back again to find the on/off switch inoperative. Replace this and cross fingers, legs and eyes – because that was only a couple of days ago.

Overheard in the Pub

The chap who was talking was getting on a bit and had been interested in radio years ago. The couple listening were of much the same age and greatly impressed.

"Take my last telly for instance. Kept having trouble with the bottom of the picture coming up, leaving a black band at the bottom. If they came once they came a dozen times. Each time they just put a new picture valve in and pushed off. So next time I knew what to do myself. Had to keep on though. Eventually the socket became so loose the valve wouldn't stay in. Got round that one! Glued it in firm. Lasted all right for a time, then the pins went all funny. Set had had it by then though."

"It just shows you, doesn't it?" said the lady. "They don't know their job properly. Take our set. Keeps getting twinkling dots across the top, right at the top they are."

The adhesives man gave his diagnosis. "It's the picture valve's grid that's loose. You just tell them to fit a new one."

A Square Deal for LOPTs

Les Lawry-Johns

NOW as you all know I'm second to none in my admiration for the line output transformers used by Thorn: jelly pots are tops as far as I'm concerned. I ask you: how many times have you had to replace the line output transformer in one of the 1500 series sets for example, or for that matter the preceding 1400 or even earlier? Ah, you may say. What about the e.h.t. transformer in the 3000/3500 series? Not guilty we say: blame the tripler. Hissing Sid is guilty of knocking the jelly pot over.

In short (sorry!) we may say that the e.h.t. rectifier is more often the faulty item and that the transformer rarely is.

If we accept this proposition, who was the bright boy who, some years ago now, decided to incorporate the single-stick e.h.t. rectifier inside the line output transformer's overwinding? We are not referring to split diodes and windings, simply to an item which is at the end of the overwinding and could easily have been left outside for replacement. If one sticks to the letter of the BEAB regulations one has to replace the relatively expensive transformer simply because it has a defective inexpensive item buried inside the plastic housing.

If the rectifier has gone short-circuit, so that removal of the e.h.t. cap and any associated capacitor (which could have caused the trouble in the first place and would have to be disconnected anyway to prove the point) restores normal timebase working and the capacitor (if present) is in order, it seems reasonable to fit a new stick rectifier in a fully insulated housing on top of the line output transformer assembly, thus restoring the set to normal working without replacing the transformer itself. Such fully shrouded units are readily available, and come complete with e.h.t. cap and lead. So why not use them? We do.

The objection of course is that the defective rectifier may have a high-resistance leak, which would cause sizzling and varying e.h.t. on bright scenes or when the brilliance is advanced. So far however we've not found this to be the case. Apparently when they short they short – and good. This of course is not what we're on about: why put the stick inside in the first place? Greater reliability? Safety? I doubt it.

More Moans

Having groaned about the Thorn 1690/1691 series portables (oh, that's what he was on about), let's have a groan about the cheaper imported portables which keep coming in because the stores that sell them are loath to repair them. They appear with the most unlikely names adorning the front fascia, but are usually much of a muchness.

There seem to be two common failings. One is caused by the use of underrated diodes in the mains bridge rectifier circuit. Even if all four diodes haven't cooked up and taken the supply leads with them (due sometimes to incorrect battery connections) it's still essential to turf out the lot and fit more robust diodes and preferably a series fuse if one isn't fitted.

The other common failing is caused by the use of unreliable transistors in the a.g.c. circuit. The customer's complaint will be that the screen lights up but there are no vision or sound signals. Oddly enough, the transistor usually responsible stands up on long legs somewhere at the

front of the panel, like a sore thumb. A quick check with an ohmmeter will establish whether or not this is the guilty party. Probably in the set you next get for repair the guilty transistor will not be so obvious, but it doesn't take long to check each suspect, and hopefully the print will be marked B, C and E to enable you to use a transistor of the type you have in stock, say a BC108 or a BC148, with the base in the middle, assuming it's an npn transistor of course. There's a fair amount of design variation so we can't be too explicit.

Having said that, we must now confess it wasn't all that long ago that much time was spent in checking the a.g.c. and the i.f. stages of one particular portable only to find that the tuner was responsible after all, and we've yet to find out how this could have rendered the i.f. stages well nigh inoperative.

Mrs. Ferguson's HMV

Have you noticed the number of complaints of late about turntables not playing new records properly? I rather suspect that this is really down to the record makers, but not being an expert on anything I'm not able to say for sure. We're expected to cure all the ills that afflict the home entertainment scene however, and a pick-up arm bouncing around on a new record is not conducive to harmony in the home. Hence the arrival of Mrs. Ferguson, with her HMV stereo, an Indesit T12 portable and a son who was a Hi-Fi expert.

Ernest (the son) immediately launched into an explanation of what was wrong with the stereo unit and what was needed to put it right.

"It obviously needs a better cartridge, one with better tracking capability – say a Shure V15 type IV – but I doubt if my mother will spend eighty quid or so on a decent cartridge and anyway I don't suppose you would keep such good, er . . ." He didn't complete the sentence, but I guessed he was casting aspersions upon my what's-its-name.

"If the cartridge is not at fault, which it isn't, she would be wasting her money if she followed your advice" I mumbled. "Why don't we find out what the trouble really is, if there is any?" Mrs. Ferguson then got her bit in.

"Shut up Ernie," which was a good start I thought. "If we leave it with you, perhaps you can sort it out and ring us when it's ready and perhaps have a look at our portable telly – everything looks long."

And off they went, Ernie still on about the stereo needing equalisation to prevent cross-talk between the tracks or something technical like that.

As it used a Garrard deck, we immediately removed the turntable and checked on the free movement of the changing cycle actuating plates. These as usual were a little stiff, but not as tight as we have known them. Sometimes we've found the plates completely immovable, which must have meant intense discomfort to the end tracks of the records played under these conditions.

So off next came the changing wheel (I know it has a proper name, but I can't recall it at the moment) and off came the upper and lower plates to enable the spindle to be freed off in its bush, which is where the trouble originates. Having ensured that they could freely flop about, we reassembled the unit and tried several records. All played through to the very end without incident, including my all-

time favourite "Night in a Turkish . . ." (censored by the editor).

I still had doubts about the performance of new records on it, in view of Ernie's comments about tracking capability, but I had shot my bolt and could do no more since the arm was as free as a bird and the weight was right.

The Indesit was where I really came unstuck. The complaint was excessive height, which was obvious as soon as the set was switched on. Since access to the height and linearity presets is through holes in the aerial input moulding, I assumed that no one had been at them and immediately started checking components in the height and linearity circuits, removing the tuner unit in order to gain easier access.

Everything appeared to be in order – capacitors had capacitance and didn't leak (even the tant), resistors had the correct resistance, the presets were intact, and the driver transistor was in order. I didn't suspect the output transistors in view of the nature of the fault.

It wasn't until I reduced the height control setting that I discovered that the bottom came up but the top didn't reduce at the same rate. Adjusting the linearity didn't have much effect, so now we had a much more familiar symptom which directed attention to where it should have been directed in the first place (and would have been if we'd thought about the possibility of Ernie twiddling with a fine screwdriver through the plastic moulding of the aerial panel).

A quick check on the output transistors revealed that one had an open-circuit junction and the other a slight leak on a reverse reading. So out they came and in went a new pair. All that messing about could have been saved if I'd followed my own advice: always check first the things that run warm, or where there's heat there's a probable trouble spot. This was the first time I'd found the output transistors at fault when the complaint was excessive height.

A Philips K80

A friend (?) asked me if I'd tackle a set that had really got him losing sleep. It was a Philips S26K414 (K80 chassis) and I hadn't seen one before, so they can't be all that thick on the ground. I'd had many a battle with the earlier K70 however, so I thought I'd stand a sporting chance. Having a 110° tube it's not as bulky as the K70, but at first glance with the rear cover off it has the same unnerving effect, due to the sheer mass of circuitry.

The problem, which I got second-hand, was that the present "no raster" condition had been preceded by incorrect grey scale and no proper colour signals.

Screwing up courage, we made a tentative start. Switching on produced an initial bright glow in the valve heaters, particularly the PL802 luminance output valve. I was also pretty sure I saw a spark inside this valve. The top right line output section houses the two PL509 valves and a PY500. Under these is the line output transformer, and under this again is the tripler.

I heard the e.h.t. rustle up, so this was one relief. Another was that the sound was present and of the expected high quality – the set has a tweeter and woofer.

Since the e.h.t. was present, the obvious course was to check the c.r.t. base voltages. The first anodes were at just over 500V, so no problem here. The grids were also about right at a little under 100V (the grids are driven by three PCF200 colour-difference output valves). Next, as expected, the cathode voltages were high – about 240V. So there didn't seem to be too much of a problem after all – fit a new PL802 we thought and all would be well. A new PL802 produced no voltage drop at all at the c.r.t. cathodes

however, so it was time to take a closer look at the luminance output stage.

With the chassis let down to the extent of the knot in the retaining cord, we chased the white luminance lead from the tube base to the print near the PL802. The anode load resistor was found to be a hefty 5.6k Ω wirewound type, and there was only about 20V across it – so clearly the PL802 wasn't passing much current. Its cathode voltage was about 2V, and there was a slight negative voltage on its control grid. With a knowing wink, we decided to get a more healthy current flow: with the meter still connected to the anode, and recording 240V, we shorted the control grid to chassis to remove the negative bias. To our astonishment, the meter's reading didn't budge from 240V.

Measure the negative voltage on the grid more carefully – just a little over 2V. Now I'm no mathematician, but the removal of a 2V negative bias on the grid should have produced a marked increase of anode current. The fact that it didn't suggested that the new PL802 was not up to scratch. Fit another. Results identical, so I bashed my head on the bench just for fun.

All right I thought, if removing the grid bias doesn't do anything, let's remove the cathode bias instead. Connecting the cathode to chassis resulted in the anode voltage falling to 70V and to my mind becoming a complete blank. Daft as a brush, I checked the continuity of the grid socket of the valve base to the print, and of course it was o.k. I then checked the continuity of the cathode socket to the print. Again o.k.

Just for fun, check from the cathode pin to chassis. Something like 400 Ω . 400 *ohms*? It should have been 27 Ω . I then remembered the spark in the original PL802. With the damaged 27 Ω resistor replaced, the anode voltage dropped quite nicely and there appeared to be something on the screen, which was mainly green, but what was there kept changing around so much that I concentrated more on what the voltages were at the tube cathodes. These were fluctuating around pretty wildly, though the voltage at the white lead input remained steady.

We then took a closer look at the tube base panel, and wished we hadn't. On the bottom of the panel is a plastic housing which contains four sliders to enable the highlights to be set slightly differently for monochrome and colour. The selector switch is on the right side, operated by a solenoid powered by the colour-killer – which confused me all over again.

It was clear that the sliders were not contacting the resistive element properly, and furthermore couldn't be made to do so, hence the varying tube cathode voltages. Having failed to improve the contact we decided to bypass the presets and switches, applying the luminance signal directly to the cathode resistors. The result was a weird but fairly steady picture, which should have been in monochrome but was so badly converged and generally set up that we had to start from the very beginning with purity, convergence, grey scale etc.

The convergence panel pulls out from the front once the two rear fixings have been released. At last a reasonable monochrome picture was resolved, but the contrast control was inoperative. So we wearily set about finding the reason for this. Since the contrast control operates on the control grid of a PCF80 valve (triode section) on the top centre panel, we thought we would find the source of the trouble here. Not so! The PCF80 triode cathode voltage was too high (about 7V instead of 1.9V), but to find the cause of this we had to trace back down on the main signal board – to the second chroma amplifier transistor (BF195), which had a base-collector short. Ah we thought, we can kill two birds

with one stone. Replace this and we'll not only regain control of the contrast but we'll also restore the colour. We regained control of the contrast all right, but of colour there was no trace.

Since signals were now passing through the chroma amplifier, but nothing worth mentioning was coming from the detectors, it seemed that we next had to lean heavily on the reference oscillator. We were about to do this when Mrs. Crooke burst in.

Negative Picture

Mrs. Crooke was in such an agitated state that I had to forget about the K80 for a while. It was put down and Mrs. Crooke's Bush was put up in its place. She was a small woman who seemed never to stop talking (shouting) – even to draw breath. I wondered if she knew Mrs. Brashley, but couldn't get a word in edgewise to find out. The torrent continued while I was trying to find out what was wrong, and I didn't really pay much attention to what she was saying except to the bit where she said that the reason she had brought the set in was that her husband worked all hours at the office and rarely arrived home until late at night and then went straight to bed. I wondered why.

The Bush A823 was not functioning because the l.t. line was very low, though the a.c. input to the bridge was normal. Since the fuse was intact there were clearly no shorts, so it was pretty obvious that the bridge rectifier was at fault. It read all right on an ohms test, but it was a green one and green is not my favourite colour. We had the option therefore of putting in four diodes or a black BY164.

The never ending chatter was putting me off my game, so I suggested that Mrs. Crooke should pop off round the shops for half an hour or so. Mrs. Crooke scratched the

cat's head (Spock had been listening impassively during the tirade, and it was about time she came in for some attention).

"Your dad's fed up with my chatter darling. He wants to get rid of me so he can do his work properly. I do talk too much I suppose. Everyone tells me so. But you don't mind do you my sweet? Cats are much better than people, especially men." And off she went, leaving Spock and I feeling sort of drained.

Not feeling energetic enough to fit four diodes, I popped in a nice new BY164 and was comforted to hear the e.h.t. come to life and the sound come on – even if it was two women chattering. The comfort didn't last long when I looked at the screen. The picture was completely black and white but reversed, i.e. negative.

I was fairly sure that the SL901B i.c. in the decoder was responsible for this condition but couldn't figure out how the loss of the l.t. line could have caused it to go. Mine's not to reason why however, and fitting another chip restored normal operation.

I'd just finished writing out the bill when Mrs. Crooke returned, presumably from a brief encounter with the hind legs of a donkey, making a bee-line for the cat. Off she went, nattering away ten to the dozen – until I handed her the bill that is. There was a deathly hush. Unearthly it was. You would have thought it was a ransom note.

The wife ran in to see what all the quiet was about. "You take the money from Mrs. Crooke dear" I whispered, coward to the last, "and I'll put her set in the car for her". When I got back Mrs. Crooke had regained her composure and was talking about the cost of living, having handed over three fivers and received her change.

The K80? Well, the above took place only an hour ago, and I haven't got back to it yet.

Surplus Tuner Control Unit

Hugh Cocks

DURING a recent visit to Sendz Components I came across an interesting varicap tuner control unit that could prove useful to TV set constructors. The unit was made by GEC and has eight channel selector switches. Only a very light touch is needed to change channels. A large nixie tube displays the selected channel.

The unit is designed to be mounted in the set vertically, by means of the bracket on its left-hand side. When the whole unit is depressed, the innards spring forward giving access to the tuning potentiometers.

Fig. 1 shows the panel arrangement and the inputs/outputs, which are straightforward. When one of the selector buttons is depressed, a feed to mute the a.f.c. circuit to facilitate channel selection is obtained at pin 10 of the 14-pin connector (note that pin 1 of the connector is towards the centre of the board edge, pin 14 towards the corner). Pin 11 is connected to a switching transistor and can be used to adjust the time-constant of the flywheel line sync circuit for VCR use (the original model used a TBA920 sync/line oscillator i.c., the switching transistor being used to short-circuit pin 10 of this i.c.). The transistor switches on when channel 8 is selected. Pins 12, 13 and 14 are connected to a Band I/III/UHF selector switch associated with each channel. This can be ignored for ordinary UK use, though some DXers might wish to make use of it.

In the original design the TAA550 tuning voltage stabiliser i.c. was mounted on the i.f. panel and fed from

R18 on the control unit via pin 5 – the idea was to prevent the TAA550 overheating when its loading (the tuner control unit) was disconnected. It's a simple job to add a TAA550 and bypass capacitor (say 0.005µF) on the PCB side of the control unit – positive side to pin 5, negative side to pin 3, with pins 4 and 5 linked. There are four i.c.s on board PC677.

The unit is currently available from Sendz Components at £5.00 plus 30p postage and 15% VAT. A full circuit is supplied. ■

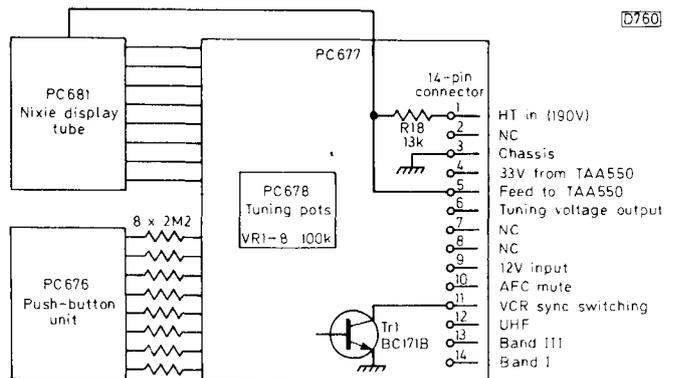


Fig. 1: The panel arrangement used in the surplus varicap tuner control unit, and the connections to the fourteen-pin connector.

white polythene box. The aerial input connection is via a standard, good quality 75Ω coaxial socket while the output is via a flying coaxial lead approximately 15in. long terminated with a reasonable quality coaxial plug. There's a substantial SPST toggle on/off switch. The PP3 "floats" within the box, the snap-on lid holding things stable.

At £7.70 plus 30p postage I call it very good value, and I'd certainly recommend it to anyone wanting a high-gain, single-channel u.h.f. preamplifier.

The BF183 is a comparatively old device. The use of a BF362 or BF479 in the first stage would give even better performance. With a BF362 you could probably increase the voltage gain by 3dB and, more importantly, reduce the noise from around 7dB to 5dB. With a BF479 an even

better noise performance – perhaps 3.5-4dB – could probably be achieved. These figures apply at 800MHz. An experienced constructor might also consider adding an input tuned circuit to achieve greater selectivity. A BF362 or BF479 would require little or no alteration to the biasing when trying the change out to see what improvement in system performance could be achieved. Personally I prefer to use a diecast box, in the interests of screening and rigidity.

The points made in the previous paragraph are suggestions for getting even better performance from the unit. The amplifier in the form supplied does however give excellent results and is wholly adequate for normal domestic use. ■

Tubes

Les Lawry-Johns

TUBES are the subject exercising our little minds this month. They are of all sorts. Most are alive, like trees, snakes and people. Take people for example. Long tubes with a hole at the top equipped with a mincing machine to break down bits of other tubes. And with two sticks at the same end to grasp the food and two at the other end to enable the food to be sought and collected. Trees are much more efficient, staying in the same place while sending down their lower sticks in search of sustenance. Also they don't need all the bits and pieces people, and other animals, require around their tube – pipes, pumps and filters, with a central control system at the top. Trees don't need such paraphernalia and therefore live a lot longer. Snakes are also more advanced than people: no sticks, just a basic tube, having taken a leaf out of their lowly cousin, the earthworm's, book. We seem to have a long evolutionary path ahead of us before we can stand still like trees. I've probably got it all wrong however, which leads me to the next bit which I've also probably got wrong but has been causing some concern lately.

Rebuilt colour tubes

It's our custom to keep in stock a few rebuilt colour tubes of the more common sizes, so that customers aren't kept waiting for more than a few hours and the cash flow is maintained. There seems to be an unexpected snag in this desirable state of affairs however.

It would appear, and we stand to be corrected, that if a tube is taken fresh from the ageing process (the final part of the rebuilding procedure) and installed, tested, converged, etc. there's very little trouble. If the tube is held in stock however, say for only a few days, when it's fitted the emission is below standard and shows symptoms of muddy colours, flaring etc. When placed on test the guns show poor emission which can be restored only by reageing, i.e. overrunning the heater and applying the standard positive potential to the grid in relation to the cathode, measuring the resulting current flow in milliamps. Some 15 minutes or so may have to elapse before the accepted 60–70 milliamps can be achieved – and maintained when the heater voltage is returned to 6.3V.

If this is done and the tube is put into use, no further

trouble is experienced. If it's not done and the tube is left working the resulting picture will be inferior and will remain so, i.e. it will not "bed itself in" or "age" itself.

You may say that this is because we have employed rebuilt tubes from one source and that this source has not used hot pumping or has not aged the cathodes for a long enough period. This, as far as the first two points are concerned, is not so. We have used tubes from several sources. Hot pumping is definitely used at least at one of these sources, which we've visited.

It's the ageing process about which we're in doubt. How long should this be if the cathode material is not to revert towards its inert state when not put into immediate use? These notes are not the result of a few isolated instances. They are based on experience over several years, and we now always check the emission of rebuilt tubes which have been held in stock for any period before using them.

There now. I've already been given ten thousand reasons why all this can't be, and if you want to add to this by all means do so. But just check that tube before you fit it if it's been laying around for a while.

It keeps going dark

When Mr. Bristol brought his set into the shop we didn't expect to have the trouble we ended up having. It was a Bush colour set fitted with the A823 chassis. He said the picture kept going dark and off tune. So we checked the tuner and found the nylon collars on the threaded rods in various stages of decomposition. To save time, we stuck on our spare assembly and refitted the tuner. It stayed in tune and the picture remained bright.

Back he came the next day to say that it still went dark. So we put it on a soak test. It remained bright until it was moved, after which the picture could be seen only with the brilliance control fully advanced – and even then only the highlights were in evidence. When the set was moved to gain access normal brightness returned and of course remained despite persistent prodding etc.

When at last the screen did darken, the cathode voltages were found to be correct and we were just in time to record a first anode voltage of about 250V on the blue gun before it shot up to about 500V and the brightness returned. "Ah ha" we said, but it didn't do us much good. Over a period the first anode voltages varied, and we leapt from the convergence panel where the presets are mounted across to the scan control panel where the supply comes from several times, each time becoming more frustrated.

There was no leakage on the convergence panel, and indeed the voltage was coaxed to vary with the supply removed from this panel. So we were back with the 2.7k Ω resistor 6R7, the rectifier 6D2 and the reservoir capacitor

6C13 (see Fig. 1). We prepared to replace the latter, only to find a dry-joint at one end. Not leakage after all, simply the intermittent lack of a reservoir.

As soon as the joint was remade the first anode voltages returned to normal and stayed there. It's one thing to know you've definitely cleared a fault, another thing to convince the customer. Two days later however Mr. Bristol popped in to say that everything in the garden was bright and cheerful.

A naughty 3000

In the meantime we'd encountered another mystery. A bulky brute with folding doors, an HMV label and a Thorn 3000 chassis. It seemed to have just about everything wrong that this type of set can have. The main trouble however was that an initially indifferent picture would slowly go out of focus, become a bright blur, then disappear.

More in hope than conviction we changed the tripler. No difference. The old tripler felt quite warm however so the tube must have been drawing a fair amount of current. We next noticed that when the picture became a blur the tube neck became blue. So we immediately accused the tube of becoming soft – a severe cold was playing havoc with our reasoning (which is not very evident at the best of times). After an all round general panic, during which measures were taken that I'm ashamed to relate, we started to behave more rationally. We unhooked the tripler and took voltage readings at the tube base. Previously these hadn't made a great deal of sense. We now found that the cathode and grid voltages remained reasonable, but the first anode voltages (yes again) on all three guns increased to over 1kV – in fact were probably higher than this, allowing for the effect of the meter. My nose blowing assumed force nine proportions.

We eventually discovered that the first anode supply earth return resistor R727 (see Fig. 2) read right when cold but became open-circuit when heated. After replacing this the picture remained in focus and we were able to clear the hundred and one other faults which could now be seen.

Caught again

Having made a complete mess of a simple repair on an HMV set we next proceeded to butcher an innocent Dynatron set fitted with the Pye 691 chassis. The complaint was that it went out of focus after ten minutes or so, becoming a complete blur with the width coming in to denote overload conditions.

Our ice cool reasoning was impeccable and, of course, wrong: either the cathode voltages are dropping due to a fault in the PL802 luminance output stage (not so – the cathode voltages were fairly steady at about 200V), or the tripler is faulty – in which case it will be hot. The tripler was indeed hot, so we proceeded to replace it – which is easier said than done in the 691. Manfully we tackled the job, and finally had the lot back together.

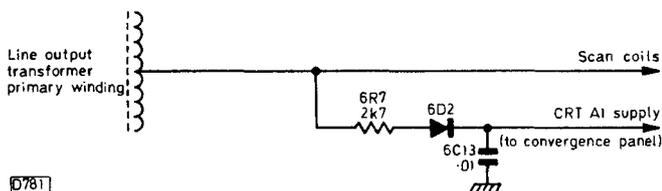


Fig. 1: A dry-joint on the c.r.t. first anode supply reservoir capacitor 6C13 caused intermittent loss of brightness in Mr. Bristol's Bush colour set (A823 chassis).

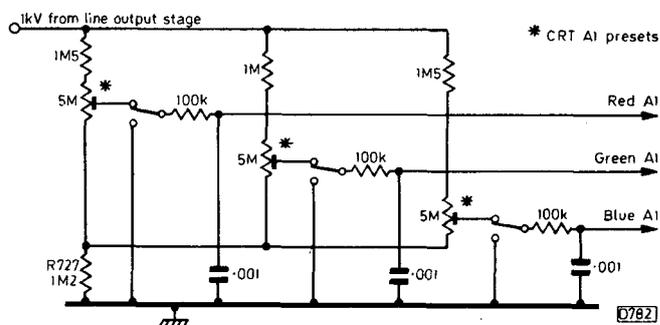


Fig. 2: A particularly nasty one this, on the Thorn 3000 chassis. When warm, R727 would go open-circuit, with the result that the c.r.t.'s first anode voltages became excessive. The symptoms were loss of focus, the picture becoming a bright blur then disappearing.

We switched on and started to write out the bill. As we did so we became aware that something was wrong. We heard the e.h.t. rustle up but no picture appeared. Hurriedly we checked the tube base voltages again. Cathodes o.k. First anodes o.k. But whilst there should have been about 100V on the grids there was a heavy negative voltage instead.

I was well aware that we'd had this trouble more than once before, but what with a thick head and old age I couldn't remember what had caused it. "Clamp pulses, clamp pulses" I thought blearily and checked them and the clamp triode grids and cathodes. Not at fault. Faulty PCL84? Not so. Oscillation due to lack of decoupling? Then the penny dropped. Sure enough, an electrolytic on the h.t. supply line to the CDA panel restored normal conditions, and of course the main smoothing capacitor was open-circuit.

A replacement was fitted and the picture appeared quite good for about five minutes. It then started to go out of focus. . . . Back to square one. Why wasn't I born a cat or a dog? All they have to do is watch me making a fool of myself. I'm not very good at being a human.

I rested my hand on top of the cabinet and hung my head in despair. The cabinet was warm over the top of the long focus unit. Touch the focus unit. Hot and getting hotter. The plastic was melting before my very eyes! Off off, switch the thing off. The focus unit continued to bubble and no wonder, since the VDR was acting more like a fire bar element than a focus rod.

Once again I remembered. Pity I couldn't have managed to do so before fitting the tripler. I'd even written about it a couple of years ago. A new focus unit restored reliable operation, but I didn't feel so good.

The K80

Oh yes, I nearly forgot. There are three chroma amplifier stages in the Philips K80 chassis. I had replaced two of them and finally reached the third which is way down on the panel where the print side is obscured by the power unit. The latter had to be removed to gain access. All three transistors had apparently been blown, presumably by an accidental short on the tube base holder where a solenoid is activated when the colour-killer circuit supplies 25V to it and the chroma amplifiers. I suppose the sudden application of 200V from an adjacent cathode connection would upset things a bit.

Have you ever tried to converge a 110° delta-gun tube when there's an unsuspected dry-joint on one of the controls?

One Damn Thing After Another

Les Lawry-Johns

I must confess to feeling very sad occasionally of late. Little seems to buck me up very much, and I seem to make so many daft mistakes. Look at what happened yesterday for example. The phone rang, as phones do.

"Hallo. Hoodo Yoovue" I said, trying to cheer myself up.

"Don't muck about. I know it's you" said a voice I knew fairly well.

Then I remembered. It was Mr. Gay, the funeral director.

"Hallo Mr. Gay. How's business?"

"Not bad. Could do with a good epidemic though. Anyway I called you about our set. Can I bring it round?"

And that's how it came about that a damn great hearse drew up outside the shop and two men clad in black solemnly opened the back and carried in a set with all due ceremony. It needed only an organ and some lilies to complete the picture.

In those brief moments my mind filled with all sorts of ceremonies that could be carried out on TV sets, including cremation. But I never said a word out of place.

The set was a Thorn 8800, and the complaint was that the sound was there all the time but the picture kept going.

A Solicitous Enquiry

Off went the undertakers, promising to return later in the day. They had hardly departed when the inevitable happened. One of the local old girls popped her head in the door.

"Has she gorn then?"

"Has who gorn?" I asked, quite unnecessarily since I knew perfectly well the old ghoul was hoping that someone had passed under or over or whatever people do when they pass on, and since I was in evidence she must have thought that honey bunch was deceased.

"The missus" she said. "I saw the undertakers and I thought they'd come to straighten someone up. My daughter can come in and clean for you if you like."

"There are still a few more years of cleaning left in the missus" I said, "she hasn't shuffled off, but thank you for asking just the same. They didn't come to measure anyone up, only to bring a set in."

The old girl wandered off disappointed, muttering something about people didn't ought to be allowed to make other people think that someone had died when they hadn't.

Now to the Set

So we turned to the Marconiphone (and we won't see that name again on a new set, at least not from Thorn), and switched it on to see what all the fuss was about. There was a loud pop as the mains filter capacitor threw in its hand and the fuse disintegrated.

Having made good that diversion, we tried again. All now seemed well, with a fair picture and sound. This continued for some time, then the picture became a mass of noise and the sound became hissy. It looked like a tuner fault, but as we were not born yesterday we decided to take a look at the lower left side of the signal panel. A slight touch on the i.f. input plug from the tuner confirmed that this was indeed making poor contact, as it so often does on this type of

panel (8000 on up to 9600).

Having cleaned the contacts, normal service was resumed for about five minutes. Then the sound failed completely. This time it was the MJE340 sound output transistor which had departed this life. A BD410 was fitted in its place and all now seemed well. So the set was wrapped up to await the undertakers' return.

Return of the Little Old Lady

Some time ago we related how we were made to feel decidedly uncomfortable when we had hysterics in front of the Vatman after a dear old girl suddenly appeared to buy a new Pye CT450 (G11 chassis). Well, she appeared again the other morning. There she stood in the middle of the shop, looking just as hesitant as before.

"Hallo Mrs. Wandless, come to buy another new set?" I enquired cheerfully.

"I didn't want to" she said quietly, "but the one I bought seems to have worn out. The one you sold Mrs. Powe two years ago still seems to be going all right. Why has mine worn out so quickly?"

"It hasn't worn out Mrs. Wandless, it's just a little thing that's stopping it coming on. I'll pop out this afternoon to make sure it's still connected up properly."

"I don't think you'll be able to. The man next door came in and he couldn't make it work."

We let that one pass and arranged a time to call.

So during the afternoon we arrived at her house with some fuses in one pocket and some diodes in the other.

Just to be sure, we checked the 5A plug fuse first and then inserted the plug and switched on. The set burst into life and I looked askance at Mrs. Wandless who was standing in the middle of the room looking lost.

"It didn't take you long to mend it, but I hope you won't have to come all this way every time I want the set on."

"Oh no" I said without conviction. "It'll come on when you do it." So saying I switched the set off and removed the mains plug (which was her habit). "Now you do it and you'll see."

"I don't think it will" she said.

"Try it and see" I encouraged her.

So she did and it didn't.

Swallowing hard, I removed the rear cover and checked around with the meter. Mains o.k. at the fuses on the input panel. H.T. o.k. at the power panel. H.T. at the line output transistor and the line driver, but no drive at the base of the driver. Move over to the timebase panel.

As soon as I touched this panel the set burst into life and no amount of prodding would turn it off. So it seemed that the start-up circuit was at fault. Close inspection revealed a dry-joint on the print to R2010, the 5.6kΩ wirewound start-up resistor. Resoldering this restored normal working each time the set was tried, but it took a little time to persuade Mrs. Wandless that the set would work after I'd gone.

A Handsome Amplifier

A chappie brought in a rather handsome Rotel amplifier the other day. "I wonder if you'll have a look at this. It

seems to be dead." I accepted the job thinking it would turn out to be some sort of short that had blown a supply fuse.

When I got round to it, I removed the case and found an envelope inside containing some ten or twelve transistors – outputs, drivers and preamplifiers. All had been neatly removed from the panel and the heatsinks. That was enough. From bitter experience we know all too well that this would be only the tip of the iceberg. Once a job like this is started, it inevitably leads from one minor disaster to another until the repair bill assumes massive proportions the owner will not accept. The fact that he (or someone else) had already been at it showed that economy had probably played a part in the tragedy, and we'd no wish to join the cast. Sorry old chap. It needs to be taken to an expert.

Unit Audio Wouldn't Go

I never really got to grips with the next one. Perhaps you can.

A lady sent her unit audio in because it wouldn't go. There was an additional note that when it did it was too loud, so would it be all right to work it without the loudspeakers connected?

Only the unit had been sent (no speakers), so we put it on the bench and connected our test speakers. Continuing with our boobs we put on a record, got nothing and proceeded to remove the bottom cover in order to find a possible amplifier supply fuse blown – the turntable was working fine.

All the supplies were in order, so we suspected a faulty headphone socket. Plugging the headphones in proved that the unit was working well, and it was only then that we realised there was a headphone button on the front panel. When this was actuated the sound came normally from the speakers, and we were again wasting our time since there was nothing wrong with the unit at all. Remembering the note that it was "too loud" we checked the volume controls and found that these worked perfectly down to zero.

When the lady came in to see if we had repaired the unit we told her that there was nothing wrong except that the headphone button had been depressed. Then it started.

What was the headphone button? Where was it? What was it there for if she didn't have headphones to use, and if she did have them where were they and what did they look like?

I could hear my lotus blossom giggling like a loon as she pretended to rearrange the window display.

The lady then informed me that she had had the unit for five years and the button had never been pressed in before. So why should it have been pressed in now? By accident I suggested, but now she knew what it did she could check on it herself.

Too Loud

Then she wanted to know if she could leave the loudspeakers off since it went too loud.

We explained that all she had to do was to slide the controls to reduce the sound to the required level and, if she wanted the speakers off altogether, to push in the headphone button.

"Which is the headphone button? . . ."

Perhaps she preferred the sound coming from the stylus only. Which brings us to the next funny thing.

Music Centre Problems

A music centre came in with a complaint about the cassette section. This was eventually traced to poor

contacts on the edge connectors (intermittent loss of oscillator bias to the record head). Having cleared that headache up we thought we'd better check the radio and the record player sections. The radio was o.k., but when our test record was put on it sounded most peculiar.

Now whatever may be on a test record, if you've played it hundreds of times you know every tiny piece on it and can immediately spot a difference. This particular one was a vocal, and a solo vocal at that. There were two voices however, one preceding the other by exactly one line of the song – as though it had been arranged that way, but I knew it hadn't.

All sorts of possible gimmicks presented themselves to my mind and were promptly dismissed. I then took a look at the stylus and found it twisted so that both the tip and one edge were riding in the grooves at the same time, the sound from the edge not being very inferior to that from the tip.

The customer hadn't mentioned this added facility, but I wondered whether his records had appreciated it. My test record seems not to have noticed, but it doesn't sing a duet now. I'm expecting the owner to ring up and complain that he no longer has a double tracking capability.

Mr. Pinchpenny's Portable

When Mr. Pinchpenny popped his ITT Featherlite portable in, he popped the inevitable question. "How much will it cost?" Since at the last count he was worth about ten million we didn't actually give him an estimate, merely saying that it would probably break him. This provoked no more than a wintry smile, and he left promising to return on the morrow. He gave a quick look at our colour portables on the way out, and visibly shuddered at the price.

The complaint was that the picture would become very grainy on occasions, while on others it would distort and lose hold. The first complaint we attributed to a dry-joint in the varicap tuner (right), the second to faulty bridge rectification (wrong).

The Graininess Came and Went

We found that by giving the tuner an affectionate squeeze the graininess would come and go. We usually take the tuner out and go over the soldered joints around the input stage, also any others that may look a trifle suspect, then refit the tuner for test. If there's any further trouble we fit a new one. In fact the soldering proved effective on this occasion, so Mr. Tightfist was saved a few bob on this score.

Supply Line Trouble

The bridge rectifier proved to consist of four hefty diodes which didn't respond to hair drying or freezing. Evidence of poor smoothing came and went at random however, and was unaffected by shunting each diode in turn with a 1N5408. We then turned our attention to the main smoother, clipping another in its place. The curvy verticals etc. still came and went, but now at about half-hour intervals. Initially it seemed as if the electrolytic had done the trick. But no. We eventually turned our attention to where it should have been turned when doubt first arose – to the series regulator transistor, which in this model is in the negative return from chassis.

We replaced the regulator transistor, using a BD203, and had no further trouble. We'd wasted a lot of time however through not suspecting a regulator fault as a result of doubts about the bridge and the smoother.

We'll doubtless be chatting about bigger boobs next time.

The Magic Set

Les Lawry-Johns

ONE of our problems recently has been a running battle with the GEC C2121 (and others of that ilk). I'm dreading the next one in case it's anything like the last few.

Take Mr. Rockbottom for example. Some time ago we had cleared a simple case of "stuck on 3" by thoroughly cleaning the touch sensors. When he appeared the other morning we thought it would be a repeat performance, since he does have this habit of gnawing chicken legs whilst watching TV and does occasionally forget to keep one finger clean for touching the sensors when a change of channel is required.

"It's not muck in the buttons this time Les" he puffed. "I've cleaned them out thoroughly with the wife's gin."

"Pity she's not a meths drinker Mr. Rockbottom, but let's have a look at it."

So up on the bench it went, where the sensors proved to be as clean as a new pin. On switching on neon 3 lit up as it should do, but on touching sensor 2 neon 1 came on and whatever you did it went back to 1.

To my unscientific mind it seemed that the ETTR6016 i.c. on the preset control panel was faulty, so we earthed ourself with a length of braid under our metal watch strap since we can't afford an ankle chain.

We carefully took a new chip out of its foil, and noted that it was the last of the quil type. When we'd fitted it we had a completely different set of conditions. It no longer lingered on 1. The two right side neons flickered on and off all the time, though the left side channels could be selected – but not reliably.

"Faulty chip" I thought.

Since the other chips in stock were of the in-line rather than the quil type I decided to fit a quil-to-dil holder to facilitate further mucking about. This done, I fitted the first one. This gave totally different results, but anything other than those required, and I was becoming slightly confused since neon 3 wouldn't light up at all.

I next declared war upon the neons. First I changed neon 3. This then lit up at switch on, but when I touched sensor 2 neons 5 and 6 flickered and neon 2 refused to light. So I changed neons 5 and 6 and everything worked beautifully. All channels could be selected and would stay selected.

Later that day Mr. Rockbottom returned. We put the set on the counter to show him how clever we'd been. Hooked it up and invited him to change channels.

"It won't change" he said in a rather flat voice.

"Of course it will" I assured him cheerfully, but with a cold chill creeping up my spine. I leaned over and touched the sensors. Every channel selected impeccably. "There you are."

"It won't change for me."

I impatiently charged round to the front of the counter and ran my finger along the sensors. Nothing happened. It remained on 3. I charged back to the rear of the counter to look for the large scissors so that I could snip my arteries and put an end to it all, but decided to give it one more go. I leaned over and touched the sensors. It changed perfectly.

Then the light dawned. The only thing different was the mat in front of the counter. It had been changed that morning, and was one of those rented things that are changed every two weeks. They are damp when laid, being

impregnated with all sorts of odd chemicals to absorb the dirt etc. from customer's shoes.

"Wait just a second Mr. Rockbottom. It's the mat you're standing on. It's robbing you of your vital energy. Get off it quick." Mr. Rockbottom leapt off the mat like a scalded cat.

"Has it damaged me?"

"I don't think so. We can soon test you though." So I rolled the mat up and we now stood on the lino tiles which cover the wood floor (just in case you asked).

"Now we can change channels with impunity, you see."

Mr. Rockbottom was torn between a desire to see his set working properly and fear that his vital energy had been sapped, never to return. He plucked up courage and cautiously touched the sensors. They all worked, and his confidence returned.

"Will it work all right when I get it home?"

"Provided your wife hasn't just shampooed the carpet, Mr. Rockbottom."

There's a Hole in my Bucket

The next nightmare came in with the complaint that it was making a noise but precious little else. On test it almost came on, with a sizzle and then a bonk, a sizzle and then bonk again, repeatedly. A meter check showed that the h.t. was building up to about 80V and then collapsing.

My diagnosis was a faulty zener diode on the power board, and proved that my ability to get things wrong every time was still holding. When the power board was removed from the centre section (complete with main electrolytics) my eagle eye spotted what anyone else would have spotted before taking it out: it was damp, as though it had been sprayed.

It had been sprayed, and there was a hole in the centre of the reservoir electrolytic to show who had sprayed it. Normally a hole in the reservoir is enough to set the local populace panicking for the hills. Anyway, changing the electrolytic was no trouble, but getting rid of the electrolyte was another matter.

Lifting the components from the print and cleaning around them took no great effort, but PL17 (multi-way plug) proved more difficult: the nylon spacer had to be lifted and carefully cleaned, as did the socket, since these two items, situated where they are, took the full brunt of the attack.

When all was done the power unit was refitted and functioned well. The same could not be said of the sync however, since the picture rolled and pulled on every change of scene. This had not been reported, but couldn't have been caused by the leaky reservoir since replacement of the TBA920Q (IC401) was necessary to restore order.

The Hatchet Man

The next one to come along seemed straightforward enough at first. The tube had simply lost emission, and flared all over the place as soon as the brightness was advanced to anything like a viewing level. The tube base voltages were all correct, with about 20V on the grids, 120V on the cathodes and 400V on the first anodes.

Since the owner (Bert) was well known to us, we thought we would try reactivating the tube before taking it out. Much to our surprise however the reactivator showed that all three guns were fully up to normal emitting standard without applying boost to the heaters.

"How long has it been like this Bert?" we asked.

"Soon after I hit the glass with an axe."

"Why did you hit it with an axe Bert? Was the programme that bad?"

Bert explained that he'd been playing cowboys and indians with his kids, and had been about to dismember one of them when the head flew off the axe and hit the front of the TV, actually at the bottom right side of the tube, slicing a chunk of glass off. Just what this had done to the tube's vacuum or the shadowmask I'm not quite sure, but most of the electrons leaving the cathodes didn't seem to be reaching the screen.

This posed something of a problem, since the tube now had no exchange value and couldn't be rebuilt. We had a tube in stock however, and it didn't take long to fit.

"There we are Bert. Cover it up next time you play indians."

The next day Bert was back. The screen had gone dark during the evening, and couldn't be brightened. So we checked the tube base voltages, but couldn't fault them because the picture was quite bright and remained so. We left it on test for a few hours and still it couldn't be faulted.

Bert took it home. Bert brought it back. This time the picture was dark and remained so. The cathode voltages were o.k., as were the first anode voltages, but the grids showed a negative voltage instead of the 20V or so positive that they had previously. The negative voltage was due to faulty beam limiter action as a result of R701 (180k Ω – see Fig. 1, page 443, June issue) increasing in value to some 5M Ω or so.

I've a feeling Bert thought we should have attended to this before changing the tube, even though we explained to him that he could previously turn up the brightness but it produced only flaring on a dull picture whereas when the resistor had gone high you couldn't turn the brightness up at all. Oh well.

Return of Mr. Charge

We'd not seen Mr. Charge for some time, so when he turned up the other afternoon we had quite a chat. I wasn't so pleased to see what he had with him though. It was his daughter's GEC. Funny how you can go off people ever so quickly. We didn't let it show however, and as it turned out it wasn't so bad.

"She let her nibbo tip a cup of something in the back. We let it dry out, but clouds of white smoke come out of it when you turn it on."

This turned out to be something of an exaggeration, but there was a wisp of smoke from the right side. After a tussle we removed the right side line output panel, and found signs of burning around the interconnecting plug and the socket on the front edge. Once again we had to lift the nylon spacer and carefully clean the panel. Cut away the affected bit of the panel and nylon and it seemed ready for use again.

While we had the panel out it seemed prudent to check for shorts. We found one from the emitter of the line output transistor to chassis, so without hesitation we clipped one end of the 47V zener diode D51 which is in series with the BU108. D51 didn't read short-circuit of course, and the original short was still present. After a little swearing it proved to be the 24V rectifier D601 (BYX70) that was responsible.

Upon reassembly everything seemed to work all right and I thought Mr. Charge would be on his way again.

"I'll put this one in the boot" he said, "and get the other one out of the back of the car."

"What other one?" I asked. It was late and I felt a bit jaded.

"Our own main set. I think the tube's at fault – it goes out of focus about every ten minutes or so."

Not another GEC, please not another one!

It turned out to be a Thorn 3500, so at least it would be a change. Switching on revealed that the grey scale was a mile out, with practically no blue. This proved to be nothing more than slight leakage through the first anode switch, and we soon had a normal picture except for some slight misconvergence. It was while I was attending to this that the focus went out and quickly reverted again. All I really saw was the screen becoming a blur, then before I could say cut off my tools and call me Mabel it was back again.

"There you are" said Mr. Charge, "what more do you want?"

I grinned back weakly at his grinning face.

So I changed the tripler and it did it again five minutes later. I changed the focus unit and it did it four minutes after. I left meters connected all over the place, and all I saw was a slight flick of the first anode voltages when the fault next tried to occur but didn't. Why didn't it? Because the meters were doing something.

So I changed R790 (1.2M Ω , in series with the first anode controls, on the earthy side) on the convergence panel, for no better reason than the flick on the meters, backed by the thought that perhaps the leakage through the blue gun switch hadn't been continuous – because if it had been continuous the present fault (R790 going intermittently open-circuit) couldn't have had the effect it did since the leak would have taken the place of R790. Be that as it may, the variation was no longer present. We had a similar problem with a 3000 not so long since (it's R727 on the 3000 chassis), didn't we...?

Book Review

Television Principles and Practice, by J. S. Zarach and Noel M. Morris, published by The Macmillan Press Ltd., at £12.50 (hardback), £5.95 (paperback).

There is no doubt that a handy reference book to which you can turn when in doubt about something or when you need to refresh your mind on some perhaps obscure aspect of a subject is a great help. Books that provide a reasonably thorough reference source on domestic TV receiver techniques are none too common, though there have been several good ones over the years. One of the first was Cocking's famed *Television Receiving Equipment*, which ran for some twenty years starting in 1940. There is sadly little it can tell us nowadays, so much has the subject changed over the years. Wharton and Howorth's *Principles of Television Reception* came along to fill the need very usefully in 1967. Geoffrey Hutson's books have been helpful indeed, and now as the latest in the line comes *Television Principles and Practice* by J. S. Zarach and Noel M. Morris (published late last year).

The price is a bit daunting, at £12.50 for some 300 pages (hardback edition), but the production is excellent, with colour diagrams to illustrate convergence and a large number of clearly drawn circuits. We hope it says

fitted the 470Ω resistor and was about to fit the electrolytic when the boy again said "when BANG". So I decided not to fit the capacitor until I'd checked the cathode voltage. I switched the set on and waited for the sound to come through, but the bias resistor started to smoke as the voltage across it soared over the 40V mark.

Scramble out to turn the set off. "Wha dat?" enquired the infant.

"Be quiet" I bullied as panic took over. The type of control grid coupling capacitor fitted in this chassis doesn't leak, so what else? I connected the meter to the control grid and switched on. Nothing till the PCL82 warmed up, then a very slight reading which vanished when I took out the valve. Faulty PCL82?

I just happened to have another, so in it went. The cathode resistor started to smoke again, something it hadn't done when the meter had been connected to the control grid. Wait a minute.

It was difficult to wait a minute, because both kids were now kicking up merry hell quarrelling about who was going to stand on my meter. I snatched up the meter and the tears flowed again. The vicar's wife picked up the little girl and her screams took on a new urgency. She didn't want to lose sight of the meter.

I gave up the battle and brought the set back to the peace and quiet of the shop where only grown ups shout and bawl about. In two minutes I'd found the cause of the trouble – a crack across the track from the control grid to the ferrite bead. This left the control grid floating. Having repaired this and fitted an electrolytic the cathode voltage remained just under 20V. We returned the set to the vicarage. "Wha dat" said the little boy . . .

Blue Angel

I love little girls. Well most of them. Except one that is. She was six years old and sat as quiet as a mouse. Good as gold she was. Sitting there whilst I repaired the Philips G11. It only wanted a new 0.9μF scan-correction capacitor. We always carry these with us and it was no trouble to fit. Before refitting the back cover I leaned over and switched the set on. Not a lot happened so I switched it off and it burst into life. A nice bright picture appeared, with normal sound. I reached for the back cover and the sound faded out. Put the back cover down and prepare to do battle. The sound then came up normal and stayed there. Glance over the top and find the brightness well down. As I looked on it came up brighter and brighter. Then the colour practically faded away to give a black and white picture.

Suddenly I knew it was time to finish with the whole game. It was all too much for a simple soul like me. I walked round to the front of the set and it was then that I saw the red light come on at the top right corner. The penny dropped, and I pointed a finger at the little angel who, to her credit, had sat there the whole time without appearing to move a muscle or even smile.

"You" I said. And she burst out laughing. "Wait till I tell dad. He said you were clever but I knew I could fool you." She had the remote control unit tucked up beside her and had moved only one finger to operate the brightness, colour and sound. It had merged perfectly with her dark blue dress. Horror.

Out of the Mouths . . .

I'd just finished the Pye hybrid set, after spending many hours patiently putting right a seemingly endless number of minor faults, most of which appeared to have resulted from

eager little fingers rather than component failure, when this very small boy came in. He looked at a point about two feet over my head and addressed me.

"Have you done our telly?"

"Which one?"

"This one."

"Yes, I've just finished it. Are you going to take it?"

"My uncle will come for it when the little hand is on the six and the big hand is on the three. Have you done it properly this time?"

"If you didn't fiddle around with it so much it wouldn't need resetting every few months."

"I don't fiddle. My uncle fiddles when we go to bed at night, and when we wake up the telly doesn't work."

"I'll talk to your uncle when he comes for it."

I did, but it didn't do much good because he'd also been up on the roof and moved the aerial around. So when he got the set home he still couldn't get a clear picture. The result of this was that the small boy turned up next morning and looked at my left ear.

"You didn't do our set nicely."

"Yes I did. I did it very nicely."

"You come to our house and do it again because when I woke up this morning it wasn't very nice and my mother is not pleased." Eventually I did go to their house. The aerial was the only one in the road pointing north-west, where there's no transmitter.

Fooled Again

"Our set's gone wrong again" said the woman on the phone. "My husband brought it down to you a couple of months ago and the same thing's happened again. He can't bring it down this time. You'll have to come up." Roughly translated, this meant that the set had gone wrong, they wanted it repaired for nothing and they also wanted a house call for which they didn't want to pay.

For the life of me I couldn't remember a thing about the set. So I called at the house on the way back from another job. The set was a Decca 10 series one (hybrid colour chassis), so I could have done it. But I'd looked through the records for the last few months and couldn't find any mention of a Mr. Twister. I conserved my ammunition however until I'd found out just what was wrong.

The set appeared to be dead except for the tube heaters. This to me meant that the supply was present and there was probably an open-circuit in the heater chain. Checks showed that there was no h.t. either however. As a matter of fact there were no signs of life at all in the set – except at the on/off switch, and those tube heaters.

My mind went blank when I checked again at the mains transformer and found no life there at all. I was about to commit hari-kari when I noticed the heater isolating transformer, fitted so neatly that it escaped attention – so neatly fitted by me some two years earlier. So this was the "recent" repair.

I checked for h.t. shorts and couldn't find any, so I pressed in the thermal cut-out button. The valves then started to warm up. The sound hissed into life, and a nasty fizzing sound came from the right-hand side. I was just in time to see the tripler case arcing to chassis before the thermal trip cut out and the set went dead . . . except for the tube heaters of course.

I'd just finished fitting a new tripler unit when Mr. Twister arrived. I showed him the faulty unit.

"Ah yes, that's what you fitted last time."

"Oh no it bloody wasn't."

I'd rather deal with kids.

All on a Quiet Afternoon

Les Lawry-Johns

WE'VE been a bit slack lately, and business hasn't been too good either. I'm always a bit suspicious when it's too quiet though. It always seems to herald the approach of a hurricane. This started on the stroke of midday, when Miss Pocock phoned to say that her colour set was changing colour, Miss Fox phoned to say that her black and white set was going grey, and Anna Logg popped in to say that her father's set was all green. "All right" I said to one and all. "I'll call this afternoon and you'll all be o.k. by teatime."

A Jowett Van

At ten past twelve there was a clattering noise outside and a 1934 Jowett van (two cylinder horizontally opposed engine) pulled on to the forecourt, attracting more attention than our window has for the last ten years.

I helped the owner extract the large Dynatron (still on it's legs) from the rear of the van after he'd unroped it. The castors rolled quite easily on the wood plank floor, and it was soon in the shop where it was found to be suffering from the usual Pye hybrid ailments too mundane to mention.

It was not the set which caused the trouble. It was the little van with its large wire spoked wheels attracting so many people that other vehicles could not get on the forecourt. I hurriedly completed the repair to the Dynatron and back it went into the little square van with its number plate on the top.

Off it clattered, to the disappointment of the crowd which quickly dispersed to allow Derek to bring in his 3500 Ultra, Mr. Deadman to bring in his 24in. monochrome set which needed a new tube, and Geoffrey to bring in his Telpro. I told them all to come back at five o'clock, as the repairs would all be done by teatime.

I was about to start on the first one when a lady came in with a Decca portable (MS1212).

"I want you to tell me how much it will cost and what is wrong before you do it."

So I whipped out the eight screws and lowered the back. When I plugged the set in the screen lit up and there was a faint hum from the speaker. It was a fair bet that the MC1330 detector chip was at fault.

Talking Chip

"If this thing with eight legs talks to you in foreign languages when you touch it, the voices will be saying that the repair will cost about eight quid give or take a bit allowing for the exchange rate in Tokyo."

"You mean the set will tell us how much the repair will cost?"

"It's the latest thing in silicon chips, but it talks in every language other than English you see."

"Lets see what it says then." I could see she was dubious. So I touched the output pin with the tweezers and the speaker burst into life with various voices as predicted but unfortunately someone was also reading the world news in English, which upset my little game. Just to be sure of the diagnosis I touched the input pin. It was dead, though my claim that it could also estimate its own repair didn't hold water.

"How much then?"

"Eight pounds twenty one including VAT."

Enter the Audiophiles

So we replaced the chip and started to put the new tube in the monochrome Ferguson set, or rather to take the old tube out. Just as all the bits were cluttering up the bench the audiophiles arrived.

"Have you a lead with a 5-pin plug at one end and four plugs at the other?"

I showed him a 5-pin DIN to 4 phonos.

"No it's not like that. Look, I'll draw it for you."

"Sorry sir, they don't make them with wander plugs on the ends."

"Can you make one up for me?"

"Which pins do you want the plugs to connect to, apart from pin 2?"

"All of them."

"Sorry sir. Try the shop down the road."

The next one to come along put me right off.

"Are you Mr. Littlejohn?"

I knew at once I didn't like him.

"You could say that. What can I do for you?"

"I've this Ferguson Studio 6 music centre. There's nothing wrong with it and it won't take you a jiffy to fix. It's just that the v.h.f. wanders off after about half an hour and there's some distortion on one channel after about two hours. I don't mind paying a couple of quid for your trouble."

"Thirty."

"How much? You must be joking."

"Thirty, and if you like to bring it back this time next month I'll see if I can fit it in."

"**** you. I'll take it somewhere else or do it myself."

And off he went whilst we concentrated on the tube change.

The job completed we then polished off the Telpro which wanted only a new boost reservoir capacitor and a fuse.

The 3500 proved to be more of a headache, requiring a tripler and an e.h.t. transformer. The rippled picture then obtained and the squeaking noise proclaimed that the core had dropped out of L502 during the tussle, suspicion centring upon the cat who had been heard playing with something that rolled. It was finally found under the Telpro. I suddenly remembered Miss Pocock etc. Time was slipping by. Teatime I'd promised.

Out Amongst the Femmes

Now think. Anna Logg's father had gone green. We'd sold him a new Ultra three years back. An 8800. Probably a shorted green output transistor. Make sure we've some BF337s in the box. Miss Pocock had merely said changing colour. Pye hybrid, probably the CDA panel. Take a spare one just in case. Miss Fox was going grey. Decca monochrome set. Probably the tube, possibly the PFL200, so check to see that we have one.

Off we drove, glad of the chance to get some fresh air. Bowling along with the window down. Who wants to

smoke? Throw cigarette end out of window and wind blows it back in again. Where has it gone? Can't stop here. Pull over when we can. Feel a pleasant warmth on inside of thigh, suddenly becoming an agony. Hole in trousers and blister on thigh. Seat covering singed. Press on, the customers await your expertise.

Miss Fox had left the door open, as she was largely confined to a chair with arthritis (she had arthritis, not the chair). Having exchanged pleasantries we got down to work. Off came the rear cover whilst we waited for the valves to warm up. On came a grey picture, but the raster was bright enough. Not the tube. Note the effect of the contrast control. Working, but it couldn't put much black and white into the picture.

Pull out the PFL200. Didn't seem to want to come out. Eventually it did, but being in two halves the new one went in to stay.

"How's that Miss Fox?"

"There's a nice white line down the middle."

Now if there's one thing these sets suffer from it's dry-joints under the line output stage, leading to the scan coils. What with all the pulling that had been required to remove the PFL200, it was hardly surprising that one (dry-joint) should show up. So out came the main panel and sure enough there was a hole where a lead connection should have been. This done, we put the panel back and refitted the rear clips. The picture was now quite nice, so we put the back on – with all the screws along the top, at the sides and across the bottom.

"Nice and quiet around here Miss Fox."

"Have you turned the volume down then Mr. Johns?"

"No er, I don't think . . ."

Out came all the screws.

"What's that you're saying Mr. Johns?"

"Not a lot Miss Fox."

Naturally when I'd upended the panel to solder the underside I'd pulled off a speaker lead and hadn't noticed it.

"Oh that's better Mr. Johns, I'm so pleased to have it going again. Do I owe you anything?"

"Not a lot Miss Fox."

Rush off to next call, as it was now past four o'clock. Drive straight across crossroads as I was on the main road, only to realise that the vehicle coming from the right wasn't stopping either. Some fool had been up all night painting a roundabout which of course gave the other fellow priority. You just can't rely on anything being the same for two minutes nowadays.

Changing Colours

Miss Pocock threw the key out of the window as she has arthritis almost as bad as Miss Fox.

"Hallo Miss Pocock, how's the legs today?"

Fancy me asking Laura Lovitt a question like that . . .

"The colour keeps changing. One minute it's a nice colour, then it goes all red."

The CDA panel was the obvious place at which to start. We turned it over, expecting to find some nice cracks that could be bridged with nice bits of wire. There were no cracks, the supply to the red output stage being intact.

Back went the CDA panel. We watched the picture for some time. Then suddenly it went red, in a way which meant that there was a high voltage on the grid of the red gun. This in turn meant that the triode of the PCL84 wasn't passing current. A new PCL84 seemed to restore order, and another simple job was done. Refit back cover and prepare to leave. Screen went red.

Remove rear cover. Check valve base, but all contacts

seemed good. Rocking the valve produced the fault however, so it appeared that there was an intermittent open-circuit inside the base.

I didn't feel inclined to change the valve base at this time of the afternoon, so I fitted the solid-state replacement panel and promised to return with the original the following day.

A Question of Ethics

Anna Logg's father (I always forget his name but I can't forget hers) lives on the fourth floor of a large block of flats. It's no joke collecting or delivering a set there because of the large number of twin doors – quite apart from the lift. When I arrived Anna let me in. Her father was having one of his bad turns, with his distressing lung condition which makes you feel bad just to look at him fighting for breath. He has oxygen equipment by his chair, and that's all that can be done.

The set was on when I got there, and seemed perfectly alright for a time. Then the screen flashed bright green. I immediately accused the green output transistor at the top of the signals panel of playing about. A meter check showed that the output voltage occasionally dropped to a low figure.

To clear the tube of suspicion I removed the fly lead. The voltage at the signals panel then remained steady, falling only when the tube lead was reconnected. Oh dear. A heater-cathode short in the tube was all we needed. Although the tube was insured for four years, it isn't funny having to implement this. I toyed with the alternatives. Disconnect the heater from earth and tie it to the green cathode instead via a suitable resistor? But if the short still occurs the green will smear across the screen. Fitting an isolating transformer would restore almost normal working, and this is what we do if the tube is not insured. This tube was insured however, and the old boy was entitled to a new one.

"The tube's at fault and will have to be replaced" I told them. "I'll bring over a loan set while we're waiting for the replacement."

"I don't want a loan set. I've never borrowed anything in my life."

Anna looked resigned. "He's like that. He depends on the TV as he can't get out, but he won't accept one which isn't his – even from us. He's a cantankerous old bugger, aren't you dad?"

This was an unexpected snag. Since Thorn take at least a month to replace a faulty tube (counting the transport there and back, which accounts for a few days), the stubborn old chap was going to be lonely for several weeks unless we told a white lie. So we lugged our test gear down to the van, then came back for the set – fortunately having Anna to open the doors for us. Back at the shop we whipped out the tube, and within half an hour it was on its way to Edmonton via UK roadlines (carriage £5.38), albeit in a Mullard box since we didn't have a Thorn one. We then nipped back to the shop and fitted a Thorn New Life tube which we had in stock, and decided to take the set back to him the next day in case he disbelieved that the correct replacement could have been obtained so quickly.

When we took the set back the old chap was very pleased.

"They're very good at implementing their guarantees, aren't they? I think I'll write and thank them."

I charged him a fiver and he said I'd earned that for all the lugging about.

I wonder what would have happened if he'd been one of those clever people who buy their sets from a discount

warehouse? No doubt he would still have found a kindly soul who would have done exactly the same as I had.

Note for Thorn. Isn't it possible to speed things up a bit? Say by having spare tubes at local branches so that they can be dispatched the same day. After all a dealer isn't going to go to all the trouble of taking a tube out and

sending it back if it isn't faulty. And again, we do go to a lot of inconvenience in implementing your set guarantees without recourse to you at all. Do you want a list?

Your good name is being upheld by our unpaid efforts. What about a bit of cooperation in keeping the customers happy?

Letters

REBUILT TUBES

In talking about rebuilt tubes (June issue) Les Lawry-Johns comments that he's "probably got it all wrong", which invites replies. May I therefore say that the symptoms Les has been unfortunate enough to experience are typical of tubes that haven't been properly evacuated. Les mentions that at least one of the sources he's tried uses hot pumping. But this isn't the whole secret. In my experience, excellence of the pumping system, combined with high temperature, are the essentials for proper tube evacuation.

Les questions the ageing process. I can say without fear of correction that a cathode properly converted from the metallic carbonates with which it is initially coated becomes a metallic oxide coating which, *in a vacuum*, will remain stable. The oxide coated cathode will change only if there's some other factor at work – and in the tubes he describes this other factor is almost certainly gas present due to inadequate pumping. The measures Les has been obliged to adopt are in fact not reageing but acceleration of the gas absorption by the getter.

There are approximately seventy companies engaged in the business of tube rebuilding in the UK, and I'm sure that the reputable majority of them will agree that Les has been singularly unfortunate. Anyone experiencing the sort of problems that Les describes should return the tube as unsatisfactory and ask for his money back.

T.W. Smith, C.Eng., M.I.E.R.E.,

Managing Director,

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VCR SPEED CONVERSION

G. Beard's article on VCR speed conversion in the July issue was excellent. For those who wish to double the playing time but don't require the machine to be compatible with the N1700 standard however there's a simpler approach. The only part that has to be purchased is an N1700 head drum – the extra servo head, new audio/sync head and centreless grinding of the capstan are not required. This is how I modified my N1500 machine – the job took a couple of hours and was well worth while.

The N1700 head drum was first fitted, giving a tremendous improvement in picture quality and much more positive adjustment of the tracking control (due to the

slanted heads). The motor pulley was then removed, and a gauge was turned up to fit the groove (see Fig. 1). A piece of quarter-inch mild steel was then chucked up, projecting $\frac{3}{4}$ in. from the chuck, and carefully turned down until the motor pulley was a tight fit (this is essential if it's to run true). The pulley was next clamped on tight and turned down to 0.505in. (Fig. 2). You'll find that the cone-shaped end of the pulley is just under 0.5in., which is a useful guide. With alternate use of a 90° V tool and a narrow parting tool made from a hacksaw blade, the groove was turned until the gauge fitted perfectly (see Fig. 3). The pulley was then replaced and all the drives cleaned. No adjustment was necessary, but an 0.1µ F capacitor was connected across SK401 3-5 to correct for loss of audio h.f.

The timer was modified as suggested in the October 1978 issue, page 646 (not page 64 as stated). Another way of doing this is to fit a switch above SK12, which closes when the machine laces up, shorting out the timer switch SK6, so that when the latter opens after an hour the tape runs to the end, the auto-stop then operating. For short-period recording, this can be disabled by using the CK switch, which is not used usually, so that the timer's switch off facility is used (see Fig. 4).

So there you are: if you don't want to be able to replay prerecorded tapes or tapes from N1700 machines the modification for double playing time is quite simple.

Mike Phelan,

Holmfirth, W. Yorks.

VIDEO POLARITY

Other readers may be interested in the problem that confronted us recently and the way in which we managed to resolve it. The set, a "Continental Edison" monochrome receiver, was brought to us with the complaint that "it wasn't working". The symptoms however were a negative picture and loss of both line and field sync, with normal sound.

After some investigation, we found that the set was intended for use with positive instead of negative vision modulation. The video channel consists (see Fig. 5) of a detector diode followed by a couple of emitter-followers and then the output transistor. The second emitter-follower provides two outputs, one to the output stage and the other, from its collector, to the sync circuit. Our first thought was simply to reverse the detector diode, but this was not successful as the video signal's d.c. component cut off the first transistor. Our second approach to the problem, transposing the video and sync outputs from the second stage, was more successful. This produced a normal, positive picture, but the sync locking was still unstable. We tried to improve the sync by taking the sync feed from the output stage instead of the second stage, but while this improved the sync locking it made the picture worse – the distorted frequency response produced smeary vision.

We finally decided to try to get the signal polarity right by modifying the first video stage – by taking the output from the collector instead of the emitter of the first transistor (see Fig. 6). This was most successful, and gave a better quality picture than some comparable, unmodified

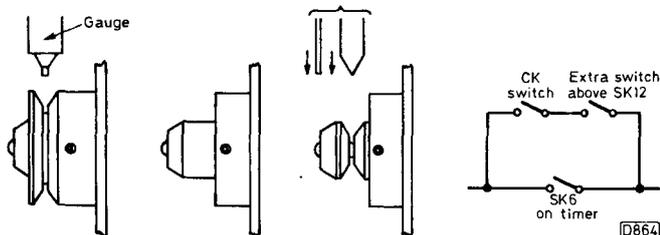


Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Ben's Waterloo

Les Lawry-Johns

I HAVE to record an event which no doubt has a moral to it. I don't know what the moral is mind you, but it must have one somewhere.

As you probably know, we have a dog named Ben, who is a rough coated collie. Some of the kids who do not know us well call him Lassie, but Ben is not too keen on this.

Again, as you probably know, we have a cat named Spock, who is of dubious parentage but somewhere way back a Siamese must have had a hand in it because although she looks a typical tabby her paws seem to be more cushioned than most and she never seems to stop talking. If no one else is around she will talk to Ben, and use his extremely long nose as a rubbing post to give herself the comfort she seems to regard as her right at all times.

Now Ben has had an upset stomach for some time, so I suppose he wasn't feeling too good. Anyway after putting up with all this purring and rubbing at his expense he suddenly snapped at Spock who gave a yell and vanished from sight. I witnessed this almost unprovoked assault and lost my temper with Ben. I threw the front door open and threw Ben out on to the street. "Go and don't return" I bawled. Ben slunk away, and I slammed the door and locked it – it being early evening and the business of the day over.

"What was all that about?" asked honey bunch, making a belated appearance on the scene.

"Ben attacked Spock. She's gone and so is he. I will not tolerate violence . . . er, in animals that is."

She immediately opened the door of course and looked up and down for Ben who was nowhere to be seen. By this time I was feeling sorry for what I had done and a bit ashamed. So we got the car out and went in search. We sought him here, we sought him there, up hill and down dale, only pausing to take brief refreshment from time to time. At last, footsore and weary, we made tracks for home. At 11pm, as we slowed at the final corner, the local pub called the Waterloo was turning out. And there, coming out of the saloon bar and exchanging goodnights with the regulars, was Ben. We stopped and opened the rear door for Ben to jump in, as though we were a taxi he'd ordered. When Ben entered the shop, Spock rubbed her nose round his face. Peace was restored.

The Heavy Portable

A couple of years (or so) back we sold a small portable to a middle aged couple. It was a Marconi Model 4816 (Thorn 1590 chassis), so it weighed only a few pounds. The other day the husband popped in to say that it had gone wrong and would I call to fix it. I suggested he brought it in, but he said that as they hadn't a car it would be far too heavy to carry.

So I called at their house and inspected the set, which had blown its l.t. fuse. There was some discolouration around the sound output stage, and the wiper of the small preset that sets the output stage bias was missing. I asked if the set had been dropped? "Well not exactly, my brother-in-law caught his foot in the mains lead and pulled it off the table."

I didn't have with me the transistors required or the preset, so I picked the set up and was about to depart when

his wife returned from the town carrying the shopping. A very small slight woman, she was carrying two enormous bags that were crammed full. They must have weighed at least twice as much as the portable. "I normally go shopping with her to carry the bags, but as you were coming I stayed in" he explained.

Incidentally, if you have a battle with the audio output transistors and are not sure of the setting of the bias preset (R70, sets with silicon audio transistors), turn it anticlockwise to drive the associated bias transistor (VT27) fully on, thus decreasing the resistance between the bases of the two output transistors – or hook a fixed resistor of 22Ω between the bases until the bias transistor has been sorted out. The fixed resistor may save another pair of output transistors if there's something wrong with the preset or the bias transistor.

The French Connection

Having picked up the portable, I had to make another visit in response to a phone call I had had from a female with a delicious French accent. "My television he has gone." So we arrived at the house and the accent proved to be matched by its owner. Long dark hair, dancing blue eyes and a figure that a man he could enjoy.

"You have come to bring my television back, no? I am so lonely without it. My husband he is away on the North Sea looking after Scottish fishermen as none of them can swim, no?"

I didn't quite understand this, but who was I to argue?

The set was a Decca Bradford (30 series) with the PL509 line output valve running red hot. I thought you'd rather hear about the set than the French lady, no?

There was at least 40V negative drive at the PL509's control grid, so the oscillator was clearly o.k. We next unhooked the tripler but the overheating continued apace. The capacitors proved to be innocent, but the transformer was warm to touch.

"Come and feel this" I invited her, and she did. "Ooh La La, it is a hot one is it not?" "You need a new one. This one is worn out" I told her convincingly. "You can put one in for me, yes?"

As it happened I was able to do so. For once I was carrying a Bradford line output transformer.

Troubles with a Deccola

There was only one outside call the next day – to see a set that was far too heavy to move unless it was really necessary. Again it was a Decca, but this time an audio suite about the size of a large sideboard – with a bow front.

Some years ago I'd replaced the original Garrard idler-wheel playing deck with a belt driven unit to bring it up to date, but I'd kept the amplifiers etc. just as they were – the response was really good and a joy to listen to. And so it should have been with its four EL34 output valves and fourteen loudspeakers (two woofers and the rest small units in rows at either side to get the maximum distribution).

The complaint was that radio was low on one channel but normal on the other, whilst on records there was

nothing on one channel with the output low on the same channel as the radio. We decided to concentrate on the good channel on radio first, and find out where the gram input went. It didn't take long to find that both channels were normal up to the ADC cartridge head, and that this was simply not contacting on one pair of the bow springs. This was put right quickly enough, and the full splendour of the record playing side then burst out from the same side that was normal on radio.

The low output on the other channel finally proved to be a high resistor on an 8D8 valve base, and both channels now rocked the house. The final complaint was that the green area of the tuning indicator could not be seen properly. We thought that this would be due to another high resistor, to the target of the "magic eye", but when we removed the tuner unit from its shelf we found that the resistors were of the correct value, the general illumination being poor due to the EM80 feeling its age and the fact that the window was murky. Cleaning the glass on the inside made quite a difference, and replacement of the indicator was delayed for another time (when I find one).

Incidentally the owner of this large, ornate bungalow had had some trouble with the flat roof a while back. He was advised that the complete answer was to cover it with copper sheeting, which he had done at no small expense.

"Les. There seems to be something wrong with our radio reception."

Don't Panic: Run for your Life

It was an ordinary Thorn 3500, nothing to worry about. After all, if you don't know 3500s by now what do you know? One of the things I knew was that it was too big for one person to handle, and that the owner had fallen off his moped and injured his back so he couldn't help lift it. His wife has nasty arthritis so she couldn't help either. So the set had to be done on the spot, and there was no reason why it shouldn't.

"It went bang and smoke came up." Inspection of the power unit showed that F603 had blown and that C618 (100 μ F) in the over-voltage crowbar trip circuit (see Fig. 1) had exploded. R626 was also blackened and measured only 30 Ω instead of the 100 Ω shown in our manual, which happened to be for the 3000 chassis because we'd lent our 3500 manual to someone a few days earlier and it hadn't been returned (it still hasn't) and we'd forgotten to whom we'd lent it. For some reason or another, the crowbar thyristor itself (W621) had not been fitted.

The fact that a high voltage had appeared across C618/R626 meant either that the 72V voltage sensing zener diode W617 was short-circuit or that the chopper transistor's output voltage had risen above 72V. A meter check showed that W617 was short-circuit. Time to consider fitting the spare panel. Spare panel awaiting repair following previous day's panic.

Press on, it can't be that bad: we've all the necessary bits in the box, and with our brilliant diagnostic ability have nothing to fear. First check the chopper transistor VT604, just in case. Chopper dead short. Our eyes narrowed, and as they were already squinting we couldn't see at all . . .

Fit new chopper transistor, new 72V zener diode, new electrolytic and . . . no 100 Ω resistor. Fit two 220 Ω resistors in parallel and blow the consequences. Wind presets down just in case and switch on.

The set came on and looked good. But the chopper's output was 70V with the presets wound down, and any movement of them only sent the voltage higher (not by a lot, or the 72V zener would have started zenering). My

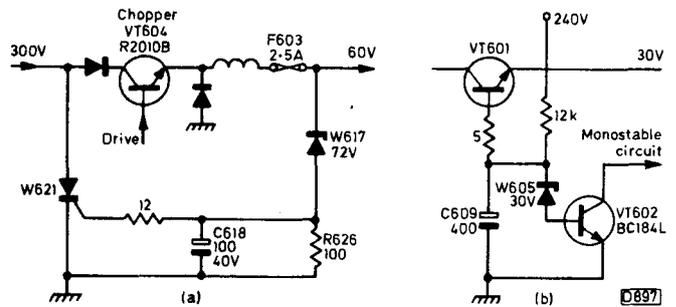


Fig. 1: Features of the power supply used in the Thorn 3000/3500 chassis. (a) The chopper and over-voltage crowbar trip circuit. If the chopper's output rises above 72V, zener diode W617 conducts, firing W621 which in turn operates the cut-out or mains fuse (early models). For some reason the crowbar thyristor was missing in the set that blew C618. (b) The 30V stabiliser circuit. The 30V reference zener diode W605 is connected to the base of the delay switch transistor VT602 instead of directly to chassis. The idea is that VT602 remains off until the 30V supply has been established. Since VT602 is in series with the emitter of one of the transistors in the monostable circuit that provides the drive to the chopper, the chopper doesn't come into operation either until the 30V supply has appeared. If VT602 goes short-circuit or leaky, the delay feature will be overridden. If W605 goes open-circuit, the series stabiliser transistor VT601 will be biased hard on by the 12k Ω resistor connected between its base and the 240V line. The stabiliser won't stabilise therefore, and the 30V rail will be at something like 40V.

mind started to go completely blank, and the brilliant diagnostic ability waned – as it always does when challenged.

Decide to check the 30V rail – see Fig. 1(b). Over 40V. Switch off and check 30V stabiliser transistor VT601. In order as far as an npn transistor should be. Check 30V reference zener W605. Open-circuit.

At this point I became a blubbing wreck. With W605 open-circuit, VT602 should be switched off, making the monostable circuit inoperative. So the chopper shouldn't be chopping since it shouldn't have any drive.

Steady on. The chopper is chopping, though VT602 is not being switched on. It must be leaky or something. Search for a BC184. Find a BC148. It'll have to do. Fit it and new 30V zener. 30V line now 30V and 60V line 50V. Wind it up to 60V and check picture. O.K. except for the need to make a few routine adjustments.

Rush home and tell honey dew about the awful time I've had.

"The radio in the kitchen keeps going off. Either you fix it or I take one out of the window."

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Quatermass and the Navy

Les Lawry-Johns

It all started reasonably enough. "Have you a large cardboard box?" asked the young lady who was moving. Moving house that is.

So I toddled off downstairs to the basement, which is used only for storage purposes. You know what basement areas used for keeping odd things in look like. A bit of a jumble with only a narrow track for the chappie to get to and read the meters.

Somewhere over in a little used section was a large empty cardboard box, among many others that were filled with this that and the other. I made my way over to the box, and noticed a certain give in the floorboards. This became more alarming as I reached the box.

I attempted to lift the box, and was surprised to find it stuck fast. "We have ways of making you move" I snarled. My mighty muscles heaved, and up came the box complete with a large section of the floor. I stood there and stared stupidly at the hole in the floor. It was not a black hole. It was a white one. Hideous white fungus was everywhere. It had come through the floor boards and had been busily engaged in eating the box when I had surprised it. I remembered the girl waiting above. Should I invite her down? Better not.

I managed to find a box in the next basement room, and hurried up so that I could bid her farewell and hurry down again. I was then able to take a more objective look at the situation. So I peered, and whilst doing so realised that the world was relying upon me (though it was blissfully ignorant of the fact) to take decisive action to put an end to this menace that had started down in my cellar. I thought I could see the mass moving toward me, angry that I had robbed it of the box. I circled the hole warily. It suddenly made its move, and my foot went through the floorboards.

"Help" I screamed. "It's got me."

Honey bunch came to the top of the stairs.

"What are you on about now?"

"This plant from another world. It's grabbed my foot and I've got only one left."

It was a relief to hear her clattering down the stairs to my rescue. "Pull your foot up you idiot" was her helpful suggestion. So I pulled up my foot and another large area of the floor came up with it. "We can't fight it" I told her. "Better by far to burn the whole place down than to let it spread."

"Let what spread?"

"This evil fungus that grows larger by the second."

It's only cellar fungus. You always get it where there's dampness and no proper damp course. It's because we're on the side of a hill and the sand and gravel . . ."

I cut her short. "That's right. Ruin the only chance I'll ever have of being a hero. If that's only cellar fungus, how come it whipped the floor away from under my feet and left me only one?"

"Because there's wood worm everywhere, and what with that and the fungus this whole place will have to be cleared. It's even older than you are and either can be expected to fall to pieces at any moment."

I stood there in stunned silence. So this was my reward

for all I'd done. I'd even sorted out a Christmas card for her from last year's box.

At that moment someone came into the shop carrying something heavy.

"You start moving the stuff into the next room. I'll be down to help you as soon as I can" I told her.

A Green Screen

The heavy object turned out to be an ITT colour set with the complaint that the picture – what there was of it – was green.

"Call back at five o'clock, I'll have it done by then" I promised. So off he went, leaving me with the set which had a bow front and a single sliding door. Vaguely familiar, but not the CVC5 I'd expected. As I took the back off I realised it was a CVC2, with three PCL84 valves for the colour-difference output stages.

I immediately made the first mistake. Instead of studying the displayed over bright, green screen to note that the field scan was shrunken and rolling like mad (which I assumed to be maladjustment), I started to take voltage readings on the PCL84 valve bases (with the set upended and the bottom cover off). The readings were queer, with negative voltages at the blue and red triode anodes while the green one was positive.

New PCL84 valves didn't help. Disconnecting the tube leads didn't help. All the resistors read right, and the capacitors were in order. Time slipped by, with the noises from below getting louder. Clearly honey bunch was getting agitated, moving things from one room to the other including colour tubes and old chassis which would have come in handy fifteen years ago. She was muttering something as she puffed and huffed, but nobody can accuse me of being an idle layabout.

"I'll be down just as soon as I get this set out of the way" I called, to give her heart. I could do the job in half the time but I can't be in two places at once.

I tried to get back to thinking straight about the CVC2. The three triodes act as identical clamps, and if all the circuitry checked out correctly how come the voltages were different? The penny dropped as I reached once again for an electrolytic to decouple the supply line. Sure enough, the voltages evened up and the grey scale was restored, as was the full scan.

I looked at the circuit diagram to identify the faulty electrolytic and found that the supply to the PCL84s comes straight from the main 700 μ F h.t. smoothing capacitor. This is in the very large can along with the 300 μ F reservoir capacitor. It was replaced in no time while I kicked myself for repeating the mistake I'd made quite recently with a Pye hybrid colour set. Will I never learn? The h.t. ripple gets rectified by the clamps you see. Or something like that.

Having restored the grey scale and set it up for nice viewing, noting that as ever on these sets the tube was as good as new, I then turned the colour up and found that it was already at maximum. Adjusting the tuning showed up the subcarrier dot pattern, so the tuning was near enough and we turned to the vertical left side decoder panel, which like the rest of the set is hand wired. I'd no sooner settled down to check the burst gate etc. than the colour flooded back, only to go again as the panel was touched. After some jiggery pokery the contacts on the bottom plug and socket were found to be quite loose, harmony being restored when they were tightened.

Which is more than I can say when honey pot came up from the cellar. I thought it was Al Jolson, about to sing Mammy. She didn't sing that.

"I've cleared that whole room without one bit of help from you and all that junk is going over the tip whether you like it or not."

"I'd better nip down to see that you've done it properly sweetheart."

She'd cleared it quite well really, for a woman that is, and now the full extent of the disaster was revealed. I was no longer afraid of the fungus. Just a bit of cellar fungus plus a spot of wood worm I thought. I'll see how far it's gone.

So I lifted the nearest floorboard to the hole and it came up quite easily. So easily that it pulled up the skirting board eight feet away and this caused the plaster wall to bow out and collapse in a cloud of dust on to what was left of the floor which gave way to leave me face down in the fungus.

At this moment honey bunch called down the stairs. "You're wanted in the shop. Hurry up."

I picked myself up, brushed myself down, and started up the stairs.

"What on earth have you been doing to my nice clear room. You look terrible, and what was all that noise?"

"The wall's collapsed on me and the rest of the floor gave way. We'd better declare this a disaster area."

"You're the disaster. Now help this gentleman, he's been waiting to see you."

The gentleman had a dark blue Philips 550 field service manual in his hand and immediately launched into his tale of woe.

"I always keep my set in good order myself, but there's something that's eluding me this time . . ." And he went on and on about the steps that he had taken over the past two weeks. *Two weeks!*

I began to get impatient as he related how he had changed the BT106 thyristor and both BC147 transistors on the power panel despite the fact that he had about 200V on the h.t. supply fuses. So I turned the pages of his manual to the line output stage section and stubbed a dirty finger at the 800mA fuse. "Have you got 200V there, at both ends of this fuse?"

"Yes I think so. I can remember you telling me about a year ago to check here and at both ends of the 47 Ω resistor over at the front end, so I'm sure it's there all right."

"If it's there, why bugger about with the power panel?"

"Well, I thought the waveform might be distorted by the trigger pulse circuit."

My cool was rapidly deserting me. Here was I at the cross roads of my life, with my world tumbling around me, and all this fool could think of was his trigger pulses. I made a last attempt at sanity.

"See that 10k Ω wirewound, start-up supply resistor on the timebase panel just there. Check that you've h.t. at one end and 18V at the other. If the 18V is absent, check the resistor by putting your finger on it. If it burns you it's all right, if it's cold it's not. If it's hot check for shorts. If the voltage is low check for leaks, here, here and there."

So off he went to check his voltages.

My friend surveyed the stricken cellar room.

"All this plaster has got to come off the walls. We've got to get down to brick. Every bit of wood has got to go, so we'd better start moving it." So we started.

No Sound

I had to go up because someone wanted me, and as I didn't like the idea of him heaving all that heavy stuff up the stairs and out the back I asked honey bunch to give him a hand. Up and down they huffed and puffed with loads of rotting wood and buckets of plaster and brick until there was a huge load near the back gate. Whilst I got on with

the difficult job of finding what had happened to the sound on a K rting.

It was a hybrid of the 52665 variety, with a solid-state audio circuit. The speaker is fed from a small, separate panel on the top left side. This is coupled to the audio panel further in. The speaker clicked nicely when checked at the plug and socket on the small panel, so we turned our attention to the output transistors. The voltages were there and were all correct, so we injected a signal at the input and received nothing. We injected a signal at the output and received nothing. We went back to the small panel and injected a signal at one end of the 470 μ F output coupling capacitor. Nothing. We injected a signal at the speaker side of the capacitor, sound loud and clear. We fitted a new capacitor and the sound was restored.

I then turned to see how they were getting on with their clearing up job. They'd cleared up the wood and rubble very well, and it was all out the back together with all my precious old chassis and spare bits and pieces which would have come in handy some day. Even my 1938 service manuals had been crammed into boxes and taken out, the HMVs, Marconiphones, Ekcors and Cossors. All consigned to the rubbish tip.

The next job was to get someone to take the lot away. I contacted the local contractor who said he would call late in the afternoon. When he came he was on his own as he was sort of doing me a favour and it wouldn't cost me very much.

He backed the lorry up to the rear gate, and we found that we would have to shovel all the plaster and stuff into a dustbin and then tip the dustbin into the lorry. The rest of the stuff could be carried the few feet.

As we were about to start, a set came in which needed urgent repair. So I nipped into the shop to see what it was all about and told honey bunny that the man out the back needed a hand but if she could do the repair I would go back out. This is how she became a navvy for half an hour or so.

The chap with the lorry said she was much better than the average workman he had with him during the day, and I said I didn't mind her working so hard if it helped him. So to the sound of much shovelling and heaving about (I had said they might as well shift all the old sets out in the shed while they were about it) I set about doing the urgent repair.

Line Output Transistor Trouble

With all this going on I wasn't thinking too well when I tackled the 8500. It didn't take long to find that the excess current being drawn was due to the line output transistor being short-circuit. I fitted a new BDX32 and checked around for any other shorts. Finding none I switched on. There was a funny buzz and the cut-out cut out. The new line output transistor was short-circuit.

It then dawned on me that I hadn't disconnected the e.h.t. rectifier, which is the easiest thing in the world to do since you just pull the plug out of the overwinding. It occurred to me that I'd done this sort of thing before. If only I'd the patience to insert a nice wirewound resistor in the h.t. feed to the line output stage like I tell everyone else to do I might have saved a few bob and quite a bit of aggravation. So we had to fit another BDX32 and then change the e.h.t. unit in order to restore normal working.

Talking about normal working, when I went out the back to see how the work was progressing I found it was all clear. Honey pot looked just like a red Indian. All red she was, and sort of puffing. She even forgot my name. Potter she called me.