

Daymares

Les Lawry-Johns

NICE chap he was. Not at all the type who would string you a line. So when he brought in his ITT CVC5 for repair and said the picture was narrow and bright we just jotted this down on the job sheet and suggested he called in the following day. When its turn came to be placed on the operating table, we switched it on and allowed it to warm up. Sound OK; narrow, bright, defocused raster with barely a glimpse of modulation on it. Where to start? Lack of width. Right.

Timebase Troubles

We didn't really suspect valves but, just to be sure, we put in a new PL509 and PY500. Result, no line output at all, with the valves overheating. Queer. Put original valves back in. Still overheating. Very queer. Check, check and check. Finally find we had put the top cap leads on wrong. They should cross over. Idiot. Try new valves again. No better.

Check line drive. High. Check values of width circuit resistors. R411 (560k Ω) very high. Ah, ha!

Fit new 560k Ω resistor. No different. Remember past experience and check R403 which turns out to be OK. Boost line voltage high.

Let's have another look at whatever picture there is. Can't really see much. Switch off green and blue guns, leaving just red. Some sort of picture could now be seen, just.

This showed that the line timebase was running at the wrong speed, although this was very difficult to see as the field was rolling like mad. Resetting the field hold control slowed the roll and then sent it tumbling the other way. Careful setting left it rotating slowly and also showed that a dark hum bar was travelling slowly upwards (our troubles were multiplying by the minute). The hum bar and rolling were put aside mentally as minor things, the multiple line images looming larger.

It was reasonable after the checks so far to assume that the lack of width was the result of grossly incorrect line speed. Since we'd had a similar tussle with a single-standard Bush receiver the previous day, checking all the usual things (capacitors etc.) and finally finding the flywheel line sync discriminator diodes way out of balance, our first onslaught was on these. They were perfect of course. Having tried a new PCF802, we next changed the polystyrene capacitors in the line oscillator circuit. No luck here.

At this point we noticed a tiny piece of white wool sticking out of the oscillator coil. The core turned out to be stuck fast, and it was evident that it had received attention. It was also evident that it would have to be drilled out.

At this point we started to get a little irritated, since there had been no suggestion that the set had received previous and unsuccessful attention. We would definitely have to have words with Mr. Fieldhouse upon his return.

We decided to press on however. Now the proper way to drill out a core in one of these angled chassis jobs is to remove the coil completely and put it in a vice. Being impatient types we did no such thing. Taking the angle into consideration, we first attempted to put through a pilot hole with a small drill. The angle was wrong of course, and when

the drill came out it had little bits of copper on it to announce the fact that we had ruined the coil which would have to come out anyway. We just happened to have a replacement coil, so out came the damaged one and in went the replacement. The core of the old coil was the wrong type anyway, being much too short to tune down to 15kHz. Someone really had had a go Mr. Fieldhouse.

With the new coil and the right core, no adjustment was necessary. The rolling red picture had a single image of full width, but of course still with the hum bar. Switching on the blue and green guns showed terrible convergence – and no sign of a colour signal. To boot the picture, such as it was, was very noisy, which could account for the lack of colour signal. Hope springs eternal in the human breast. At this point we decided to consult Mr. Fieldhouse.

"No" said Mr. Fieldhouse. "No one has been at it since it was last repaired a couple of years ago, but I must admit the colour has been funny and we have had that bar going up the picture."

"Sorry Mr. Fieldhouse, but the set could not have worked since the last time someone had a dabble."

Mr. Fieldhouse looked puzzled. "Well we've been away for nine months, but it definitely worked when we left."

Then comprehension dawned. "Can I use your phone?"

He rang a number and the conversation got heated. He rang off and turned to me.

"Sorry old chap" he said. "You're quite right, someone has been at it while we've been away and my relatives know more than they're letting on."

Having cleared up that point, it was a matter of whether I could do it, how long it would take and how much. I didn't relish the job, but we decided to press on.

Rolling responded to a new PCL805, with a check on the interlace diode and the sync separator circuit. The hum bar was banished by fitting a new l.t. bridge rectifier, and the nearby fuse was replaced because it was bridged by a length of fuse wire and dabs of solder. The line output stage supply fuse was also too heavy, which explained why it didn't fail when we got the leads mixed up.

The convergence and grey scale were painstakingly brought into line, and the grainy picture responded to a.g.c. setting up.

And a Got at Decoder

Faint colour bars were seen running through what was now a reasonable black and white picture, and it was noticed that the subcarrier oscillator preset R311 on the edge of the panel was actually touching the metalwork. It was moved and adjusted. The bars now resolved into a cyan picture, with no red in sight. Voltage checks next revealed that the bistable (see Fig. 1) was inoperative, one transistor being hard on, with practically no collector voltage, while the other was turned off.

Some time was spent looking for an explanation for this. Then the phone rang and the high priest of *Television* himself enquired about our health and about an article recently submitted. I poured out my heart to this kindly (occasionally – *editor*) soul who listened for a while and then said:

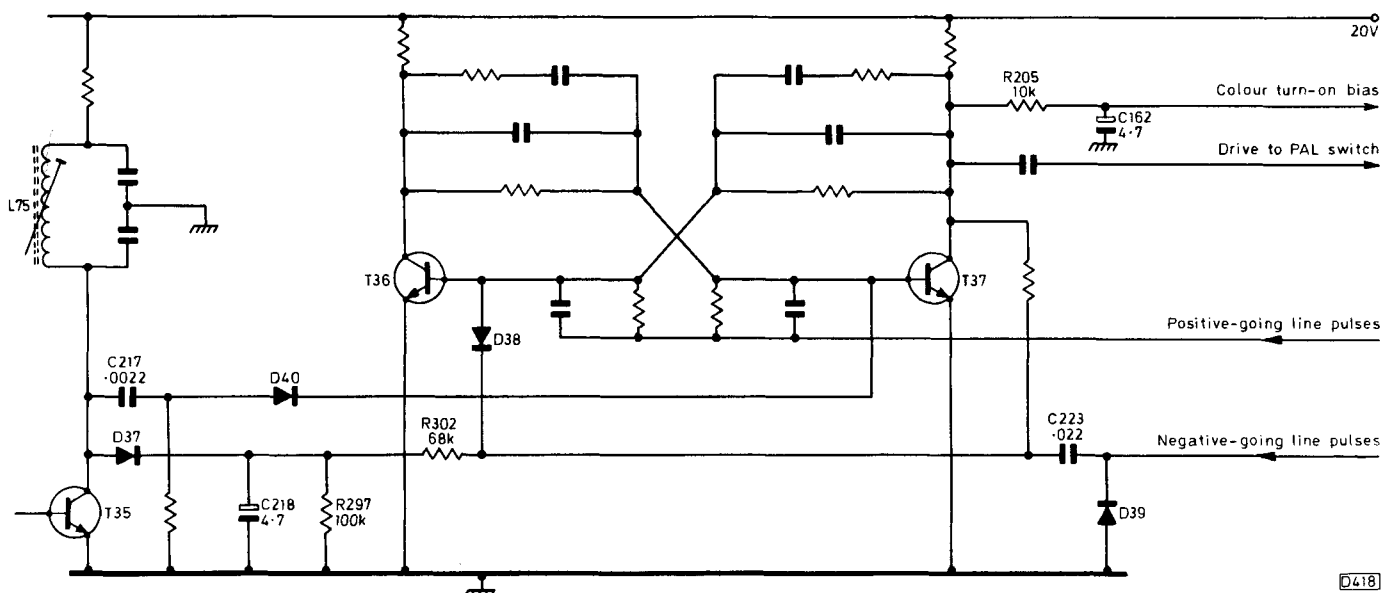


Fig. 1: The ident amplifier (T35), bistable (T36/37) and colour-killer arrangements in the ITT CVC5 chassis. On colour, the squarewave produced at the collector of T37 is smoothed by R205/C162 and used as a turn-on bias for the delay line driver transistor in the chrominance channel, with the positive-going line pulses triggering the bistable. This means that on monochrome the bistable circuit has to be stopped. This is done by applying negative-going line pulses, clipped by D39, to the base of T36 via C223 and D38 to ensure that it remains cut-off. T37 will then be permanently on, and there'll be no colour turn-on bias. On colour, D37 rectifies the ident signal produced by L75, and the positive bias developed across its reservoir capacitor C218 cuts D38 off so that the negative-going pulses no longer reach T36's base. D40 provides the ident action on colour to ensure that T36/7 switch in synchronism with the V signal line-by-line polarity inversions.

"But there shouldn't be any colour at all on the CVC5 if the bistable isn't working. You must have ditched the colour killer." I hadn't.

He then suggested that all I had to do was to unditch the killer and find out why the bistable wasn't switching. All the agony would then be over.

I thanked him humbly and rang off. Just who does he think he is? "All I had to do" was find out why the bistable wasn't working . . . Suppose I'd better do as he says . . .

Examining the panel on the print side, I found a nice little 12k Ω resistor wired from the 20V l.t. line to the junction of R204, R205 (TP18), thus over-riding the colour-killer . . . Someone had left it in, having failed to sort out the bistable.

Mr. Fieldhouse had said that "the colour had been funny". He wasn't kidding. So we removed the 12k Ω resistor and sure enough the green faces became white. We next found that there was no 7.8kHz output at the collector of the ident transistor T35. At that moment the whole horrible truth burst upon me. There was another tuft of white wool, this time just protruding from the ident coil (L75). Oh no, not again. Investigating the core showed that it could be easily moved, but that it was nowhere near long enough to tune the coil to half line frequency. Wearily we sorted out the right type of core and screwed it in. The bistable started flip-flopping, and lots of lovely colour flooded the screen, the right ones at that. A final trim up was all that was left to do.

Mr. Fieldhouse called and declared he'd never seen such lovely colours since he'd had the set. He also confided that he'd found out who'd had a go.

Woodman Spare that Tree

Now you're not going to believe this but, on a stack of bibles, it's true so help me. Mr. Wood is a regular customer and is a very nice jovial sort of man, which is just as well since he appears to be a very strong fellow indeed. You should see the way he carries his old Philips G6 (26in.) solid teak monster from his Range Rover into the shop, and then lifts it on to the bench as though it were a portable, laughing

like mad at the thought of the money it is going to cost him for its repair. They don't come like him very often. By profession he's a woodsman, or tree surgeon, and a very good one at that.

His set doesn't really come into this, but in fact it took a little while to knock into shape. The complaint was "no picture" which we confidently thought would turn out to be an inoperative line output stage. With the top cage off the line output section, we waited for the thing to warm up. A neon waved near the PL509 glowed healthily enough.

"Is there a tingle when you put the back of your hand on the screen Mr. Wood?" we enquired.

"No, not a sign" said Mr. Wood.

Now I know what you're thinking. These names he keeps on drumming up: surely he could do better than this? I'll have you know that his name is definitely Wood however, so there, and just to brighten your day a little more I'll also acquaint you with the fact that our butcher's name is Reg Butcher, while the name over the baker's shop down the road is Baker.

Now. Ah yes, no e.h.t., line output OK.

Take cover off to reveal the PD500 shunt stabiliser and GY501 e.h.t. rectifier valves, and risk instant sterilisation by X rays . . . There was plenty of life at the bottom, er, top cap (it's mounted upside down, as you know) of the GY501, i.e. the output of the transformer, but little else. No visible heater glow. The PD500 looked OK, but there was no life on its glass. Open-circuit GY501 heater? Slacken screws and lift PD500 (set off, of course); free off plastic shroud and remove. Lift out GY501. Check heater. OK. Check continuity of heater winding. OK. Check continuity of resistive element on valve base. Open-circuit. Should be 2.7 Ω . Remove resistor and fit replacement. Reassemble while listening to the fascinating story being related by Mr. Wood. E.h.t. now OK. Nice picture. Tweak up convergence and set up grey scale. Set wrapped up. Now to the story.

A certain gentleman had some land that verged on a fairly well used road. On his land was a large elm tree which had escaped disease. A large bough overhung the road

however, and the local council decreed that it must be removed. Mr. Wood had been called in to advise and estimate. This he did.

The estimate did not please the gentleman, who said he could do the job himself – with the help of his wife.

With stout ropes to lift and guide the bough, a long rope was passed up through a pulley and back down and tied to the back of a vehicle. His wife was entrusted to keep the rope taut with the vehicle in first gear and pulling. Told to move forward when instructed. You see?

So there was hubby up the tree sawing away at the hefty bough. "Stand by." "Right." "Take the strain." "OK." "Here she goes." "Right."

Crack went the bough. The vehicle strained forward.

Then down came the bough and up in the air went the Mini.

Return of Mr. Doubleday

I was busy trying hard to understand a little book which a young boy had left on the counter, called "How Transistors Work", and had almost got to the third page when an estate car drew up outside. Oh dear, it was Mr. Doubleday from Bluebell Hill, Hill.

"It's gone again, again" he moaned. "I swear it spends more time in your shop than it does in my house house."

My heart sank and I offered him £10 to take it away as it had cost me twice that in transistors the last time.

"No" he said. "I'll have it done once more and then out it goes goes."

"But it costs me more than it does you" I protested.

"Just this last time."

So off he went and I got down to the 8500 Thorn again again.

The cut out was cutting out (it gets you, this repetitive

business).

Lifting the line output transistor's collector lead from the transformer stopped the cutting out, so we were back to the old routine again. Checking the transistor (BDX32) confirmed that it was in no fit state to operate, with an emitter to collector leak. All the feeds were checked, and to be on the safe side a new e.h.t. unit was hooked up.

Switch on. For a second all was well, then there was a nasty flashover from the e.h.t. connector to earth. The cut out opened and another BDX32 bit the dust.

The one thing I hadn't done was to clean off round the e.h.t. connector on the tube. Now this I'd done most thoroughly quite recently, which I suppose was a partial excuse.

Re-examining the connector of the e.h.t. unit previously in the set showed that the "claws" were rusted to the point where they just broke off when touched. But the thing hadn't been in all that long. The bitter truth now dawned. Even the connections to the recently fitted focus unit were green. What sort of conditions had the set been living in?

In the event we fitted another BDX32, another e.h.t. connector, thoroughly cleaned off the tube area with silicone and polished up the focus connections. The set then functioned quite well.

Mention has been made in past *Televisions* about the adverse conditions many sets operate in or are expected to operate in. Kitchens are obviously not the ideal place. Many people leave a paraffin stove working all day however, and these give out as much water as the oil they consume.

When Mr. Doubleday returned we laid it on the line for him in no uncertain terms. It transpired that he was out all day, and used the set for only a few minutes in the evening. All the rest of the time the set was gathering all the dampness it could from a paraffin heater. These bachelors!

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JAWS 3

Les Lawry-Johns

WHEN you first come face to face with a shark or perhaps a crocodile, what is your first reaction? Fear? Flight? This would have been mine I must admit. Until last week, that is. Now it would be infinite compassion, sympathy and sorrow for the poor beast, cursed with so many teeth to give it trouble.

Nobody knows the agony I've suffered of late, and apparently nobody cares — except to fall about laughing when I tell them of my plight. I shall never know why it is that when others are in trouble I'm all ears, attentive and grave, listening to their tale of woe and making sympathetic clucking noises. Yet when I'm in the mire, I might just as well be alone in the middle of the desert for all the sympathy I get. Perhaps I get in the mire too often.

You'll listen though, won't you?

For some time I'd been aware of a nagging ache up on the top left side. I concluded that it was due to an infected gum, and therefore washed it regularly with brandy. The ache came and went without giving too much trouble, and although I toyed with the idea of phoning Mr. Pullit for an appointment I kept putting it off as I am a fully paid up member of the Cowards Union.

I was tackling a hybrid GEC colour set which had the complaint of no colour however. I must admit that the decoder panel on these sets is not one of my favourites, and I always end up in a muddle. I tried to be logical, but kept going round in circles because the gated burst amplifier transistor TR325 wasn't being turned on. This was apparently due to the gating diodes D303 and D304 (see Fig. 1) not being switched on by the line pulses which were there but not very strong. The question was, why? I kept going round and round from the line output transformer to the decoder, and the dull ache was rapidly becoming a nagging pain. Aspirin, aspirin, that's the stuff. Enter wife carrying aspirin and ice cold water. Exit wife carrying ice cold water.

"The pain will go as soon as you get that set right. If it doesn't, phone the dentist for an appointment and don't be a coward."

"I can't get the set right, there's no colour signal. I know why, but I don't know why."

"You mean that that's supposed to be a black and white picture?"

"The fact that the grey scale is a mile out isn't what is causing me the trouble. I can put that right in no time. Once I get the colour signals through I can turn them off and sort out the black and white. All right?"

She pondered this for a moment. "No it's not. You always tell other people to get it right in black and white first. Why don't you do it if it's such good advice?"

"Oh all right. Just to prove it to you. If the tube's O.K., I'll present you with a beautiful black and white picture inside ten minutes. But that's not going to help my colour problem."

It was a bit of a relief to get away from the decoder and the poor gating pulses, so the tube base voltages were examined. The first anodes were about equal, but the blue grid was a fair bit out. In went a replacement PCL84. On came a BBC-1 test card. In full colour . . .

The gating pulses were now at full strength. Colour

turned down produced fair black and white. Looking again at the circuit showed that tag 4 on the line output transformer also supplies pulses to the grids of the three PCL84 triode clamps in the colour-difference output stages. So a faulty triode can mangle the gating pulses to the decoder as well as mess up the grey scale.

Enter wife. "How's your face?"

"Red."

"You've got the set right in black and white then."

"Yes, and I've solved the colour problem as well."

"Who's a clever boy then?"

Just to prove it, I turned up the colour and there it was as good as new.

Which all goes to show how little women know about anything, because my jaw ache was now worse, not better. So with a fantastic display of courage I phoned the dentist, expecting to be booked in a few days later.

"Come round now."

"Er, you don't mean right now, do you?"

"Yes."

Sitting back in the chair with a bib under my chin I indicated to Mr. Pullit which tooth had the abscess over it.

"Ah yes, there's some infection over it." So saying, he did whatever dentists do with a needle and then left me there to mull over my fate. Would it break on the way out? Would there be complications with ambulances screaming all over the place, collecting blood to replace that which I would probably lose as Mr. Pullit fought to remove my mighty molar?

After a while Mr. Pullit returned from his ablutions, tilted my head back and inserted a pair of insulated pliers into my open mouth. My jaw cracked open and the world exploded.

"You can stop screaming now, and wash out your mouth. It's not a bad tooth really. Pity about the infection."

"Make another appointment on the way out and I'll clean up the rest."

Gorn Green

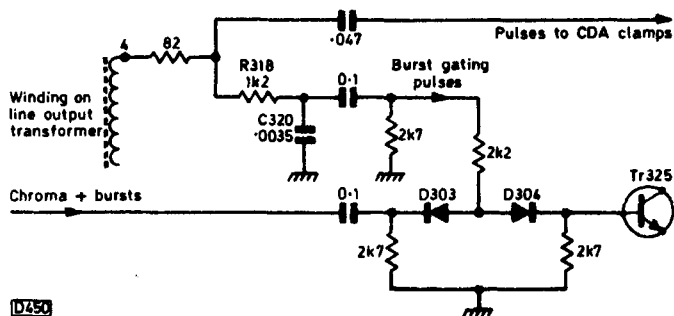
With grave doubts I arranged for another visit in ten days, then continued to a couple of service calls.

The first was to a Philips G8 which looked greener than I did. The c.r.t.'s green cathode voltage was low, directing attention to the relevant BF337 output transistor. Its base voltage was higher than that of the other two. Switch off and check the transistor. Reads right. Switch on again and note that the screen didn't go green for quite a few seconds. Grab the freezer and prepare to spray. Probably the preceding i.c. No. Next spray the BF337. Instant results, with normal screen illumination. Change BF337 after all. Nice lady thanks me for prompt attention and asks me if I am well. I tell her about my tooth. She tells me about all of hers (one by one), which takes longer than the repair of the set did.

Gert Knotted

Mrs. Knotted is a well known local character and there was little need for formality.

"Wotcha Gert!"



D490

Fig. 1: Burst gating circuit used in the hybrid GEC colour chassis. Positive-going pulses from the line output transformer, delayed and shaped by R318/C320, forward bias the gating diodes D303/D304 to let the burst signal only through to TR325. With no burst getting through there's no colour of course, since the ident amplifier and colour-killer rectifier stages don't operate. Tag 4 of the line output transformer also feeds pulses to the triode clamp circuits in the colour-difference output stages. A defective clamp triode can reduce the amplitude of the burst gating pulses, thus removing the colour from the picture as well as upsetting the grey scale.

"Wotcha Lawry!"

"How do you like your new house, Gert?"

"The ***** house is all right Lawry. I don't feel so good though, it's that bum of a landlord along the road, selling gin that's been ***** about with. Makes me sick it does. He must be ***** barmy trying that one on me. I ask you, twenty five years up the high street and he thinks I don't know gin. I'll get the git I will. He'll be sorry."

I lapsed into sympathetic silence, and started work on the set. After all, how could anyone hope to get away with selling dud gin to Gert? I knew the chap in question. Into every shady deal you could think of. But I didn't think he was that daft.

However, the set was a Thorn 3500, with very queer symptoms indeed. There was some sound, but the screen illumination was dull and grey with occasional bursts of lines of colour in vertical bands - green, red and yellow - which came and went, leaving again the dull grey raster which undulated to betray heavy hum.

Switching off, we unplugged the power panel and persuaded it off its top clips. Turning the unit round showed the main smoothing block to be in a very sorry state. The negative tag was a good half inch away from the unit, leaving a gaping hole through which the connection still protruded.

"Picture valve gone has it Lawry?" asked Gert. "Stan said that's what it'll be."

"Must have done Gert" I muttered. "Can't find one anywhere."

So in went a new smoothing block, and back went the power unit. The only change was that the blank raster no longer undulated. I then found that the contrast at the back had been turned right down: turning it up produced a nice lot of lines across the screen. These couldn't be resolved with the line hold control. With a bit of luck, this turned out to be the first capacitor tested, namely the electrolytic (C511) in the reactance transistor's emitter circuit. The line hold was now good, and the colour could be tuned in. I was about to make some witty remark to Gert when there was a funny noise, the screen centre appeared to be occupied by an hour glass and I was aware that the side of my face was beginning to throb.

Now wait. Hang on. Don't panic. Could it be my rotten soldering on the main electrolytic? Could it be the 1,000µF reservoir capacitor in the supply to the 30V regulator? Slap another one across it. Bingo!

"You're O.K. now Gert, must get going."

"Thanks Lawry. Was it valve trouble?"

"Not really Gert. Your thingamy bobs had dried up."

"Don't you believe it love" said Gert.

The Second One

So off we went with the ache getting worse. Back at headquarters there were many things to do and by the time they were all sorted out it was too late to check with Mr. Pullit.

"Didn't you go to the dentist after all? Lost your nerve?" asked my ever considerate spouse.

"I did go and he took one out, but it's aching just as bad."

"Did you tell him which one?"

"Course I did."

"Then you told him to take out the wrong one, didn't you? Trust you to muck things up." Now you won't believe this, but she actually started to laugh. Laugh, I ask you. So did Harold when I later tried to kill the ache with brandy. Funny how landlords of pubs find other people's mistakes funny. Like wives I suppose. Under the sheer weight of spirit consumed, I had about four hours' sleep before cramming aspirin or something down my throat. Soon after nine o'clock I was back in the torture chamber.

"You pulled out the wrong one."

"Oh no I didn't, that one had to come out. So will all the rest in time."

"The rest don't ache, only that one up there."

So out it came with a sickening crunch.

"Good tooth that. It's a pity you dallied so long with the other one and let the infection spread. Nip in and have a look at my telly when you're passing, will you? People's faces look like yours does. Sort of green."

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It Went Bang!

Les Lawry-Johns

WE'RE getting quite a few Pye group sets in lately, of the 725 series ilk – CT223, 225, etc. From a practical servicing point of view there's not much to separate the 731, 725 and 741 series. All have the vertical panels in moulded frames, two on the left of the tube, one on the right.

Depending upon the symptoms reported, one either leaps for the left side signal panel which houses the tuner, the i.f. strip etc. on the lower part, and the decoder and colour drive circuits at the top; the more central line timebase panel; or the right side field timebase, power supply and convergence panel.

One gave us a distinct shock the other day however – one which is worth bearing in mind. It happened like this...

A Woman of Distinction

The moment Mrs I. Glass walked in I could tell that she was a woman of distinction. A real big spender. Good looking, so refined...

"My name's Glass, Ida Glass. My husband put it in before he left for work. Perhaps you could get it out for me to save me straining." She had deliberately left out the words car and TV, but I could see through her. I never mix business with pleasure. For one thing, it makes giving estimates difficult, if one is asked for.

"No trouble madam," I gave quite a bow, thus allowing full vertical scan. With a huff and a puff the CT223 was whisked from the rear seat and into the shop.

I remembered her now. She was the one who brought an amplifier in and said she was dead on one side, and I'd said it was probably due to lack of drive, not being turned on or some such rubbish. Oh yes, cheeky type. Think they can get away with murder. Usually can.

"It's the on/off switch"

"It's the on/off switch," she proclaimed with certainty. "It blew the fuse over on the other side."

My eyebrows shot up. Whilst the centre h.t. fuse is in full view with the rear cover removed, the 3.15A mains fuse is partially concealed over on the right, behind a vertical strut.

"How do you know all this?" I asked. "Mind you, you've got it round your neck, but that's not a bad place to be."

With a quick nod and smile, she acknowledged the import of the latter part but took up the challenge.

"We took the back off and followed the mains lead to the switch and then over to the other side where we saw the fuse was all black, and since the switch is the only thing between the mains and the fuse, we knew it had to be the switch."

Amazing, isn't it? Such logic. Nice but so wrong.

I didn't take the trouble to explain that the cause must be after the fuse in order to blow it, but since the mains filter capacitor is only a small item it wasn't worth an argument.

"Never mind dear. You've got it a little bit wrong, but only a little bit, and we don't want to quibble over a little bit, do we? You pop off and do your shopping or something and I'll have it sorted out by the time you come back."

So she started up her motor, and with hips swinging went out to her car. Nice movement. Nice class. Cut glass.

Now the set. Sure enough the fuse was shattered and the filter capacitor was a dead short, with a bit of the plastic blown off the side to show its innards. In went a new capacitor and a new 3.15A anti-surge fuse. Apply mains, and all hell broke loose.

There was an ear-splitting howl from the loudspeaker, which sounded like a beserk foghorn, and funny noises from the back of the set. The dog fled in one direction and the cat in another. I punched in the on/off switch but it didn't function. The racket continued until I switched off at the mains. At the same time I caught a glimpse of the tube heaters. Like three 100W bulbs.

With shaking hands, I rolled myself a cigarette. The dog's head peeped round one corner and the cat's round another.

"Cowards" I accused them.

I reviewed the situation. Obviously the voltages were sky high everywhere. But why all this, after a simple blow out of the mains filter capacitor? And what damage had been done?

Let's have a look at the print around the capacitor. Nothing wrong, and we would have seen it anyway when the new one was fitted. Have a look on the component side. This preset control looks a bit queer. The wiper's not contacting the track. There isn't any track. It's gone. And it's RV917, the coarse set h.t. control.

Of course! The side of the filter capacitor had blown off, and had sliced off the track of the control on its way into orbit. Ah well.

New 4.7k Ω control fitted and set midway. Stand back. Switch on. Normal sound hiss, tube heaters normal. Check h.t. 170V at centre fuse. Dead on. Well, well.

Picture on, but only a few inches high. Not much voltage on the field output transistor VT688. Peer over the back of the line output section. Thermal resistor R686 in the feed to VT688's collector unsprung. Solder up to restore 25V supply line.

Looks good, except for the on/off switch that is. She did mention that. Nickers.

Bang, bang, Wallop!

Having had my nerves strained already, I didn't deserve the next one. Mr. Crabtree said on the phone that his Bush colour set had gone pop and he was bringing it in. I assumed that it would be a dear old A823 chassis with a shorted BT106 thyristor h.t. rectifier or something. No such luck. It was one of these new-fangled BC something or the other models fitted with the Z718 chassis. You know the one. Long thin panel, which swings down, across the rear.

With this down one can see the power unit, supported by a strut on the left and a clip over the main electrolytic on the right. It has two fuses, a 2.5A anti-surge one on the right of the panel and a 5A HRC type on the left. The former was

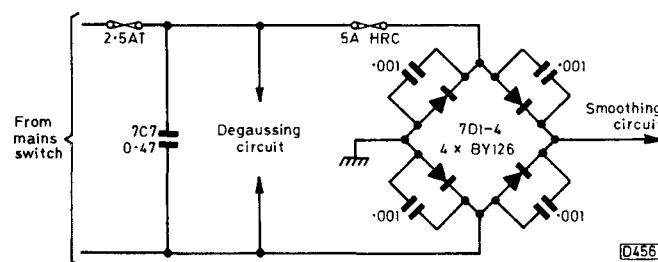


Fig. 1: Mains input circuit, Rank Z718 chassis. Note that the chassis is live whichever way round the mains plug is connected.

blown and blackened, which tended to direct suspicion on the 0.47 μ F 1kV mains filter capacitor 7C7 (see Fig. 1). The capacitor was not at fault however.

A meter check next showed that one of the bridge rectifier diodes was shorted, the others being OK. So full of confidence we replaced the offending BY126, made sure there were no more shorts, fitted a new 2.5A fuse and switched on. On came the sound and up rustled the e.h.t., but with a spitting noise. BANG! There was a blinding flash of sheet lightning generally from the centre of the set.

The dog took off as usual, but the cat had known something was afoot and had left as soon as we switched on. How do they know? How much more of this can one be expected to stand?

Shaking from head to foot, I waited for my eyes to recover from the flash. Both fuses had shattered this time. Two BY126s had bit the dust. Don't panic I told myself. But I just can't help it.

"Can I have two HP7 batteries", asked the dear old lady handing me a pound note. I gave her change for 50p, and the dear old lady turned into a spitting and snarling Gorgon.

Oh dear. Can't I do anything right?

Now what about that spitting noise just before the explosion? With recent experiences in mind, I investigated the e.h.t. surround on the tube. Whatever it was, it wasn't nice and clean. So we made it so and cleaned off the lead and rectifier (no tripler, the transformer has an overwinding).

Out came the power panel and in went the BY126 replacements and fuses. Check to make sure that the diodes are the right way round – I'd fitted them and don't trust myself. I then disconnected the mains supply at source, switched everything else on, and retreated to the hideout where the mains supply control switch is. With the cat and dog. I next restored the mains supply, shutting my eyes and covering my ears.

The sound hissed on and a nice noisy raster appeared. No spitting noise, no lightning. Incidentally, I'm not kidding about the blinding white flash. That the air between the e.h.t. and the power panel can ionise to this extent is somewhat alarming, but I've seen such flashes before, even where there's been no e.h.t. to trigger it off, merely mains and h.t. Any comments?

We told Mr. Crabtree to move the set away from the window to avoid condensation (central heating, no paraffin stoves this time), and hope there will be no repetition of this unpleasant experience.

Help!

We wanted something easy after this, so we started on a Thorn 3500 chassis which needed attention. The complaint was no results, funny whistle. Being of unsound mind, I decided that the power pack was at fault. But the spare was still awaiting attention with a queer fault around the monostable (I think) so I couldn't change it.

On switching on, the whistle started and so did I, taking voltages on the power pack. The 30V line was OK, but the 60V chopper line was down to 20V. I then wasted a lot of time as I wasn't thinking straight at all. There were lots of other things happening by now, and time was pressing. I decided to consult my friend Ray who has this irritating habit of being able to think straight.

"Hallo uncle Les" he said when I phoned him. "You in trouble?"

"Yes I am. I've got a 3500 that whistles at me."

"Does it? The line oscillator must be running at the wrong speed then, mustn't it? But you've checked that of course."

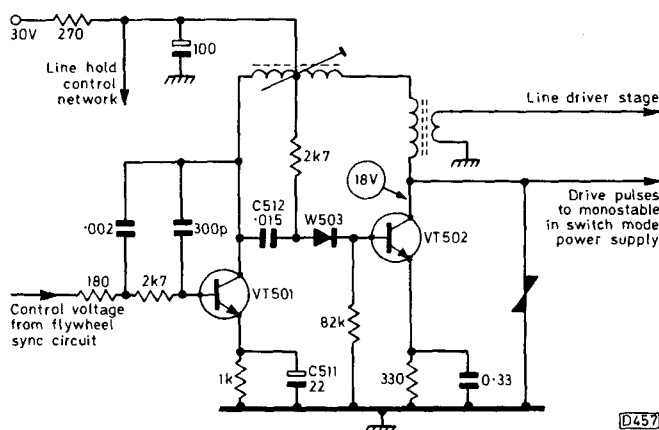


Fig. 2: Line oscillator circuit, Thorn 3000/3500 chassis. The output goes to the driver stage and also triggers the monostable multivibrator in the switch-mode power supply circuit. The trouble was no results, with a funny whistle. As a result of the tuning capacitor C512 going short-circuit, VT502 was excessively biased with about 10V at each of its electrodes.

"Er, well I was just going to Ray, but I thought I'd ring you to see if you're all right."

"Of course. Thank you Les. Oh, while you're there, Don wants to know the value of the resistor across the line linearity coil on an old Philips 210 chassis. Have you got the circuit?"

"Don't need the circuit Ray. It's a 1k Ω . Bung in a 2W one and keep it clear of the line output transformer winding."

"Thanks Les, bye."

"Thanks Ray, bye."

Line oscillator. Why didn't I think of that? It's so obvious. It's just that you get used to the power pack making funny noises.

Voltage checks showed that although the 30V line was OK, the line oscillator transistor's collector voltage wasn't 18V as it should be (see Fig. 2). The transistor was OK, but the tuning capacitor C512 proved to be a dead short. In went a replacement, and everything came back to normal as correct line pulses were now being fed back to the power pack. Easy. When you've got friends.

And More Help . . .

We had recently repaired an ITT CVC5 chassis, fitting a new boost capacitor, a PY500 and a PL519, to cure (a) fuse failure when the boost capacitor shorted and (b) failing width after some hours' use. Now Mrs. Twintub had reported something very funny happening. Everything would be perfect for hours, then the sound and vision would go off leaving only a couple of vertical spikes in green and red, roughly in the centre and to the right of the screen. The fault would clear after a few moments, returning later. Investigation showed that the condition could only occasionally be promoted by disturbance of the main panel – but not in any particular spot.

So we spent some time resoldering the main frame tags to the panel at all likely places, on the assumption that it was bad earth returns that were causing the weird effect. This appeared to be successful, as disturbance failed to promote the condition. Several hours later however we were back to square one, with the condition never staying long enough for us to get any useful voltage readings anywhere.

Once more I felt panic gnawing away at my vitals.

The phone rang. It was our very own editor. What a nice man he can be.

"Hallo Les. Everything all right down there?"

"Well not really John, but I'll say it is just to be brave."

"Getting a nice lot of material to rave on about then, are you?"

"Yes but I don't know the answer to some of them and I don't like ITT any more." And before you could say knife I had poured out the whole sorry tale.

"Well now Les, we can't have you getting upset, can we? Spikes in green with red edges? Well, well, sounds like you're scoping a waveform, doesn't it?"

"That's it John, just like a waveform. But I'd rather have a picture."

"Don't worry Les, I'll phone you back later." And he did. Late in the evening, would you believe it? He's ever such a nice chap.

"Put the lights out Les, and when the fault occurs, look at the base of the line output transformer where the tags come through to the sub panel. You'll see a little spark, then you'll know what to do."

I did put the lights out, I did see a spark, and I did make good the soldering of the transformer's earthing tags, which are also used to earth the winding which provides the gating pulses. I did say "thank you" as well!

I get by, with a little help from my friends.

(The editor's face is red, and his legs are twisted like barley sugar. What an embarrassment this fellow Les is! It's our old friend E. Trundle who must take the credit here however, putting his finger on the cause of the trouble before I'd even finished describing it. Thanks Trudge!)

Service Notebook

George Wilding

EW Tinting

There are times when it's difficult to know what it is you've done that's cured a fault! Take the case of a Pye hybrid colour chassis we had in recently. The complaint was that the picture was severely tinted towards blue in a gradual manner from left to right, and it was mentioned that the fault had got worse over a period of weeks. On switching the set on, the fault was just as described and remained so even when the colour control was set at minimum. We switched off all guns to black out the screen, then checked each individually on the test card then being transmitted. Switching on the red gun gave perfectly even reproduction – and likewise with green and blue! Switching them all on then gave a perfectly good picture which required only slight adjustment to the first anode presets and the focus control for optimum results. Even after a prolonged soak test and repeated switching on and off there was no sign of the fault. Each first anode is decoupled by an $0.02\mu\text{F}$ capacitor, so we're wondering whether the action of switching the guns off and on produced a spark that sealed one of them up.

The same fault, though not with the same severity, was present on another of these sets that came our way recently. This time our gun switching tests showed that the B–Y output was not being properly clamped – the chassis uses colour-difference drive. The most common cause of this is a marked change in the value of the clamp triode's $8.2\text{M}\Omega$ anode load resistor, or alternatively a defect in the associated 680pF coupling capacitor. The resistor seemed to measure about right, but replacing it along with the capacitor completely cured the EW colour drift.

Line Frequency Shift

A sudden change in the line frequency does not necessarily imply the sudden breakdown or change in value of a component in a time-constant network. A defective diode or other component in the flywheel sync discriminator circuit, or in the following d.c. amplifier where one is incorporated, can produce similar symptoms.

We recently came across a dual-standard monochrome ITT set with a variety of line generator faults. The picture

would sometimes lock correctly, but would need hold control adjustment following channel change; sometimes line lock would be very critical; while on other occasions there would be such a marked change in the oscillator frequency that the hold control became useless. Changing the PCF802 line oscillator valve produced no improvement, so the two flywheel sync discriminator diodes were next checked. Both seemed to be o.k., but on repeating the test, since prod connection wasn't all that good, one of them appeared to be open-circuit. Inspection then showed that one end of it, also the lead of an associated resistor, were just twisted around a soldering tag, having apparently missed being soldered during assembly. On soldering up and readjusting the line oscillator coil, perfect line sync was obtained.

It was then found that the top push-button needed retuning after each operation, while the bottom one was so stiff to turn that optimum adjustment couldn't be obtained. These ITT u.h.f. tuners are far from ideal, the three-legged aluminium castings associated with each push-button plunger often developing cracks, causing mistuning after each channel change. Replacements can be obtained from ITT, but are tedious to fit. The castings were all right in this case, but only one spring was fitted to the catchplate. A similar but longer spring was found in our "nuts and bolts" box, and when this was cut down and fitted the mistuning of the top push-button was cured. The bottom push-button's stiffness was apparently due to it never having been used: normal operation was obtained on applying a little thin oil to the threaded push rod and then gradually turning the button in both directions.

Width Variations

The trouble with a monochrome GEC set fitted with the Series One chassis was spasmodic slight but annoying width variations. Valve replacements made no difference, so attention was turned to the resistors in the width circuit as the next most likely possibility. The first suspect was R228 ($10\text{M}\Omega$) from the boost line to the width circuit, but the spasmodic width variations continued after replacing it. The next suspect was the $2.2\text{M}\Omega$ resistor R226 between the width circuit and the line output valve's control grid, and this turned out to be the culprit.

Contrast and Sound Level Variations

The trouble with a Decca hybrid colour set was that the picture contrast and, to a lesser extent, the sound level spasmodically varied. The odds were against a tuner fault, since there was no increase in background grain when the

Send in the Clowns

Les Lawry-Johns

YOU'VE probably gathered that we have some comical and sometimes strange characters in our neck of the woods. They keep on coming. Take Mr. Black for instance. Just about knee high to a grasshopper, but oh so aggressive.

"I want to see you" was his friendly greeting almost before he came through the door. "You know who I am."

"Of course Mr. Grey, I remember you well. How's your wife?"

"My name is Black and my wife is hopping mad, just like I am. I wouldn't like to be in your shoes if she cops alongside you."

So I had two hopping mad people on my hands and wondered why. I didn't have to wonder long.

"You repaired our set a few months ago and charged us through the nose just like all you people do and now it's gone again. Didn't make a very good job of it, did you?"

So saying he thrust a bill under my nose. It was dated eight months earlier and stated that a BT106 had been replaced along with a 3.15A fuse, convergence set up, etc. Charge, £5.60 plus 70p VAT.

"Six pounds thirty chucked down the drain. My missus went through the roof when it went off last night, and I got the blame. She's down the town now. Shouldn't be surprised if she hasn't gone to the advice brewrow like she did when the kettle blew up."

"Did they advise her to put water in it next time?" I asked, with genuine concern.

"Never mind about the kettle. What are you going to do about our telly?"

"Nothing. It's your set, not mine. It's up to you what you do. If you think it's so unreliable, what about a nice new one?"

We had a few words after that. Something about fifteen rounds and a duel at dawn, but it didn't amount to much. When he saw that I was not impressed with his aggression he dropped it like a cloak and the true reason for it emerged. He was scared stiff of his wife and would be glad of my co-operation to get her off his back.

Once this was obvious I was on his side. After all, when a bloke's wife is on the war path he needs all the help he can get. Don't we?

So we got the set in and had a look. Bush A823 or one of that ilk. Anyway, it was one of those with thermal cutout wirewounds as the load resistors of the three colour output transistors on the top of the decoder panel. I wasn't interested in the exact type, more in the fact that all three wirewounds were sprung open.

"What have you done Mr. Black?" I accused him.

"Me? I ain't done nothing. What's happened? Is it finished? She'll do her nut. Oh my gowd." Mr. Black looked bleak.

I wasn't feeling all that happy either. If all three resistors had overheated at the same time, all three must have been taken down to chassis at the same time. All three BF337 amplifiers bottomed at the same time? What was common? Well, one possibility was absence of pulses to operate the feedback clamps, since with no clamp action the three RGB amplifiers are biased hard on. The pulses do sometimes get lost due to a faulty connection in plug 3Z. The pulses were

there however. So what then? The tube? Oh no! Black day at bad rock, or bad day at black rock. More like picnic at hanging rock.

"All three Mr. Black. Not just one, not just two, but all three." Let him suffer too. I reached for the soldering iron.

"What are you going to do Les?" queried a now friendly Mr. Black.

"I'm going to solder them up and see what happens, 'cause I can't see why they all went together unless the tube's bugged or just messed about a bit."

On went the set and on came the picture. No trouble.

"Looks all right to me" said Mr. Black, his face still white.

I refitted the back cover and reflected upon the situation.

"Leave the set here for a few hours Mr. Black, and if it's all right it will prove my theory that there's a disturbing influence in your house causing peaks in the mains voltage and making things go wrong. Like the kettle and this, you see?"

"Must be my missus. I'll tell her that things will go better if no one gets excited."

So far so good. It hasn't happened since. If it was the tube, I wonder what would have happened if the earth returns and the spark gaps had not been in place and in order. A little more than sprung springs I fancy.

Mr. Bakewell's Pye

We had to do some service calls on people who for some reason or the other were unable to bring their sets in. Mr. Bakewell was the first, and of course it just had to be a Pye 691 which had given long and valiant service but which is now nearing retirement age. The list of complaints about the set looked a bit formidable, but we plodded on through.

First it didn't work at all. Blown fuse. Short from top cap of PY500 to chassis. Shorted 0.47 μ F boost capacitor on line output transformer. No trouble. PY500 worse for wear. With both replaced, picture came on but with fault number two. Picture going yellow intermittently, which was blue drop out.

Check blue PCL84 base contacts and print. Solder up all suspect joints and rock valve. No results. Blue drive plug not making good contact in socket? Plug o.k. Tap tube base socket. Blue drops out with each tap. Clean up tube socket and pins. No more blue drop out.

Fault number three. Poor line hold. Turn up power unit. Reference pulse integrating resistor R203 (47k Ω) turned to powder. Makes one wonder how there had been any line hold at all. Lucky this time: it often goes very low and blows the discriminator diodes. Everything o.k. Goodbye Mr. Bakewell. The next one was Mr. Winder the clockmaker.

Another Oldie

Another aged set, but good. An ITT CVC2. Dead. Not really, as the valve heaters were glowing merrily enough.

Up on the top left there's a group of four fuses, and nearby is a wirewound surge limiter to the h.t. rectifier. Resistor open-circuit. We just happened to have a 6.8Ω 10W with us, so in it went. The grey scale looked a bit dicey, and Mr. Winder said it varied over the evening. The red PCL84 seemed cooler than the other two, so we put in another and this seemed to do the trick. Not being sure, we said we'd call back later to confirm that it had. It had.

Two down, one to go. We thought. It didn't work out like that.

Mrs. Liquorish

Go on. Laugh. There's more than one in the book. As true as I'm standing here waiting for this bus. Anyway . . . some weeks previously we had fitted a new line output transformer to the lady's Bush TV181S, due to a breakdown of insulation between the overwind and the yoke – not the DY802 heater winding this time. Now she'd phoned to say there was some sparking on the same side. In the event the transformer was not at fault. It was no more than a defective print contact to the PY88 base. Clean up, tidy up, no trouble. "I wonder if you could find time to call next door as they are new in this area and their set has broken down." Time was pressing but being a kind hearted cove I graciously consented to take a quick look.

Help from Wellington

She was a pretty little thing but her set was a brute. A sloppy great red setter dog didn't help much either. With one foot in my tool box and another in the spares box he just stood there, tail wagging and barking his stupid head off as I struggled with the rear cover of the Decca Bradford.

"Push off you daft bugger" I bawled. "You're mucking up my whatsits." Kneeling down, I tugged at his feet and received a great wet tongue all over my face. Mrs. Lightfoot came to my aid and dragged Wellington out to the kitchen.

When she came back she told me that the cutout had cut out, or that was what her husband had said.

Armed with this information we checked for shorts and scored a bull's-eye straight away with a short from the top cap of the PY500 to chassis. Just like the Pye we thought. In this case the suspect capacitor is on the panel under the line output section, and is $0.22\mu\text{F}$ 1kV. Sure enough, a dead short. Our glory was short lived however.

Make sure there were no more shorts and switch on, pressing in the cutout which was still cut out you see. The valves lit up brightly and settled down. After a while the sound started to appear (sound) and the e.h.t. hissed away – but with sparks from the PY500. All off. Only one PY500 in box. Fit it and try again.

Up came the e.h.t., but with spitting around the e.h.t. connector cap. All off again. Clean around e.h.t. connector with silly stuff and try again. More hissing, this time from leads from top caps of PL509 and PY500 as they go down to the transformer. Not nice, rather brittle. Take all off, rake new leads from box and fit. E.H.T. now o.k., no hissing.

I was just leaning round to have a look at the screen when Wellington escaped from the kitchen and came lolling straight across to me. Bash. I put my hand out to steady myself and touched the top caps of the PL509 and PY500. Ahhhhh! I toppled over and landed on the dog, who naturally didn't take kindly to my weight. He struggled, I struggled. Mrs. Lightfoot dashed forward to save the set toppling over as I got off the dog who cannoned into Mrs. L who bit the dust. Chaos and confusion continued for a few

seconds, but order was quickly restored and Wellington was put out to graze in the garden. I found two white burns on my hands, but otherwise no harm had been done.

We could now see what the screen looked like. Decidedly green. It then became normal, before reverting to green. Surely not a poor tube base contact again? No, this time it was the green preset control VR296: faint sparking could be seen under the wiper. I searched through the spares box, but nowhere could I find a $2k\Omega$ preset.

Not wishing to make a return visit, I decided to wire in two $1k\Omega$ $\frac{1}{2}\text{W}$ resistors to simulate the preset set halfway, which was where it had been anyway. A slight touch up and Mrs. Lightfoot was satisfied. Er, that's to say she was satisfied with the picture, but if it was all the same to me could she have some sound?

I turned up the volume, but there was no trace of noise at all. My heart sank. Working on the timebases is one thing, access to the PCL82 audio output valve is another. Laying underneath the thing I could just about take some voltage readings – if I could remember the pin connections that is. I could remember that pin 7 is the screen grid and that this should have some h.t. on it. It didn't, although pin 6 (anode) did. My mind was by now becoming somewhat muddled. I could remember that it was a fairly high-value resistor, and I could see by the print where it lived. Did it die or was it killed?

"Mrs. Lightfoot. Would you turn the set off please?" She did. There were no shorts to chassis, so in went a $10k\Omega$ 1W resistor (should have been $12k\Omega$ but never mind).

With the set back on there was plenty of sound with no distortion and the cathode reading on pin 2 seemed normal. So we concluded that the resistor had just died after all.

Time to tidy up and bid farewell to Mrs. Liquorish, Mrs. Lightfoot and Wellington.

Back at the Ranch

After that lot you would think a little peace and quiet had been earned. Well maybe it had been earned, but we didn't get it. Mr. Goosey was waiting for me.

Now hang on just a second. This was not the Mr. Goosey that some years ago kept a pub called the Darnley Arms at Cobham (Kent). Oh no. You see, that Mr. Goosey had a next door neighbour called Mr. Gander. And what's more, Mr. Gander is still there.

Anyway, Mr. Goosey was waiting for me with his Philips G8.

"It's gone again. Same as it did before. What do you repair these sets with, dynamite?"

I managed a ghost of a smile at this dazzling display of wit. We had fitted a new tripler some months earlier, but doubted whether this was the cause of the trouble this time.

Anyway, off came the rear cover. The 3-15A mains input fuse was o.k., so the trouble was unlikely to be on the left side. Over to the right the 800mA fuse in the supply to the line timebase had gone.

Check for obvious shorts. None. Could be the tripler. Unhook it from the line output transformer. Hopefully stick in another fuse and switch on. Bonk. Not an immediate bonk, but a slightly delayed one. Leave the tripler off just in case, and remove the fuses from the supplies obtained from secondary windings on the transformer (saves checking the diodes etc.). Stick an ammeter across the fuse to see just what the overload is. 1.5A. Line output transistors warm when meter removed. Check transistor readings with base and emitter leads off. No leaks. Feeling sad now. Transistors could be breaking down under load, or

– continued on page 305

and again this is done by building a rechargeable battery into the decoder board.

A special tuner with a local oscillator sample feed outlet is needed, and the current U321 has been adapted to become the U321-LO. This has a coaxial supply outlet (at the top) which delivers a typical 33mV of local oscillator output at 75Ω impedance.

Although designed as a complete package, this system will interface with the Mullard remotely controlled teletext system. This too is a flexible system which has many extra features optionally available to setmakers by having them built in – to be discarded as desired. The handset keyboard can be made to operate in any of four modes – TV, teletext, Prestel and DICS.

Plessey Tuning System

Like the Mullard DICS system, the Plessey Direct Channel Tuning system (see Fig. 14) is a frequency-synthesis system to dispense with the tuning resistor bank. Again, a stable 4MHz crystal controls a ROM programmed with the local oscillator frequencies of 70 TV channels. Again, by comparison with the varicap tuner a voltage is produced to correct any error and to pull the local oscillator on to the selected ROM frequency. Six i.c.s form the complete package, to which can be added the two remote control devices previously described.

A novel feature is the absence of a battery to keep the RAM information permanently stored. The memory chip is a CT1116, non-volatile MNOS memory (metal-nitride-oxide-silicon) which has gates made of very thin layers of oxide and nitride. If the gate is made negative with respect to the source and drain, a positive charge tunnels through the thin oxide layer and is trapped in the oxide-nitride dielectric. This stores

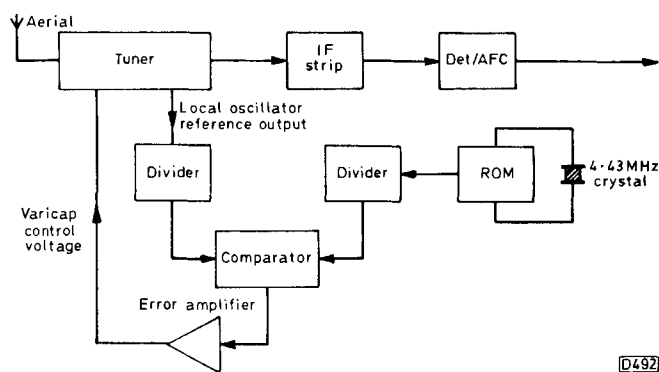


Fig. 14: Block diagram showing the basic principle of the Plessey direct channel tuning system. The local oscillator frequency is compared with the selected channel presented in digital form by the ROM, the difference signal being amplified and used to pull the local oscillator into lock.

the charge for at least 28 hours, and in practice considerably longer. To erase the memory, the polarity of the gate to source and drain voltage is reversed. This avalanches "hot" electrons into the oxide-nitride interface, neutralising the previously trapped charge. The method is known as "punch-through erasure". To read off the stored charge without erasing it requires an applied voltage which is midway between the negative charge and positive discharge potentials.

Conclusion

We've come a long way since describing the advent of the varicap tuner. The TV set front end is getting steadily more complex.■

Send in the Clowns

— continued from page 295

they could be on too long. Check R521 (4.7kΩ resistor in series with 0.0012μF capacitor C522 across driver transformer's primary winding – they are essential for correct drive pulse timing, as they damp the primary). R521 o.k. Suspect flyback tuning capacitors on top left of board, but seeing type fitted not really convinced that replacement would at this stage help. As the leads were off the BU205s it didn't take long to whip them off the heatsinks and plonk in a replacement pair – without much conviction that this was it. It wasn't.

"What is it?" queried Mr. Goosey.

"I'm not sure, but I think you need a new line output transformer you poor soul."

"Have you got one?"

"Yes."

"How long to make sure?"

"Ten minutes."

"I'll wait if you don't mind."

"I don't mind if you want to watch a right cock up".

Make a little sketch, just in case, and note direction of turns on 7 and 8. New transformer the same so proceed unsoldering etc.

"I wouldn't like your job."

"Neither do I at times."

In went the new tranny, back went the panel. Check current. Nicely low. Fit fuses. Nice hiss on sound. Fit tripler cap. Nice rustle up of e.h.t.

"O.K. Mr. Goosey. Now, about the bill."

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Come back, come back . . .

Les Lawry-Johns

WE'VE just had the roughest patch for a very long time. I now realise that as a service engineer I'm a pretty good cowboy. Even so, most of it wasn't my fault . . . but some was.

An Ageing Ultra

When Mr. Middlestump (initials L.B.W.) brought in his somewhat ageing Ultra 3000 because it didn't go, we thought it was going to be another quick job. It wasn't too easy, but then again it wasn't too bad – at the start that is. The tube heater was glowing, or rather the tube heaters were glowing, and there was plenty of h.t. on the body of the chopper transistor (VT604). Other than this, there were no signs of life.

Checking the 30V line proved that F602 was intact, the 30V was present and was being passed on to the line oscillator. R607 in the feed to the chopper driver transistor VT605 seemed to be warmer than usual however, so the voltage at its "low" end was checked and found to be 5V instead of 12V. Funny, we thought. Until this was cleared up there was no chance of the chopper being driven. So out came the power pack, after the usual struggle with the front hooks.

An ohmmeter check on the 12V line showed a low reading one way but a higher one the other. This didn't seem strange, but in view of the low voltage we thought it worth investigating. Moving the test prod from chassis to the emitter of VT605 showed a dead short whichever way the leads were connected, and in no time at all VT605 was out and another E1222 was fitted.

With the power unit back in the set the chopper started chopping or whatever choppers do, and all services were restored. A fair picture was displayed, and Mr. Middlestump was happy when he took his set away. He wasn't happy for long. He was back the next day. Sound, no picture: screen lighting up, purple. Examining the latter first, with the set on its side, we found the green output transistor's collector voltage high and this transistor proved to be open-circuit. In went another and the grey scale was restored, but of course still no picture.

So back along the line we went and finally ended up on the i.f. strip, set now the right way up. The final i.f. amplifier transistor VT104 turned out to be open-circuit. Replacement restored the picture and made the sound a lot stronger (it would have been much simpler had the sound signals gone right off, as they should have done, but they didn't). So there we were, all systems go. For a while that is.

We showed the picture to Mr. Middlestump and were just saying "nice, isn't it?" when the picture went completely blurred. Surely not the tripler? Removing the rear cover showed the focus lead from the tube away from its pin on the top right side. I was about to plonk it on when there was a sharp crack in the tube (I think) and the set went dead. The cutout had cut out. Putting the focus lead on firmly, I pressed in the cutout button. There was a hum and it pop-

ped out again. Frantic investigation showed that both R2009 line output transistors had gone short-circuit.

"Surely nothing else could have gone wrong?" said Mr. Middlestump a trifle irritably.

"It could, it has and I don't like it any more than you do" I said.

We wearily fitted another pair of line output transistors and carefully checked around to make sure that everything was in order. Back came the picture but the height was anything but right – and fluctuating in time with a queer hum which came and went. Voltages were varying on the field panel, and much time was wasted in this area. We then found that the 30V line was fluctuating between 40V and 45V.

Panic stricken, we turned to the 30V stabiliser transistor VT601 and accused it of having emitter-to-collector leakage. So we changed it: the variation continued apace. Unhooking its emitter lead should have killed the lot. It didn't. In fact the voltage went up. There was obviously a leak from the h.t. line, but where? Unhook this, unhook that. Red herrings came and went. Many were the bitter tears that fell.

Bleary eyes scanned the circuit diagram and focused on the power unit. I had looked at the links from the h.t. rail to the feedback amplifier VT608 several times, but had stupidly not seen the relationship between W619 and W620 (see Fig. 1). If W619 goes short-circuit the 30V rail will be connected to h.t. via W620. Fool. A quick check on W619 proved that it was indeed short-circuit. Out it came and in went a replacement. 30V line steady. Height stabilised. Picture quite good.

"It's O.K. now Mr. Middlestump. I think."

"I wouldn't like your job" he said. "Fancy all that just because you left a lead off."

"I, I, er, oh well never mind." I gave up.

I thought (hoped) that that was the end of that one. It wasn't. However . . .

No Colour

His name isn't Mr. Hoo actually, but he came from Hoo which is a fair distance from us and is on the Medway. His name was so unusual however that I just can't spell it.

Anyway, it was an ITT CVC5 or something like that and it had no colour. Ah ha, thought I, not going to get caught this time. So off came the back and up the top we went to ensure that the flip-flop was flip flopping (T36, T37). Sure enough, it wasn't. So back to the ident transistor T35 to see how this was faring. "Nice colour" said Mr. Hoo as I touched the test prod on the base of T35. So I took it off. The colour stayed. "Very good" he said. "How did you do it?"

"Blowed if I know" I confessed, thinking to myself that I must have prodded T35 into life thus starting up the 7.8kHz generator. This suggested that T35 was sluggish, so I changed it. Result: no colour.

All associated components were painstakingly checked,

and Mr. Hoo departed because he had a lot to do.

We then found that an electrolytic bridged across C205 (4.7 μ F) in the burst amplifier's collector circuit restored colour signals. That's it! It wasn't.

The temptation to rush round the decoder in a blind panic was resisted since the trouble was right there up on the top right side and was probably a dry-joint of some kind. But where? The burst amplifier transistor T34 next received attention. The voltages were slightly wrong, so the associated components were checked and the transistor changed. Full colour! Nothing would shift it. I thought (hoped) that that was that. It wasn't.

When Mr. Hoo came back we proudly showed him his glorious colour and off he went with many a yelp of pleasure. One hour later he phoned to say that he had no colour. He yelped with displeasure and said he would return the following day. I cried.

Enter a Jolly River Pilot

"Mr. Lolly-Jones is it?" rubbing me up the wrong way to start with. "Harold said I'd find you here. Frankly I didn't know you existed till he told me over a pint. Anyway, I've a Bush colour set and it keeps going down to a thin white line or two across the screen every week or so and the buggers can't find out why. Harold said to take it to you and you'd sort it out in no time. Speedy Gonzales he called you. Ha Ha!" Bully for Harold. With friends like him you don't need enemies. So in came the Bush CTV1226 (A823B chassis).

Prodding around the field timebase caused the fault to come and go, but it wasn't till we opened up the panel and played with the pincushion phase coil 6L20 that the cause was evident. Resoldering the coil pegs cleared the trouble permanently.

"Well I never. Perhaps it'll be all right for a week or so, eh?"

"Bet you a pint to a brandy it'll stay longer than that."

It was not quite the end of the saga though.

"Oh, by the way, last night we kept getting a sort of morse code coming through on the sound. Perhaps you could have a quick look at the sound side while it's here?"

Until now I'd kept the sound down. Turning it up produced quite reasonable quality but with an edgy edge to it. After a short time the quality became worse and the thing started to motor boat. I touched the audio transistors and burnt my fingers. Spraying the BC126 driver transistor 2VT11 with freezer stopped the motor boating, but for a short time only. So I stuck in an equivalent and this got hot too. The voltages were haywire, and how, it produced reasonable sound beats me. Checking the output pair cold showed that they gave perfectly good readings, provided they were both npn types that is. *BOTH* npn?

Grabbing the circuit confirmed that the lower one should be a BC139 pnp transistor. The one fitted was an npn field output type 16039. My mind went numb. How long had this been in? Perhaps this is what is meant by bipolar... Now I knew.

Anyway, we stuck in a BD204 and everything ran nice and cool and there was no more morse code.

Looking back at the screen and changing channels, the faces went green.

"Oh that happens quite often. We just press the buttons in a couple of times and it goes right again."

Getting the faces to go green again, we reset the ident preset 3RV4 and tried it a few times. Now O.K.

Wrap it up and chat. "Thanks very much. Nice to have met you. See you soon. Goodbye." Very nice chap. His wife

was very nice too. Funny about that sound output though.

Back they Come

The phone rang. Mr. Middlestump, and I felt my nerves cracking.

"We're having to watch this rotten set in black and white. After it's been on about an hour the colour starts flickering in and out and we're fed up with it."

"So am I. Why don't you find a good engineer?"

"I'll bring it in tomorrow. Perhaps it's only a little thing caused by that wire coming off. Cheers."

So we had a lovely day to look forward to. The ITT with intermittent colour and the 3000. Quite apart from the usual run of the mill heartache. Was tomorrow going to be the day when they would finally cart me off to the funny farm?

When it was time to get up in the morning I didn't want to. I wanted to stay there nice and warm and go back to sleep and not face these colourless colour sets.

The cat insisted that I got up however, so down we went to feed her, take the dog for his sniff around and generally do all the things everyone does at the start of the day.

Easy Ones

The first set to be tackled was of all things an ITT. No signals. No transistor supply voltage. O.K. at the l.t. bridge. Not passing through the AD161 regulator transistor as its base voltage very low. This comes from T45 (BC170) which was also not being turned on. Check the reference voltage. Very low. Suspect the zener i.c. D11. Change to TAA550. All voltages now back to normal. Picture rolling, so change PCL805. Width in each side, so check drive to PL509. O.K. Change PL509. Done.

Bring on the next one. Thorn 8500, picture very blurred, suspect focus unit. Focus unit O.K. Low voltage at focus pin on tube, so check 100k Ω series resistor which turns out to be virtually open-circuit. Fit new resistor. O.K.

The Intermittents

Enter Mr. Middlestump. Spirits fall.

On the bench there was very little colour signal and what there was was varying. We started on the decoder panel, which really was not a good place to start.

There was quite a bit of variation going on. We finally ended up at R306 (see Fig. 2), where there was quite a bit of variation. Now this is the a.c.c. line, so it seemed logical to check the associated preset R308 which could have been playing about. It wasn't, and the voltage at its slider was steady.

So back to the i.f. panel where the first chroma amplifier transistor VT110 lives. This proved to have base-to-emitter leakage, and once a new BF224 was fitted the colour signal was steady and the picture could not be faulted. Our spirits rose. To be quite honest we had spent some time chasing red herrings on the decoder panel, but we are learning, bit by bit, not to leap before you jump or something.

It appeared that Mr. Middlestump had finally been sorted out so it was one down, one to go — with Mr. Hoo.

The latter gentleman finally arrived, and we set to to sort out his intermittent trouble.

It needed only a finger on the base of the ident transistor T35 to cause some sort of colour bars to appear on the screen, so we had to conclude that the trouble was still in the circuit preceding this — the burst detector circuit. The coil, diodes etc. are in the top left can, and although we had

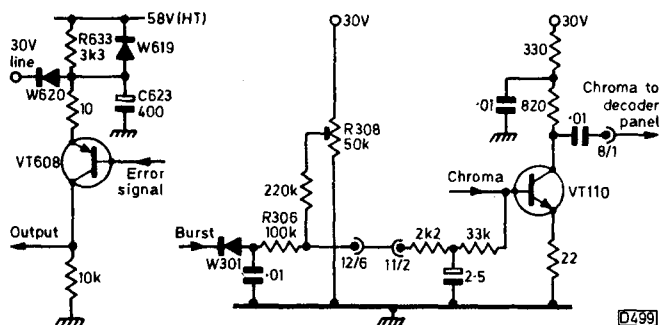


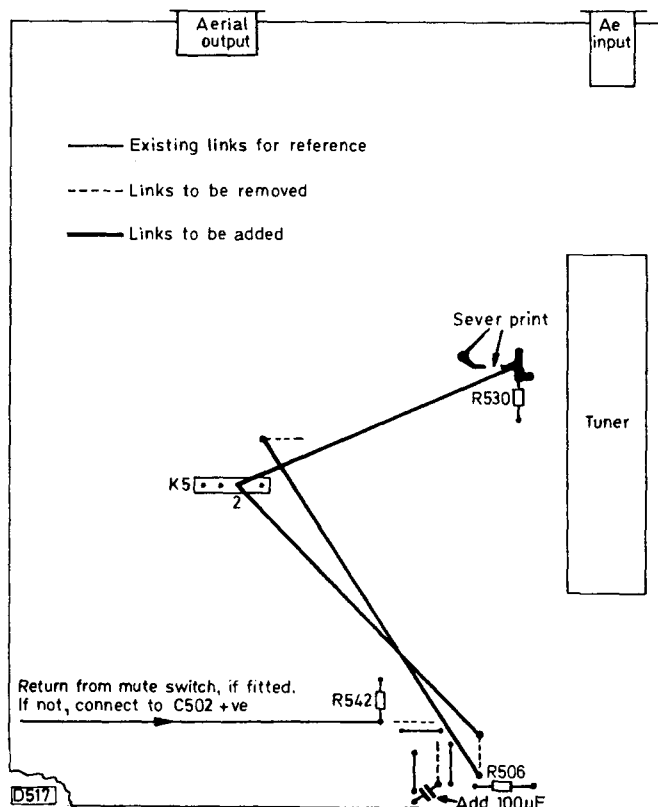
Fig. 1 (left): Power supply error amplifier circuit, Thorn 3000 chassis. W620 clamps the emitter of VT608 to the 30V rail. The time-constant of R633-C623 ensures that VT608 is cut off when the set is switched on, giving a slow-start action. W619 is included to discharge C623 rapidly when the set is switched off.

Fig. 2 (right): A.C.C. detector and first chroma amplifier circuits, Thorn 3000 chassis.

already had this off once – to check the diodes – we hadn't really attacked it head on. Now seemed the time to do so. Every connection on this small subpanel was checked and resoldered.

Upon reassembly we had the bistable happily sharing the voltages and the colour on the screen warmed our hearts. It didn't go off any more, so we had to conclude that no component had actually been at fault and that all along it had been a dry-joint in the phase detector even though all the connections had looked good. It was a good job the cat had got me up, or I'd have still been worrying about them. Now we have only the changing colour on that Decca to worry about...

N1700 VCR MODIFICATIONS

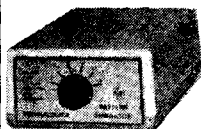


The above layout should help those carrying out the off-tape monitoring modification suggested last month.

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The Best Laid Schemes

Les Lawry-Johns

I WAS trying to find an irritating fault on a cassette deck and was engrossed in watching the busy little VU meter needles flickering up and down in time with the music coming through the headphones, which were keeping my ears warm, when this fellow came in.

Communications Problems

I didn't like him very much. Intelligence wise, he was a cross between a cretin and a moron. His distinguishing characteristic was that he didn't bother to open his mouth when he spoke, which on the one hand showed decided lack of consideration for those expected to listen to him but on the other was of little consequence because what he did say didn't amount to much anyway. Added to this I did have the headphones on.

Ignoring the fact that I was totally engrossed with the job I was doing, he launched into a tirade of his troubles, at the same time keeping time with the index finger of his right hand. I didn't hear a thing, so just to be awkward I pointed to the headphones and then removed the jack plug from the deck. I showed him the plug, whereupon he took it and bawled into it as though it were a microphone.

Now that the music was off, I could vaguely hear bits and pieces of the gabble since now he thought he was talking into a microphone he was speaking far more (for him) carefully. Apparently he had brought this here stereo thing into us for repair some time ago, and now when he plays his record it sounds funny half way through. It's outside and he'll bring it in. He brought it in complete with his record, by which time I'd removed the headphones.

"Can you hear me without your hearing aid?" he shouted.

"Yes thank you, I need it only now and again."

"I'll leave it with you and call back at the end of the week then."

That isn't exactly what he said, but that's what it amounted to. After he had gone, I rigged it up with a couple of speakers and put the record on — at the far end of the bench so that I could get on with the cassette deck at the same time.

Cat's Paw

It played away quite nicely, and I could hear no distortion at all — until it reached track three when the sound was decidedly distorted. Apparently the cat thought so as well. In one movement she leaped up on the bench and swiped the pick up arm with her paw. Zip.

"Spock, you horrible cat, clear off" I bawled.

Spock fled, leaving me to examine the record which was well and truly scratched from track three to the centre. My fault of course, but it was the first time the cat had taken a hand in the bench work for a long time. Enter the wife.

"What are you shouting at the cat for? Honestly, you make her life a misery. What's she done now? Damaged a

record? Is that all? Well I'm going to the record shop so I'll pick up one of these as well. A lot of fuss over nothing. You ought to be ashamed of yourself."

"Either that cat goes or I do."

"Wait until I get back from the town and then I'll help you to pack. Don't you dare kick her while I'm gone. I know you, you're evil." There's no justice in this world.

Actually she did get a new record, and track three sounded just as good as the others. Did he have only one record? She's a good cat really.

The Fool on the Hill

I had a couple of outside jobs to do, so I packed my bags with care, slightly hampered by knowing only the make but not the model of the sets to be dealt with. One was a Murphy, the other a Pye, so there are no prizes for guessing the main content of my bags. Both calls were in the vicinity of Telegraph Hill, one actually on it.

The Murphy was the first one. It turned out to be the 110° remote control Z179 chassis, not one of my favourites so far. The complaint had been reported as "no sound or picture." Quite so, but the glass of the tube face was very much alive, and the tube heaters were glowing, plus the fact that there were very faint traces of shortwave stations issuing from the speaker. There was not the hiss that there would have been if the i.f. stages were working however. The left-hand signal panel can be released on the bottom catch and slid out to allow better access to the plug-in i.f. strip.

Playing with this revealed plenty of life at the output of the video processing i.c. (SC9503P or TDA1330) but no response from the input. Our spares box contained just about every i.c. except this one, so we promised to "pop back later with the bit you want."

Up the hill to the Pye. This turned out to be one of the 725 series, solid-state with vertical panels.

The bottom centre 800mA h.t. fuse had failed. This is in the feed to the line output stage. With the stupidity that seems to characterise my every move lately (senile decay), I thought I'd take a short cut and unhook the tripler. Sure enough the current dropped to about 500mA and a new fuse held. Our box contained almost every tripler except one for the 731-725 series. So we made the same promise and departed. Oh well, it was worth it just for the view from the hill over the estuary.

A quick nip back to base to pick up the (a) necessary and (b) unnecessary parts, delayed by people wanting to know this, that and the other. Eventually we were on our way back.

Whip out the Murphy's i.f. panel, suck up the solder on the chip, and stick in the replacement 1330. Lots of lovely sound and vision signals.

Up the hill to the Pye. Remove suspect tripler, fit new one. Switch on. No e.h.t. Fuse slowly gets red hot, curls up and dies. Realisation hit me. Idiot. Too stupid to take my

own advice (these pages some months ago, suspect C563 0.1 μ F 1.2kV under the focus unit, c.r.t. first anode supply reservoir, off the tripler). This capacitor was short-circuit of course, and had been isolated by disconnecting the tripler (it's at the earthy end of the line output transformer overwinding). Better by far to have removed the two-pin plug rather than the input to the tripler. Next time, next time.

Having restored what appeared to be normal reception by replacing the capacitor and refitting the original tripler, we stood back to admire the picture.

Tap and Tap Again

"Oh, there's one thing you might see to while you're here. The picture goes off every now and again and we have to tap the top to get it back again." So we tapped the top of the cabinet and off went the picture (leaving the sound). Another tap brought it back. Here we go again.

Having slid out the left-side signal panel, every touch anywhere caused the picture signals to come and go. It appeared to be plug and socket connections, so each relevant one (and others) were checked with fairy fingers.

In view of the symptoms – sound unaffected but complete loss of luminance – we were inclined to dally around the delay line area. But as we prodded and probed, the fault became less and less easy to provoke. In short we were improving the contact without locating it, and time was a hurrying by.

A purpose had been served however, since only one item would now respond to light treatment. This proved to be the i.c. near the delay line (IC348, TBA560CQ) – it clips into a socket rather than being soldered to the print.

Out came the wee beastie (thus slightly altering the leg formation) and back in again he went. Inspecting the print side showed no sign of dry-joints or what have you, and no amount of vibration now seemed to disturb the picture.

Out again to admire the view, and then back to the traffic and the noise and the shop and the jobs.

Tube Trouble

"Mr. Creaky has left his set here. He says that since you put the new tube in the picture is worse than ever. He'll be back at five o'clock to collect it." It was four thirty.

"You wouldn't like me to paint the Forth Bridge before five o'clock as well would you?" I complained.

"Well he did bring it in as soon as you went out, and you have been gone a long time. Mr. Creaky is very nice looking too."

I gave up and hoisted the G8 on to the bench.

The picture looked fine to me, for a while anyway, and then something funny happened. The whites started to have long pennants of orange streaking out to the right, which is typical of a failing tube. Off came the rear cover, back in went the aerial, and in the mirror the picture looked perfect. Whites were white with no streaks. Bitterly I wished I knew my job better than I did. Why can't I be quick witted and clever like most chaps I know? All I can ever do is plod on following dull routines that may or may not result in eventual success.

Self-hypnosis. That's the thing. I'll tell myself I'm clever.

It didn't work however, and I had only a few minutes left.

As I watched the crisp picture it started to play about again. This time it faded, becoming bluish in the process, and I heard a very faint clicking noise. The tube heaters were out.

Quickly (for me) I switched the meter to a.c. and applied

the prods to the heater posts. Full 6.3V. The tube heaters were glowing. Ah! A dry-joint on the tube base.

There weren't any. The clicks started again (from the speaker). Again the heaters dulled, and now the 6.3V reading was swinging. I fairly leapt over to the power panel to the tube heater supply plug. Moving it produced the clicks and the variation. Tightening up the socket stopped the hanky panky completely.

I now felt full of guilt. Had I put in a new tube unnecessarily? The old one was still in the basement. Checking it with the tube tester showed very low emission on all three guns. The poor heater supply contact must have occurred after the new tube was fitted. I was not guilty but I could have been, easily.

By the time Mr. Creaky came to collect I had also painted the Forth Bridge. I cannot understand these dull people who have no confidence in themselves.

The phone rang. It was Mr. Hoo.

"A couple of weeks ago you had a lot of trouble with my ITT because the colour kept going off. Well, it's gone off again."

Help!

Anyway we had the set in again, and this time had a look at the reference oscillator control loop's filter circuit. There's a 6.8 μ F electrolytic here (C208), and replacing this seems to have done the trick at last. I'm still nervous when the phone goes though.

Ghost Train

Nothing to do with defective TVs, but it's worth telling. Now it's part of a river pilot's job to get up at unearthly hours in order to be at a certain place at a certain time – to pick up his ship. So our friend Clifford left home at 03.30, down to the pier where the cutter took him across to Tilbury where he intended to catch the 4.30 first train. At the station there was only a sleepy ticket collector.

"Purfleet train, platform 4" he yawned. Clifford looked over to platform 4. There was no train at platform 4 or for that matter at any other platform. In other words, the whole place was bare of trains.

"I thought it started from here" said Clifford.

"It does. It comes in last thing at night and it's the first one out in the morning."

"I can't see it".

The collector turned his head toward platform 4. He woke up with a jerk.

"Where's it gone?" he demanded.

"I haven't taken it" Clifford assured him.

The collector hot footed it over to a phone. Whoever was on the other end of the phone seemed as disturbed as the collector, and apparently accused him of losing the train. He banged the phone down muttering "It ain't my fault."

Just then two lonely figures came on the scene. It was the driver and guard, who were to take the train out.

"Where is it?" asked one.

"Don't you start. How do I know where it is?" said the unhappy collector. "It must have come in last night."

"It's bloody Fred, that's who it is. He just won't walk home last thing." Whereupon the driver and guard walked down the platform and into the darkness.

"Where've they gone?" asked Clifford, by now prepared to believe anything.

"Over to the sidings I suppose. Fred lives over there somewhere."

Sure enough, ten minutes later there was a rumbling on the tracks and the 4.30 slid into platform 4.

Clifford swears it's true, but you never know with him.

Only in Dreams . . .

Les Lawry-Johns

WEARILY I clambered up the graceful curve of the Spit's port mainplane, once again to wedge myself in the tiny cockpit, to clunk-click the straps, and to prepare for the ordeal to come. I looked down on the strained and anxious faces of my faithful fitter and rigger, Fred and Reg, who had kept the Spit serviceable through the long months to enable this one plane, with its one pilot, to hold off the entire enemy air force by night and by day. I was feeling a bit groggy, after six months without sleep . . . Alone to keep the skies clear until replacements could be built and pilots trained to take my place.

"Be careful sir" shouted Fred. "They'll be coming at you out of the moon." My haggard face managed a ghost of a smile as I pulled up the side of the cockpit cover and pressed the starter. The sharp bark of the Koffman cartridge preceded the clatter of the Merlin as it burst into life in the early morning air, and the March Hares sat up in silence around the airfield perimeter, sole witnesses to what could well be the last act of the drama, their ears providing V signs of encouragement.

"Chocks away chaps."

"Chocks away sir, and good hunting. Oh God. He can't, he just can't. But of course . . . he must".

My headphones crackled into life. Dorniers over Dover, Junkers over Jarrow, Messerschmitts over Manchester. I pushed the throttle forward and the tiny aircraft raced across the grass. Make sure the guns are working. I gave the eight Brownings a quick burst, and the Vs disappeared from the March Hares' heads. No more for them the battle's noise. The engine screamed and the tail lifted . . . Screamed.

"Wake up, wake up. You're tearing the bed to bits. What dream is it this time?"

This was to be my reward then. To be rudely awakened by an unsympathetic spouse who knew and cared nothing about my valiant efforts to save our blessed island home.

I lay there reflecting for a while, the battle of the skies receding as I remembered what I'd done the previous day to my precious test cassettes, all carefully recorded. Correction. They had been carefully recorded until I'd left that open-wound transformer next to them while testing some audio stuff. For the life of me I couldn't find the reason for the loss of playback on the next cassette to be tested. I really must learn to be careful and logical like all those other chaps are . . .

Came the Day

Some outside calls to make. Mrs. Acorn was first.

"I'm on the third floor, this end. The lift's at the far end."

Might just as well nip up the stairs at this end rather than drag all the way along to the lift carrying this lot and then drag all the way back again once I get up there and repeat the process on the way back.

So we danced up the first flight and then up the next to the first floor. Nip smartly up the next flight and round up the next to the second floor. Funny, it says first floor on the board. The first two flights had been up to the ground floor . . . Plod up the next two flights to the second floor. The boxes now weighed a ton and my legs felt a bit rubbery. Stagger up the next flight

and then the final seven steps which seemed like seventy. It was worse than this when we climbed Everest the first time though. But not a lot worse. At least we (the boxes and I) arrived at No. 49.

Mrs. Acorn was the chatty, worrying type, always thinking up reasons for doom and disaster and discussing them at great length to no real purpose.

"The set's in here. Do you think it's finished? I've had it only a couple of years. It should last longer than that, shouldn't it? Doesn't seem fair. The vacuum cleaner was the same. It all happens at once, and I do miss the telly. Half way through Cross Roads. I'm frightened to touch it myself. Always have been afraid of electricity, but I don't suppose you are. Neither was my husband, and he's dead."

By this time I'd reached the set. A 20in. monochrome one with a solid wood case. Unfamiliar. Unitra. Oh dear.

Back off, juice on and present at h.t. points. No heaters alight. Where's the dropper? Swing down chassis. Thermistor and large wirewound behind the e.h.t. compartment, upper right side.

Wirewound intact. Chase along to PY800. Open-circuit. Should have been a PY88 (PY800 19V heater, PY88 30V heater). Fit new PY88.

Heaters now alight, hissy sound. Aerial out of wall socket. Insert plug. No better. Redress plugs at both ends. Sound clear, but no raster yet.

Narrow picture slowly expanding after extended wait. Lazy PL504. Fit new one. Full picture now, but expanding when brilliance advanced. DY802 e.h.t. rectifier glowing o.k., but suspect low emission. DY802 not a DY802 but an EY86, with four turns on the heater winding. Look in vain for an EY86. Refit old one and promise to return later with replacement.

"Can I use it? It won't blow up, will it? Perhaps I'd better not have it on, but it's all I have and I do want to see the World at One."

"It's all right Mrs. Acorn. It's just that the picture gets bigger when it's bright, and I'll be back later anyway to stop that caper."

"All right, I'll get my little radio out, and you can do that for me, as well when you come back, and perhaps you could have a quick look at the cleaner as well."

I fled.

Ekco, Ekco

They never come in singles, and it's a constant source of surprise that if you get a fault on one type of set the next one will be identical. After this you may go months before encountering the same fault again, even though the same type of set is met regularly but with different defects.

Next we had a 26in. Ekco colour set (Pye group hybrid chassis) which was a little too big for the customer to bring in. Symptom: sound, no picture. No valves heating. Whip out the PY500: open-circuit heater. Whip out the PL509: open-circuit heater. Check for shorts, none until PY500 refitted — it had a heater-cathode short of course, and since the PY500 is the second valve in the heater chain the first heater (PL509) is

also dealt a mortal blow. Extract new valves from spares box, fit, and ensure that all is well before departing. The following call required exactly the same performance, with the result that we are now out of PL504s and PY500s.

And of Course

The last call was a little way out in the sticks. Ringing the door bell produced a loud barking by way of response. The door was opened by a friendly lady and the largest Old English Sheepdog I have ever seen. As far as his face was concerned, all that could be seen other than fur was a black nose. His feet were the size of dinner plates. More like a Yeti than a dog. He was friendly though. Even though he had no tail to wag, his rear end sort of undulated to show his pleasure.

"Get out of the way Saxon, you big slob" said Mrs. Norman.

We made our way to where the sick set stood. A large Philips G6. I was suddenly aware of what was not in the spares box.

I put the tool box down and grappled with the G6 to move it out. At the same time Saxon decided to sit on the tool box and I think he looked at me although I couldn't be sure. I then had to grapple with him to get him off the box, and he thought this was great fun and was in no hurry to give up his seat. Eventually I grabbed the box and got out the 4BA nut spinner to remove the rear cover of the set. Saxon was a great help, and did his best to distribute all the tools on the floor just in case I needed them.

With the set on, all the valves glowed and there was h.t. to the top caps of the PL509 and PY500 but no pulse voltage, the PL509 remaining cool. Check its screen feed resistor. Easier said than done on these sets. It proved to be open-circuit. The spares were out in the van.

"I'm going out to get a couple of bits and pieces. Are you coming?" I asked Saxon. He didn't need second asking and was ahead of me to the front door. Out we went to get the wirewound and the iron. Saxon jumped into the van and settled down comfortably.

"Come out you daft bugger, we haven't repaired the set yet." He didn't argue, and amiably followed me back into the house.

Now putting a new wirewound under the PL509 and PY500 valve bases is no joke, and as I wasn't inclined to put the set on its side I had to adopt a rather uncomfortable posture in order to solder the thing in. The trouble was that Saxon wanted to see what was going on as well, which made our heads too close for comfort, particularly since his was twice the size of mine and took up far too much space. Mrs. Norman came to my aid and dragged away my helper.

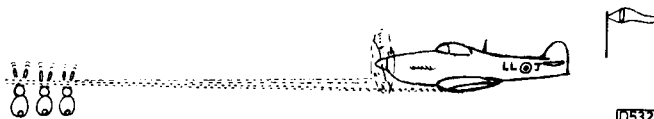
Eventually the resistor was in, and as there were no shorts present we tried the set, desperately hoping the PL509 was not going to play tricks. The resultant picture was quite pleasant, but rather soft and tinted due to the age of the tube precluding an accurate grey scale. I prepared to depart and the final pleasantries were being exchanged.

"The picture's gone off" said Mrs. Norman. Back to square one, with the wirewound overheating sufficient to melt the solder. The PL509 was faulty after all.

"Sorry Mrs. Norman, I'll have to pop back later. It needs something I had when I started out but haven't got now. See you later Saxon."

Visit from a Reader

Back at the ranch we had a few bits and pieces to clear up before we could return to the scene of the uncompleted jobs. I'd just accidentally managed to short the base and collector



A quick burst from the Brownings . . .

of a regulator transistor in a reel-to-reel tape recorder, thereby returning us to exactly the same condition as when we had started (worse, as we now had no MJE3055: the last one had been the last one), when a couple of very nice people came into the shop to make themselves known as regular readers (she as well as he). As I say they were very nice people, but there was one odd thing: he was wearing a fur collar, not her.

"We thought we'd pop in to say hullo and just to make sure that you really do have a dog and a cat that do funny things."

"Oh yes. They're here all right. There's Spock, and the nose round the corner is Ben."

At that moment I took another look at the fur collar and it yawned at me. It was a dog. "She was getting tired you see." The dog was elegantly draped around his neck and for all the world looked like a fur collar. What a lovely lot of daft readers we do have.

Came the Night

We had discharged our responsibilities to the letter, and had recharged our batteries at Harold's hostelry before retiring for the night, the better to slumber rather than lie fretting into the early hours . . .

It was a freezing cold morning as day dawned. The lone Swordfish stood, ungainly as ever, freshly loaded with its single torpedo, and only one occupant instead of three.

Lt.-Commander Prangham-Wright nodded to me briefly as I clambered up the lower port mainplane, the starting handle in my icy hand.

"The entire enemy fleet is proceeding up through the straits — two carriers, two battleships, four cruisers and ten destroyers. They must not be allowed to get through, or all is lost. Not one. I must press home my attack with the utmost despatch."

"But this is our last aircraft sir, and that's the last torpedo" I stammered, at a loss to see how he could sink the lot in one go.

"No one knows that better than I" said the intrepid naval officer. "I've had the armourers up all night specially hardening the warhead so that it'll penetrate anything up to nineteen ships and explode on impact with the last — just in case they have a supply ship tucked away. All I've got to do is to get 'em in line and dive the old stringbag at 100 knots at the first one and the lot will go down *wham!*" What a wonderful man. What ingenuity. What courage. No wonder he had the D.S.O. and scar.

"Right Les, wind her up and we'll get going."

Standing on the leading edge of the mainplane, I inserted the handle into the socket behind the engine and commenced the winding up process. Slowly my frozen hands rotated the handle to get the flywheel moving, then faster and ever faster until the flywheel was up to speed. "Switches on." "Switches on." I removed the handle and pulled the ring which would bring the spinning flywheel into marriage with the engine. Clatter, clatter, clatter. The big three-bladed airscrew turned and stopped as the engine coughed and died.

"You bloody fool, you didn't get her up to speed. Do it again" bawled Prangham-Wright. "And this time put some backbone into it."

Warily I reinserted the handle, and with aching muscles started to wind her up again. Faster and faster, faster and faster. The flywheel was screaming, screaming . . .

Midsummer Madness

Les Lawry-Johns

I WAS busy making out a list of spares needed to top up the shelves, making sure to get the order code right for each item and frightening myself thinking of the probable cost, when this young lady walked in.

"We're doing a survey of small radio, television and electrical businesses, and I wondered whether you'd mind answering a few questions?"

"Not at all my dear. Fire away. I bet a pretty girl like you has to answer a few questions herself in the course of a day or, er, oh well, carry on."

So the questions came thick and fast. What type of appliances do we sell? What brands? Which sell best? What percentage of our turnover is the result of sales as opposed to service, and so on. Then came the question which stopped me dead in my tracks.

"Would you say you're slack in the summer?"

I looked at her for quite some time, gravely pondering the question and a suitable answer, during which time her face became bright pink.

"I wouldn't say we are more slack in the summer than in the winter, but. . . ." At that moment my beloved's voice floated down the stairs.

"He's slack all the year round, don't let him fool you."

Seeing that she had an ally, the young lady regained her composure and put a tick against No Slack Period.

The rest of the questions were dealt with without embarrassment, and she departed in good spirits.

Hardly had she gone when another female appeared, carrying an orange Indesit T12LGB, orange apparently being the favoured colour for these popular portables.

Apparently it had failed altogether, but prior to this it had suffered from intermittent loss of signals, the screen remaining bright but blank. The cause of the non-operation wasn't too difficult to trace, since the voltages appeared low (not absent) – the 15V line was only about 7V. Since there was no sign of overheating we suspected an open-circuit electrolytic and were inclined to pounce on C902 (see Fig. 1). It wasn't until R908 was bridged however that the whole thing came alive (the low voltages had been due to the start-up circuit). A new 620Ω, 18W resistor was fitted and a

nice picture was obtained with a piece of wire stuck in the 300Ω aerial input (too lazy to fit the 75Ω adaptor).

This didn't last long however. The sound and vision signals then suddenly cut out, leaving a bright screen. We spent some time checking through the i.f. stages, getting nowhere because we hadn't studied the circuit of this and had assumed that the collectors are fed from a positive rail with the emitters returned to chassis. Close inspection revealed that there should be a –11V negative rail as well, for the emitters, and that this was absent. Switching the set off and then on again after a brief period restored the signals, and the negative voltages were present. These vanished quickly, so we were left to find out where they went.

Their source proved to be the line output transformer, negative-going pulses being rectified by D909 to provide the negative line. When D909 was sprayed with freezer it obligingly came to life, as did the i.f. strip. A new diode put a stop to these pranks and the Indesit settled down nicely. For a while.

It then again cut out completely, and investigation showed that the voltage on C904 was sky high, with nothing on the collector of the pump transistor TR902. This time R909 (27Ω, 5W) had become open-circuit. R909 and R908 (on the lower centre heatsink) are both suspect on this chassis, and even if they are not faulty it's prudent to check their contacts as these tend to corrode over a period.

Double Filter

We've had a few all solid-state Bush monochrome sets in lately (Model TV309 etc., A816 chassis) with varying troubles. One in particular is worth mentioning, to save a few minutes for our all too busy readers.

Dick Dix brought one in the other day with a shattered supply fuse.

"Won't take a minute Dick, it's bound to be the mains filter capacitor."

The fuse is on the control panel, together with a hefty 0.47μF 1kV filter capacitor. There was a dead short across the capacitor, so out came the panel and off came the capacitor – only to find that the capacitor was in mint condition and that the short was still across where the capacitor had been.

The mains leads go from this panel over to the right side of the main board, and there of course resides 3C67 which is an 0.1μF 600V type of the more suspect kind. This was the culprit, and it was speedily replaced with a more reliable one of 1kV working.

It was then necessary to refit the front control panel which needn't have been removed in the first place. Next time we'll swing out the main panel first and check the 0.1μF capacitor instead of wasting time on the control panel. If I remember, that is.

While this was going on, Dick was practicing his deplorable French on the cat. "Ze cat sat on ze mat" he pronounced slowly and with perfect diction. Spock was clearly not impressed. She stretched out one leg and yawned.

"Wait a minute Dick" I said helpfully. "Shouldn't it be Ze cat zat on ze mat?" Dick looked thoughtful and was about to try again when my beloved came on the scene (she never misses any conversation that's going on, even if she's ten miles away and it's whispered).

"Neither of you have the slightest idea of you're own language never mind French. Anyone knows it's, La cad, sad on la mad."

We both looked at her with renewed respect.

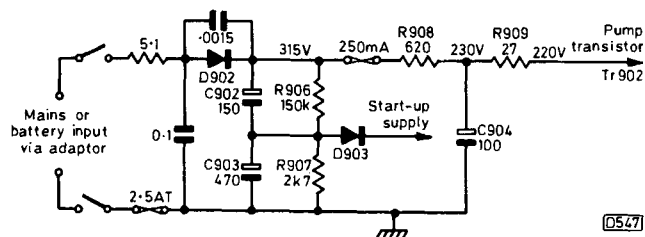


Fig. 1: Mains input/h.t. rectifier circuit used in the Indesit T12LGB portable. R909 is a fusible type in later production. A problem we've had on occasion is the h.t. filter capacitor C904 going open-circuit: the symptoms are a small picture after a slow tube warm up, with the l.t. line low at about 7.5V. R906/7 provide a 5-8V start-up supply to get the line oscillator going.

"Tray bong" she said and vanished as quickly as she had come.

"Well I never" said Dick, "Well I never".

Seeing me refitting the rear cover of the Bush, his thoughts came back to the job in hand.

"Was it what you thought it was?"

"Well, yes and no really. About six months ago, a chap brought one of these in for the same thing. I thought it was on the control panel and took it out only to find it was over the other side after all, and I've just done the same thing."

Dick shook his head in awe.

"You must have a mind like a computer. It's a pity you can't put it down on paper like some people do."

Laura Lovett's Dicey Decca

When Laura phoned to say she had frame collapse I was ringing her bell before she had put the phone down. After all, Laura's frame was not a thing to be taken lightly and if aid was needed mine would be first. As soon as she answered the door I could see that it was not her frame that had collapsed. It was just as I remembered it from last week, when she kept getting red.

"Sorry to bother you again so soon. It's getting naughty lately isn't it?"

"The neighbours will start talking if I keep on popping in like this" I suggested. . . .

"Oh, I don't think there's much fear of that. Not with you anyway. Now if it was that young telephone engineer, they'd have grounds to talk."

I never did like Laura very much really, and I could feel in my bones that this was going to be a more expensive repair than when she went red which was only a faulty green output transistor. These women needn't think they can twist me round their little finger like they can some of these telephone louts.

It was a Bradford chassis with valved timebases. I switched it on and within a short time the picture came up as right as ninepence.

"Oh dear" said Mrs. Lovitt, and went red. "I hope I haven't got you here on a wild goose chase. It really did go down to some lines across the middle, honestly it did."

"It's probably a touch of the tantrums" I diagnosed with knowing nod.

"I think it's wonderful the way you engineers can put your finger on it right away."

"Some of us are better at it than others" I admitted. So off came the back cover. Tap the PL508.

"That's it" she said excitedly.

Off set, out PL508, in with another, switch on.

"Still the same."

"You have to give it time to warm up, it's no good rushing things." We gave it time but it didn't open up so I tapped it and it did. Moving the PL508 produced the same performance, so I had to conclude that we had a poor contact on the print side of the panel. Set off, remove panel plugs, release the top three clips and remove panel.

Taking my glasses off so that I could see properly, I peered at the panel in the vicinity of the PL508's base and immediately spotted the poor contact.

I remembered from last time that the nearest mains socket was nowhere near the set. Actually the nearest socket was in the bedroom (believe it or not), through a sliding door in the wall where the TV lived. "Can I go through and plug the iron in?"

"I'll put it in for you, you had trouble finding it last time."

(Editor's note. We had better condense the rest of this

story. Suffice it to say that the job was completed to everyone's satisfaction.)

Meanwhile

I was feeling a little fragile when I got back to base, and was not at all in the mood to tackle Mr. Gagg's G8 which, according to him, had nothing wrong with it really. It was just that it kept jittering from time to time, changed colour once or twice an hour, while the picture would become grainy on the odd occasion.

"It's four o'clock now" said Mr. Gagg. "Shall I call back at 5?"

"Make it 5.30 and bring twenty quid with you. You might get some change, but don't bank on it".

"What could be wrong to cost all that money this time?"

"I'm not sure, but the jittering could be a faulty thyristor, the changing colour a duff BF337 transistor, and the grainy picture could be a tuner unit fault which could mean an exchange tuner unit as they are difficult to repair – for me anyway."

"Good Lord, I didn't think it would come to all that. Last time when it packed up altogether it cost me only a few pounds, yet this time when it's still working it's going to cost a lot more. Funny."

"Not really funny Mr. Gagg. Last time it was just that long black thing with tags on it, and they don't cost very much. Anyway, I might not have to replace the tuner unit, but if you definitely want it ready by 5.30 the chances are I will".

"Well that bit of it's not too bad. Just do the jittery picture and the change of colour. That'll make it easy for you won't it?"

"Thanks Mr. Gagg, we'll do just those bits then. See you later."

As soon as he had gone, the landlord from one of the local pubs popped in carrying a radio-cassette deck (Sony stereo) which had apparently drunk (unwillingly) a pint of bitter and a glass of sherry. By its appearance, it had absorbed considerably more than this.

"Don't you keep it covered?"

"Are you supposed to?"

Believe it or not, he wanted it for six o'clock that evening.

As he was going, in came a lady from over the way.

"I am fed up with buying two 996 batteries at a time, at over a pound, for this radio. Can you fix me up with a mains adaptor? I'll be back when I've done some shopping."

Incredibly, she was followed by a chap with a Philips battery operated record player.

"Can you fix me up with a mains unit? I'm fed up with buying six SP2 cells at 17p a time."

Oh dear, I thought. I wish I hadn't lingered at Laura's. After all it was only a dry-joint that had been troubling her.

I really was out of favour with the Gods that day, because the 'phone rang and it just had to be her.

"My frame's all wobbly and I'm afraid it will fall. You must have left it loose." I swear I hadn't touched the frame on which the set stood. It just rolled out and back on its casters and seemed firm enough. Can't argue though.

"O.K. I'll shoot over as soon as I shut the shop."

"What was that all about?" asked my little sun flower who had just finished putting little crosses all over a picture of a football pitch.

"I've got to go out again when we shut the shop. Laura Lovitt's legs are loose. Er, I mean her frame feels fragile. Er, oh I don't know, I'm proper fed up. I wish I was a telephone engineer."

All Slog and No Grog...

Les Lawry-Johns

THERE'S absolutely no rest for us busy boys lately. Even when we finish you can bet your life some joker will spoil your pint with "I don't want to bother you, but...". You escape from that and settle down at home with a bite to eat and a quick glimpse of the telly before bedtime and the thing changes channels all on its own. So you give up and go to bed and dream about sets that won't go right or women that won't go wrong or something. Look at yesterday for instance. It started with colourless sets.

First an 8500 (Ferguson) with the complaint that the colour had been intermittent but had now gone beyond recall.

Dealing with Lack of Colour

I suppose we all have our own pet ways of making a start when tackling faults that can have various possible causes. I always like to start on this one by proving the presence of timing pulses from the line output stage. These are applied to connection 3/2 on the decoder panel on the 8000 series chassis, and can be measured at TP9 in the burst gate circuit. Finding little activity here we nipped smartly over to the timebase panel and had a look at TP28, which again was lifeless. It was a short step from here to R404 (33k Ω) which was found to be open-circuit.

Nice going we thought. Keep it up and we might regain some of our lost confidence which has taken a bashing lately due to persistent wrong diagnoses, er diagnostics, er, jumping to the wrong conclusions, with the consequent hours lost plodding toward the right conclusions.

And the Next Gent Please

Of course the next case just had to be loss of colour again. Apparently Mr. Earlybirth had had a spot of trouble with his Philips G8 of late, and was dissatisfied with the service he had received from the original suppliers of the set. He produced massive repair bills to prove it. Horrific would perhaps be a better word. Since the last one was very recent and was incurred in the quest for lost colour, I suggested that he returned the set to the repairers for their approbation. "I'm too scared" he said. "It'll probably be a hundred quid this time." I couldn't quite see how this could happen, but as he was clearly adamant about not going back with it I didn't press the point further.

"O.K. Mr. Earlybirth, leave your phone number and we'll ring you when it's sorted out."

Clearly this was one to approach with caution. It was one of the separate panel type, and it was obvious that some work had been done on both the signal and the decoder panels.

So we decided to cut across the usual routine and fit a known good decoder panel which we just happened to have lying around. With this in there was still no colour, so we did something daft. We refitted the original panel and then checked for the positive and negative pulses at pins 8 and 1 respectively at the rear edge connector. The negative pulses were there but there was no joy at pin 8 (TP39). So over we went to the timebase (line scan) unit and checked at pin 1 of

plug U. Nothing here so follow the track along to R576 (4.7 Ω , or 4R7 if you like that better). It didn't look well, and indeed proved to be open-circuit. A replacement of the same small wattage did not overheat, and the positive pulses were now present on my little diode probe.

Sadly however there was still no colour (and I hadn't left the colour control turned down like I did on that one some time ago, chasing all over the place before I realized it).

So out came the decoder panel again and in went the test one. Full colour. Suspecting hanky-panky, we looked with care at the removed panel. The core of the reference oscillator coil looked decidedly out of place, whilst all the other cores were still sealed. So back went the panel and careful adjustment to the suspect core restored almost normal results except that the grey scale was out and the picture was too bright with the brightness right down.

Resetting the blue d.c. level control R297 restored normal brightness, and a touch up on the green and red level controls restored the grey scale to very nearly perfect. All that remained was to converge the set. This was easier said than done, since R1933 on the convergence panel had seen better days. A new 10 Ω potentiometer put this right, and we were quite pleased with the result.

"Mr. Earlybirth. Your set's ready. Bring a couple of hundred quid with you, ha, ha."

It was a bit premature really because I suddenly became aware that there was no sound when I turned it up to hear what the tennis scores were (I can't read).

The rear cover had to come off again, and the sound returned on its own. This proved to be nothing more than a poor contact on the audio plug, so we weren't all that upset.

Put the back on again, having wangled the control knobs through, and that was that. We didn't really sting him. He got change from three fivers, and was happy.

Only No Sound

"Not a lot wrong" he said. "Not a lot. Just no sound." As this was an ITT CVC5, it came as no surprise and of course we made straight for the PCL86. Giving it a quick clout with a screwdriver handle restored the sound with a sharp crack. In went a new valve and we waited for the sound to burst forth. It didn't. Applying the voltmeter, we found rather more h.t. than we expected. Not too much voltage you understand, but what there was was in too many places.

As usual, my mind went completely blank. I knew I should have h.t. on pin 6, the output pentode anode, but I couldn't remember what pin the screen grid voltage should be on. So we had 200V on pins 6, 8 and 3, and 100V on pin 9. Looking it up, we should have had 200V on pins 6 and 3, but pin 8 was the control grid. Not to be bothered with niceties, the valve was whipped out and the voltage on pin 8 vanished. Another duff new valve, but what had happened to the cathode bias resistor? Nothing apparently. It still read 120 Ω and the 50 μ F decoupler was also in one piece. Another new valve restored the sound.

"While you're at it" said Mr. Ratchet (christian name I presumed was Paul, as it said P on the job sheet), "you

thing goes off will knock you back a hundred knots, so you must go in at two hundred to avoid stalling.

We know your reputation for missing the target every time Thompson, but this time you mustn't miss. All the other pilots have shot themselves down."

Sub-Lt. Thompson,
Second in command,
Couldn't find the target,
Too much bloody sand.
He dropped all his bombs out in the blue,
Too bloody true, and so would you.
If you had seen Benghazi,
If you had seen B.G.

So off went our hero, out into the blue, flying the Hurricane burdened with the enormous gun.

Approaching Benghazi, he could see the distant speck of the three-engined Ju 52 out over the Med. He could see other flying things as well. Large birds called Shite Hawks, wheeling about the sky, hungry for prey. Peculiar birds. The only ones that fly in herds. Lots of cows and only one big bull. He was so wrapped up in what was before him that he didn't see what was behind. An Italian Macchi 42 was slowly coming up astern.

The Ju 52 came lumbering in over the coast line as our Subby closed in to attack. He could plainly see the corrugated side of the big jerry transport looming large.

Before he could get into the firing position, he saw the transport dropping its secret cargo. Hundreds of cones falling, each with their little parachute. Cornets from the toe of Italy. So that was it. Cornettoes. What a devilish scheme, seeing that allied troops held Benghazi at the moment.

They bomb Benghazi every night,
And when they're not,
They're getting tight.

He fired his mighty gun. Crash it went. Bash came the recoil, and the Hurricane practically stood still. Unfortunately, the Macchi had closed up for the kill and couldn't avoid hitting the Hurricane. Bang, they went.

The impact shot Subby Thompson clean out of his cockpit, and he'd forgotten his parachute. Whizz he went, through the crisp North African air. The big Shite Hawk saw his chance and moved in, grasping Subby firmly in his enormous talons. The 70mm. shell tore into the Ju 52 and down it went. Boom. The tangled mass of the Hurricane and the Macchi spiralled into the sea off the coast. Leaving our hero suspended as usual by Bull Shite.

Footnote to a Previous Epic

Footnote to the saga of Lt-Commander Pragham-Wright who attacked the whole Italian 7th fleet in the Straits of Messina (see July issue).

Nineteen ships were sunk that day by one torpedo. The twentieth ship was rammed by the lone Swordfish, whose pilot was heard to shout just before impact "one more for the pot."

We've had several enquiries, you see.

NEW TELEPART CATALOGUE

The new 152-page Telepart trade catalogue, listing over 5,000 items, is now available from Willow Vale Electronics Ltd., Old Hall Works, Arborfield Road, Shinfield, Reading, Berks. (Telephone: Reading (0734) 884444.)

next month in

TELEVISION

● COLOUR RECEIVER OPTIONS

Most constructors who embarked on the colour receiver project we started a year ago should by now either be receiving pictures on their set or be very close to finishing construction of the basic receiver.

Next month we start on the various options mentioned earlier in the series, starting with the addition of teletext reception facilities. For this purpose the Texas Instruments XM11 teletext decoder module is used, together with a very simple interface board and an inexpensive cable linked keypad. This approach provides the simplest possible solution to the provision of teletext, and the whole thing can be built and working within a matter of hours.

In subsequent issues we will describe how to add remote control to the basic receiver: this will be followed by the ultimate option, the addition of teletext and remote control – the remote control system operating both the receiver controls and the teletext functions. This last option will enable constructors to build a receiver which compares favourably with up-market commercial sets.

● SECAM COLOUR

Following our feature on receiving French TV this month, we thought it would be a good idea to take a look at the way in which the French colour system (SECAM) works. Keith Cummins describes the system, its pros and cons, and reports on his observations of the results off-screen.

● TACKLING MAINS/BATTERY PORTABLES

With their need to be able to operate from a 12V supply as well as the mains, portables present their own problems. A dead set can be a very dead one indeed – no signs of life at all. John Law describes how to tackle this sort of problem, with particular reference to the Thorn 1590/1591 chassis.

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By using this circuit, the size of the complete reactivator can be reduced quite considerably – the one I've built fits into a plastic box measuring only $2 \times 3 \times 3\frac{1}{2}$ in. A piece of equipment this size will fit easily into a standard tool box of course.

C.S. Wood, Ossett, West Yorkshire.

AMATEUR TV

Perhaps you would bring to the notice of your readers the amateur TV fraternity in Britain, represented by the British Amateur TV Club?

Amateur TV pictures are transmitted on 436.5MHz, using mainly 625-line negative modulation. For reception, a fairly common system is to use an ELC1043 tuner with 2pF capacitors added across the varicap diodes and the tuning lines pressed closer together to increase the sensitivity, feeding the output to the Band I tuner of a dual-standard set. Using 10V of peak r.f. power, TV pictures can be received at 10-15 miles with this receiver system.

If any of your readers in the Reading, Berks area are interested in amateur TV, a demonstration could be given.

I wonder whether any readers know of any circuits for improving the line sync with weak signals, as this seems to be a major cause of picture degradation?

Amateur TV pictures can be transmitted using a class "B" amateur radio licence. For further details, write to the Radio Society of Great Britain, Gt. Doughty St., London. *Steve James (G8LCL), 21 Lind Close, Earley, Reading, Berks.*

Editorial comment: We're only too pleased to draw readers' attention to the BATC. For membership details, write (enclosing s.a.e.) to Brian Summers (G8GQS), 13 Church St., Gainsborough, Lincs. Telephone Gainsborough 3940. Several of our regular contributors are members of the BATC incidentally. We don't generally give much attention to amateur TV activities in this magazine for the simple reason that the BATC has its own quarterly journal which covers the field thoroughly.

Up the Family Tree

Les Lawry-Johns

I WAS busy wondering what to do when a vaguely familiar figure walked through the front door (she didn't bother to open it). "Hallo Leslie" she boomed. It was auntie Tessa. A formidable figure and an ex-hospital matron, so you didn't fool around with Tessa. "Hallo Tessa, how nice to see you after all this time. You do look well. How is uncle Ben?"

"Oh dear" said Tessa. "I thought we'd informed everyone. He passed on in June. Fancy you not knowing."

"I am sorry Tessa, you must miss him terribly. Mind you he'd done well. Must have been about eighty or so I'd have thought."

"He was eighty four, and I'm seventy now you know."

"Well I never, I would never had thought it" I ventured.

"What about you? Must be knocking on a bit yourself, though you don't look it. How do you manage to stay the same?"

"Well, it's easy really" I said modestly. "I always put my socks on standing up you see." (The magazine cannot accept responsibility for the consequences of following this advice. I tried it – Editor.)

So we exchanged other pleasantries and Tessa departed, being only on a flying visit and having to see other relatives before bouncing off back to Barnstable.

When she had gone, I pondered upon the passing of uncle Ben. He was the last of four sons and one daughter (my mum). All had been characters in their own right. For example, uncle Jeff had no time for dentists. He would have his tooth ache like most other folk, but his solution was to have a drink (more than usual) and pull the molar out with a pair of pliers, swearing and cussing everything and everybody in the painful process. Uncle Fred solved his problems with an open razor, whilst Uncle John was the bravest of all. He married aunt Lil.

It was Grandad who towered over all though. Albeit small in stature, his heavy black beard and uniform stamped him as the pirate he was at heart. Earlier he'd been first

mate of a two-funnelled winkle barge; later he became the skipper of a ferry boat, and for many years had criss crossed the Thames on the ferryboat Rose. He was sometimes on Edith, to the intense annoyance of his wife Matilda.

Navigating Techniques

His one deep secret was his failing eyesight. In short, he couldn't see, which was somewhat of a drawback since the Thames at that time was an extremely busy waterway. We concluded however that he had his own method of navigation which did not require good sight, because he had a wonderful record of accident free crossings. This he shared with his opposite number skipper, old Jewiss, who by chance was the Grandad of my friend Ernie (landlord of a pub if you remember from a previous article). Accident free that is until one night Grandad hit the Tilbury landing stage an almighty thump which shook the Rose from stem to stern and didn't do the landing stage much good either, not to mention the passengers who were convinced that they were about to meet their maker while most were totally unprepared to do so.

Grandad said it was foggy at the time, which seems a pretty poor excuse if you can't see anyway. The upshot was that he had to have a medical and parted company with Rose (and Edith).

Uncle Jeff said it was a pretty poor show, and it was obvious that the medical examiner didn't know what he was talking about as none of them did. Grandad retired, and mum had to go across the road to get his beer for him because it was dangerous for him to cross the road, not being able to see and all that.

All this was a few years ago now so I don't suppose it's of any real interest to you. I just thought I'd let you know I had a grandad (two as a matter of fact) that I can still brag

about, even if Ernie reckons his grandad was a better ferryboat man than mine.

From Russia with Love

We are getting a bit choosy in our old age about which sets we take on for repair. For example, we are not keen on tackling Rigonda portables. So when one is brought in we immediately think who we can unload it on to.

Two came in last week, and we suggested to both owners that they should take them to someone who kept the spares. For example our friend Geoff who has a shop in Moon Lane.

Within the hour Geoff was on the phone.

"Do you happen to have service sheets on these little Rigonda portables Les? Some rotten bugger told them to bring 'em to me". The penny dropped. "It wasn't you was it?"

"No Geoff. I wouldn't do that to you, you know that. As it happens I do have the sheets. Funny regulator in them Geoff, sort of like an AD149 with three legs. See you when you pop down old mate".

I mean, what are friends for? What's the point in getting older if you don't get crafty with it.

Another Portable

I got my come uppance with the next portable though. It was a Ferguson 3840, with the 1690 chassis, and was wanted for five o'clock that afternoon as it was shared by the crew of a tug and they were going on at six and expected a quiet night.

The regulated line was a bit high, because the line output stage wasn't drawing any current. The efficiency diode was intact and read right. The supply was present at the collector of the line output transistor, and this made us feel uncomfortable. Not because the voltage was there and the transistor wasn't functioning, but because it was a T6006V (BU407) and we didn't have one.

We consoled ourselves by thinking that maybe it wasn't being turned on by the preceding driver or oscillator. With the solder removed from the base and emitter it seemed perfectly good on the ohmmeter. So we checked for line drive when it was resoldered. There wasn't any (should be $-0.3V$ base to emitter). Checks showed that the line oscillator was functioning and that line drive was present at the collector of the driver transistor, though damped. "Ah ha" we exclaimed as we leapt to the wrong conclusion once again. C86 could be leaky ($0.01\mu F$ damping capacitor in series with the 82Ω resistor R89 from the collector to chassis). It wasn't.

"Oh dear, not the transformer" we panicked.

"Don't be daft, it can't be the driver transformer because we haven't got one." The logic of this was beyond question, but. "We haven't got a BU407 either."

What are friends for? Frantic phone round. "Sorry Les." "Sorry uncle Les." "Sorry Lawry."

Alone again. Up the creek without a whore, er oar, er, paddle. Are we to be defeated? Don't answer that.

Make a conclusive test. That's it. What have we got? Lot's of line output transistors for the bigger stuff. Disconnect the BU407 and hook up an R2008A. Why not?

Instant success. Nice raster and the right sized picture with the aerial in. No heatsink though, and the R2008 was running pretty warm. Decide to improvise one rather than drill the existing one which also carries the regulator transistor. The correct transistor can then be fitted as soon as we get it.

So there it was with two heatsinks for the next couple of days. It worked well. I wonder if the new BU407 will last as long as the R2008 would have done if we had left it in? We'll let you know in due course.

A Lesson Here Somewhere

Enter a local engineer. "Hey Les, you don't happen to have an Indesit T24 line output transformer do you?"

I had one. "I've got one left. Let me have the replacement as soon as you get it will you?"

"I'd rather pay for this one if you don't mind."

"Oh, all right then."

One hour later. "Can you fix our Indesit? There's smoke coming from where the metal box is." Frantic phone calls. "Sorry Les." "Sorry uncle Les." Phone suppliers. "Certainly, we'll put a couple in the post for you. You should get them in a couple of days".

Enter an Anxious Man

"I borrowed this set from my sister because our colour set went up in smoke. The picture went off after a few minutes however. She says it's down to me because she spent twenty odd quid on it only a couple of months ago, so it shouldn't have gone wrong again and it must be me."

I had a sinking feeling that this was going to be awkward. It was a Philips G24T300 or something. You know the one, single-standard version of the 210 series chassis.

"It could be the line output transformer."

"That's what she had replaced."

"Oh well, it shouldn't be that then, should it?"

It shouldn't have been, but it was. The line output transformer was obviously fairly new, but a bit more than a couple of months I would have thought.

I told him that these things are guaranteed and that he should get his sister to contact the person who had fitted it. He looked scared. "Can I use your phone?"

Although I was six feet away I heard the reason why he looked scared. He put the phone down with a shaking hand.

"My sister wants her set back tonight and it had better be in going order." It was a shame to see such a big man reduced to jelly.

So I put him in my last 210 line output transformer and charged him only what it cost me. Away he went, confidence restored, fit to fight another day. Funny how women frighten us isn't it?

Of course, only two seconds later in comes a Philips 210 which wanted a line output transformer and no one around had one. This sort of thing used to happen with triplers until those darling people at Anglia Components brought out their universal tripler unit which has made life a lot easier. Now that we are well armed, tripler trouble seems to be less frequent than it was . . . Wouldn't it be nice if there was a universal line output transformer?

A Lovely One

The next set to come our way was yet another Philips one, a 24in. monochrome set fitted with the 320 chassis. It had a really lovely (?) fault. Now as you know this is the all solid-state chassis, with a bridge rectifier feeding a thyristor which provides a regulated h.t. supply of about 160V for the line timebase and the video output stage. As you probably also know, the regulated power supply doesn't deliver its full output until the line timebase starts up and in consequence the 34V line appears. If the line output stage is not working

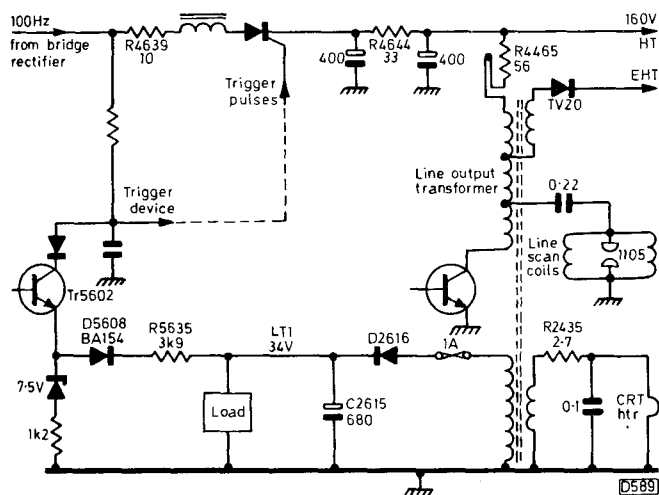


Fig. 1: Simplified circuitry showing the interconnections between the power supplies and the line output stage in the Philips 320 solid-state monochrome chassis.

or the 34V line is not intact, the h.t. line drops to below 100V (see Fig. 1).

We found the h.t. line was at 100V, with the 10Ω surge limiting resistor R4639 and the 33Ω smoothing resistor R4644 running too warm for comfort. The 34V supply was practically non-existent at the fuse for that line – fuse was intact, with virtually no current passing – and we thought that the line output stage was inoperative. In fact it was operating however, and a spark could be drawn from the exposed cone of the e.h.t. stick. This meant that the stick itself was o.k. and the line output stage functioning, but not well enough to produce the 34V line. Together with the excess h.t. current (overheating R4639 and R4644) this suggested an overload on the line output stage, but not one sufficiently severe to open the 56Ω spring resistor R4465 which supplies it.

We spent some while bumbling around until we finally unhooked the line scan coils. Immediately there was a vicious spark from the d.c. end of the e.h.t. stick, through the plastic housing. Off went the set, and we turned our attention to the scan coils – to be immediately burnt by the small spark gap (1105) wired across the line tags. Removing this and reconnecting the coils, we set the h.t. regulator to minimum and then turned on again. Everything now functioned, but not very well of course as the supply was low.

Turning up the control with a meter on the h.t. test point, we achieved 155V before the e.h.t. cracked over from the stick base. Inserting another layer of plastic solved this one, and we were then able to get full size and enough heater glow to provide a respectable picture.

Another spark gap was fitted across the coils, and the set seemed to function well enough except for a rather subdued tube heater glow which resulted in a slightly extended warm up time. The series resistor R2435 was correct at 2.7Ω, and since the heater supply winding is on the line output transformer and the rest of the line timebase functioned well we did not pursue the point, having already spent a lot of time chasing the shorted spark gap.

It was not the end of the story though, since we'd been testing on one channel selector only. When the others were checked, we found that three of the six were inoperative.

Since these were the top three we opened up the unit (Philips six-latch type, as used on the G8) and found the top plastic broken away on three of the selector strips. The top latches act on the top loop of each strip only, the lower three engaging in the loop half way down. So it was possible

to interchange the strips and render all latches fully operative and tunable.

A Bout with the Baron

I do wish people would keep their mouths shut. They've only to mention something to me and I'm blown if I don't go and dream about it. Someone was having a go at me recently because I wrote about my dreams of World War II. "Well I never" they said, sarky like. "I'd have thought at your age the first World War would have been nearer the mark". Not being quick thinking, I couldn't conjure up a suitably cutting reply. So I just drunk my beer and said nowt. But come night time I had a very queer dream.

There we were on an advanced airfield in France, lovingly tending my Sopwith Camel. Fred, Reg and me. And while we worked we sang our favourite song:

Four and twenty virgins
Came down from Inverness
And when the ball was over
There were four and twenty less.

Suddenly our song was cut short, as a speck in the sky grew larger and zoomed over our field. It was a red Fokker D8 triplane, almost certainly flown by the dreaded Prussian aristocrat Baron Von Poorhoven. He seemed to throw his hand down at us before roaring away – not even attempting to shoot us up.

We ran over to the hand and found it to be a gauntlet with a note attached. It read: "up your soppo Camel." It was a challenge not to be ignored. So we prepared our trusty aeroplane and filled it full of this that and the other, singing away with renewed vigour:

The village butcher he was there
Chopper in his hand
He swung his chopper round and round
And circumscribed the band.

Fred fitted and Reg rigged. Fred finely fiddled the engine until it sung a sweet song, and Reg rigged the airframe until the flying wires could be played like a harp. Perfection was the aim and perfection we achieved that day in Flanders. I donned my Didcot and helmet and wrote my note with care.

"Up your Fokker triplane" on one side, "0500 Somme" on the other.

I took off and skimmed across the trenches, ignoring the ground fire, but was slightly worried about Big Bertha lobbing shells toward Paris as I gained height for my run in at high speed across the Baron's field. I saw him standing there, looking upwards as I zoomed in, a mocking look upon his face. His scarf billowed out in the breeze, the red a bright contrast to the green field and perhaps an omen of what was to come . . . Blood.

Red and green, red and green. The blue was missing. I had to find why the blue was absent and it had to be done by five o'clock or Mr. Forth would make me paint his bridge again. I leapt out of bed. It was 4.30.

"What on earth are you up to now?" enquired my ever considerate prairie cactus.

"I've got to fight the Red Baron at 0500 and the blue's missing and, and . . ."

"What did I ever do to deserve you? It must have been something bad. Fight the Red Baron! He'd have to catch you first. Get back in bed and try not to snore and jump about."

I crept back in bed and lay there quietly while she snored and jumped about. Probably dreaming about mixing up two Yorkshires at once. These women have no imagination . . .

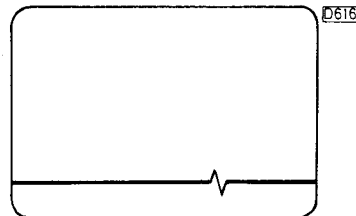
flywheel sync/line oscillator circuits were replaced, but the fault persisted. I then decided to take a look at the sync separator circuit, which is on the i.f. panel. It turned out that the high-value ($4.7\text{M}\Omega$) bias resistor R33 between the base of the sync separator transistor and the 205V line had gone open-circuit.

The other fault was on a Thorn 1500 chassis which displayed a perfect picture except that approximately two inches from the bottom of the raster two or three lines were paired, with a peculiar small kink which looked like a triangular pulse about three-quarters of the way along the paired lines (see Fig. 4). The culprit turned out to be C37 ($64\mu\text{F}$) which couples the video signal to the base of the video output transistor. It seemed all right on test however, charging up perfectly via an Avo 8 on the times 100 range – a nice, smooth steady climb to $10\text{M}\Omega$ or thereabouts.

D. Hewitt,
Havant, Hants.

Editorial note: The high-value resistor is included in the sync separator's base circuit to ensure that it's driven to saturation by the sync pulses. The trouble given by the video coupling electrolytic capacitor could possibly be due

Fig. 4: Unusual fault condition experienced on the Thorn 1500 chassis. Linearity otherwise perfect.



to its inductance – or has anyone any other ideas on this one?

PYE SOLID-STATE COLOUR CHASSIS

Further to Mike Phelan's comments on the Pye large-screen solid-state colour chassis (731 etc.), I've found that a leaky field output transistor (VT688) can cause a very rapid reduction of the scan down to two-three inches, with a linear scan. If the field scan reduces in this way, check the field output transistor's heatsink: if the temperature is high, the transistor is suspect.

S. J. Humphreys,
Welwyn, Herts.

Don't Ask Why

Les Lawry-Johns

WHEN women start asking questions, they never stop. Take the other night for instance.

"Why is it warmer in the summer than in the winter?"

Now I'm not going to be taken in by a simple question like that. There just has to be something behind it. But I thought I'd play along.

"Because the earth tilts and we see more of the sun up this end. In other words, it comes up earlier and goes down later and they see less of it down South America way, until it's our winter and then it's their turn to see more of it and we see less, you see."

"When do we start seeing less of it?"

"Oh about the middle of June or something – you know, the longest day."

"Well, if we see less of it after that, why does it always seem warmer two months later, in August?"

"Er, well, you see, by then the sun has warmed up the places which were cold when it arrived. So whichever way the wind blows, it's always warm until these places start cooling down again. Say in September, when it starts getting a bit nippy. Something to do with Arctic Terns so they say."

"So the best time to buy a new coat is in the Autumn then, say about now?" I might have known. So I thought it was my turn to ask silly questions and during the day, instead of concentrating on the work, I was trying to dream up something daft.

It's All Yellow

It was a Thorn 8500 chassis with the complaint of "previously changing colours, now all yellow" (i.e. no blue). So naturally we leapt at the blue output stage to see whether the voltages there could tell us anything. They couldn't. The base, emitter and collector readings were more like those in

the red and green stages than they were themselves . . . well, you know what I mean. They couldn't be faulted. So we leapt where we should have leapt in the first place, to the tube base, and checked the first anodes. If anything, the blue first anode was slightly higher than the other two. Check the cathodes we said, and did. Instead of being high, the blue cathode voltage was slightly low, which should have meant more blue on the screen.

My mistake of course was not looking in the mirror when I took the readings. But I had my glasses off to peer closely at the meter, and when I put them back on to look up the test prod was no longer on the blue cathode.

To my befuddled mind it now seemed that the tube had lost emission on the blue gun, so I bugged on the tube tester. Not too good it said, but not too bad either. About the same as the green and red guns. What more do you want?

I was rapidly getting fed up, and when my honey bunny asked what I wanted for lunch I snapped nastily "a turkey egg".

This was it, the daft question I'd wanted since last night. "Don't be silly" she said. "Whoever heard of a turkey egg for lunch?"

"I'll have it tonight then."

"Don't be stupid, you can't buy turkey eggs."

"Why not? There are millions of turkeys around doing nothing until some bank holiday – except gobbling food and making funny noises."

"Well I've never seen them for sale. You deserve beans on toast."

So back we went to the 8500 and its missing blue. This time I happened to look in the mirror as I took the voltage readings on the cathodes. Red o.k., green o.k., blue slightly low and the screen became blue and remained so until the meter prod was removed.

Moving back to the output transistors, the blue collector was correct and the meter made no difference. Obviously the choke between the collector and the tube's cathode was open-circuit. It wasn't. But there was no continuity from the choke to connector 7/3 which takes the blue drive to the tube. My bleary eyes couldn't see any crack in the print, but a jump lead restored normal working.

Voltage readings can be misleading if you don't look in the mirror at the same time to see the effect of the meter on the circuit. The trouble with looking in the mirror of course is that you stand a chance of seeing yourself peering over the top of the set. Then you know just how dozy you look when you're trying to concentrate. Not a pretty sight.

More on the Pye Hybrids

Every time we look round there seems to be a Pye 691, 693 or 697 needing attention. One caught me nicely the other day. It came in for "wrong colour". This was putting it mildly. The grey scale seemed reasonable enough, but when the colour was turned on it was horrible beyond description.

Checking the PCL84 colour-difference output valves didn't produce much joy, although one was definitely low-emission – and leaky to boot. A check on the 12k Ω pentode anode load resistors then revealed that two of the three were open-circuit, which was a promising start. We were out of 12k Ω wirewounds of course as I'd forgotten to order any, but as we seemed to have plenty of other values we decided to fit three 10k Ω resistors and see what the picture then looked like.

At first sight it didn't seem too bad, but when the colour was turned up much the newsreader's face turned green and looked decidedly sick due to a horrible hum bar. So we checked the earthing of the panel, screening of leads, and everything except the right thing of course. We had already checked for the presence of clamp pulses at the yellow plug on the CDA panel – only briefly, in view of the fair grey scale. In the end we took a closer look at the d.c. clamping, and found that although the pulses were arriving at the yellow plug there was a poor contact between the socket and the series capacitor C372, thus leaving the triodes virtually unclamped. With the clamping restored, we could turn up the colour and only maximum contrast would produce hum bars of any mention.

Another Silly Question

We had to call on Mrs. Allnutty whose Doric was dicey (no raster). The line output stage was overheating, and this proved to be a faulty tripler. Whilst we were struggling to fit the new one, Mrs. Allnutty carried on with her decorating and was engaged in mixing paint, or rather was preparing to mix some. She had a fine tin of white satin gloss which she tipped into a large tin. As she did this, she chatted.

"I'm not keen on brilliant white paint. I much prefer a touch of colour, and I do like a very delicate green tint in the white to contrast with the Avacado. Trouble is, I'm right out of green paint. Do you think this emulsion will mix in all right?"

You could have knocked me down with a feather. Mix emulsion with paint?

"You can't do that Mrs. Allnutty. They just won't mix, and if they do they'll separate afterwards. Oil and water you see."

"What do you mean, separate afterwards?" Mrs. Allnutty asked in a worried voice.

"Well, if you painted that door with it, the white would

go to the top and the green would go to the bottom, so you'd have a two toned door."

"That sounds a bit daft to me" said Mrs. Allnutty. "I painted the door and skirting in the other room with it yesterday, and it's still all right."

"It might be all right now Mrs. A" I explained, being an expert on telling my wife how she should decorate our own place. "You wait until er, well, you wait. They don't call me Lowery for nothing you know."

"Well I'm going to mix it, and I'm going to paint the woodwork in here with it like I did in the other room, whatever you say."

She did. And it looks all right.

A New Servicing Hazard

Jeff phoned the other day to acquaint me with a hideous new aspect that's entered upon the servicing scene. You know how touch tuner channel selectors and their attendant circuitry can often present problems due in some part to the high impedances involved? Obviously any additional conductive material will do the circuitry no good at all.

Apparently Jeff had a Thorn 9000 in for service which included fitting a new tube. The job finished, the set was placed on the lowest storage rack to await collection. His dog inspected the various sets and finding that the 9000 carried a challenging smell he naturally cocked his leg and sprayed the touch tuner, then with a sniff trotted off without telling Jeff.

Some time later the set was put on the bench for a predelivery check. The full horror of what had happened burst on Jeff as soon as he saw the front of the tuner selectors. Needless to say they were totally inoperative. Thinking that it was just a matter of cleaning the sensors and drying out, Jeff merely kicked the dog and told him not to hiss over the sets anymore or he would be seen to. Alas a thorough cleaning of the touch tuner panel resulted in no improvement at all. The internal works had received a lethal dose of whatever it is that spells doom to touchy components and printed panels. No amount of cleaning and drying out restored reliable selection, and Jeff had no option but to replace all affected parts.

Particularly beware of ladies with two small dogs on leads. We know only too well that they attempt to outdo each other against any vertical surface in a strange place, and our shop is certainly a strange place. Fortunately there were no touch tuners around at the time. The fact that she had recently purchased a new unit audio and a colour set from us saved the dogs from our wrath. When I had occasion to call at their home recently I resisted the temptation to ...

Too Fast, too Slow

A Ferguson studio something or the other music centre came in with the complaint that the records played too fast and the tapes too slow, with the weird result that records could be taped reasonably but the radio recordings were hopelessly wrong, records sounded like the Chipmunks and prerecorded cassettes of Maria Callas sounded like Paul Robeson.

Being used to funny things and people, we were not disturbed and immediately dealt with the record fault by clearing off the rubber deposit on the motor spindle. This restored its original diameter. The cassette section however was a different kettle of fish (why fish?).

We noticed that when fast forward or rewind was selected, it started at high speed and then slowed and

stopped. A meter showed that the motor voltage fell to zero, although the input to the motor control board remained constant. So we attacked the control board, in the wrong way of course as is our wont or natural bent you might say. Hang on a second. We are not naturally bent, I didn't mean that of course, I mean we usually do things wrong because logic is not one of our strong points. Our strong points are muddle, chaos and panic, in that order.

So we checked the three transistors cold and of course they read right. We then did it right and set the thing going. When it slowed we sprayed each transistor with freezer, and when one received a cooling draft the speed immediately increased. Replacing this restored normal operation.

In other words, a job which should have been done in ten minutes took an hour. Maria Callas now sounded like Maria Callas and on record Jim Reeves sounded like, well, Jim Reeves. I'm not keen on servicing these things: TVs seem so straightforward from a handling point of view.

Bear with Us

One of the nice things about running a personal business is that you deal directly with the customer and the customer deals directly with you (never mind about Laura Lovitt, we're not going into that . . . I mean, we need not discuss our flights of imagination just now). Although this is not always a good thing, in the main it is.

One unexpected facet is that we often receive small gifts as tokens of appreciation – bunches of flowers, pot plants, vegetables in season, the odd bottle of Bell's and lots of other nice things, quite often from people we thought we had upset or who had upset us, which all goes to prove that the milk of human kindness should be spread out even to those you can't stand the sight of at first. However, we received something recently which really shook us, and not only us, but the dog and cat as well.

To be honest I must say that this was from someone in the family, so perhaps it doesn't qualify as from a "customer". It was an enormous teddy bear, over 4ft. tall and 3ft wide (paw to paw), with a head perhaps too large for the body – the sort of thing most people like and most females love (why?). This could not be said for our cat and dog however. The cat took one look, arched her back with every hair extended, spat in defiance and then fled for dear life. Ben came in to see what all the fuss was about and was confronted with an enormous head a few inches away from him as he skidded to a halt. He looked away as if the bear wasn't there, which we took to be a gesture of submission, and slowly slunk away.

Thus our brave animals proved their worth when confronted by Ted, and instead of threatening them with the vet we've now only to say the magic word Ted to obtain instant obedience or at least their temporary absence. Which brings us back to our daily work.

Caught Again

We had a Thorn 3500 that lead us a merry dance the other day. The report was that it had suffered from the "twitters" for some time, the twittering being audible while visually the effect was of corrugated verticals. Someone had been in to fix it and had left it free from the twitters, but within a day or two the whole thing had gone off, the cut-out popping out as soon as the set was switched on. So we collected it and started.

There were no apparent shorts, so we started by unhooking the tripler. The set then came on and stopped on for a while, during which time we checked the 30V line and then

the 60V line which read more like 70V. Before we could do anything else, several things seemed to happen at once, with some smoke and the cut-out coming to the rescue as my reactions are so slow that they cannot be relied on to switch a set off quickly.

The 15Ω resistor in series with the chopper looked sick, while the chopper transistor itself was short-circuit. These items were replaced and the supply lines checked for shorts. The line output transistor was a dead short, and was also replaced. Just to be sure, we wound back the set e.h.t. control so that the 60V line would be under this. The set then functioned up to a point, but the line timebase was still taking too much current – measured by checking the voltage across the beam limiter sensing resistor R907 which was very hot though of the right value.

We eventually changed the e.h.t. transformer, which had shorted turns, only to find that the restoration of full timebase working resulted in severe arcing in the field timebase panel at C434 which is in the c.r.t. grid bias circuit. This resulted in the loss of three transistors and one diode. To cut a very long story short, this transpired to be due to our accidentally moving a capacitor in the line output section up against a tag on the e.h.t. transformer when the latter was replaced.

After this harrowing and self-inflicted experience, we set up the supply lines correctly, noting that the original twittery whistle had returned. We then considered connecting the original tripler, but decided to do this with caution. Rather than clipping the pulse lead on, we left the set on and advanced the clip to it. There was a vicious arc of flame when it got near. So out went the tripler.

With a new one fitted we had a fair picture, but it was marred by the corrugated effect whenever the brightness was turned down. We also noted that it got worse when the 60V line was reduced, and faded away when the 60V line was increased to an unacceptable level. This then was how it had been "cured" by the someone who advertised his services by only a phone number – by setting the 60V line too high. Apart from my bungling with the capacitor against the transformer tags, the "cure" had resulted in the loss of a lot of expensive bits and pieces.

So now we had to find the cause of the twitter and silence it. Something nagged in the back of my atrocious memory. This was a known fault. Surely not the core of a coil? No it wasn't. Check here, there and almost everywhere. Something started saying 0-01, 0-01 in the back of my mind. C631 in the chopper driver transistor's collector damping network was changed and the twitter stopped. Of course! We'd had the same trouble some years ago, but I'd forgotten it so easily. Why don't I jot these things down? Even if I did, I'd probably lose the thing I jotted them down on.

And Yet Again

It was inevitable that the next set would be a similar model (3000 chassis) with corrugated verticals that came and went. A fool to the last, we immediately whipped out the power pack and in a trice had fitted a new 0.01μF capacitor in the C631 position. With a leer of self-confidence, the power pack was replaced in another trice and the set switched on . . . the raster was still rippled of course. We shone a light on the decoder board and there was the core from L502 (h.t. supply choke in the line timebase) just lying there doing nothing – not even shorting anything out. A dab of adhesive and back it went and away went the ripple, hopefully never to return. Why didn't I do that first?

Tapez-Les*

Les Lawry-Johns

FIRST we have to apologise for the error of location, or more exactly name, of the place mentioned in the unlikely tale related in the September issue. For those of you who spotted it (and several did) I merely claim a lapse of memory occasioned by old age, plus a little bit of a coincidence. For those of you who didn't spot the mistake, it doesn't really matter that Fayid is actually down in the canal zone. The rest of the story was true or nearly true. Well, not really, but it could have been . . . I think.

A Flight to the East

I mean, look at the time we went well east of Suez, so far east in fact that we nearly went west, Fred flying the Tomahawk, Reg the Kittyhawk and me the Shitehawk. We didn't know where we were in fact, because we'd been troubled by wind of late. Fred thought we were somewhere in Burma, Reg reckoned we were in Rangoon, and I thought they were both right but we were still troubled by the wind which was ruining our war effort.

Fred said that he'd heard of a wall up north which would give us protection, and as soon as he'd said this a little man appeared with a little round hat which had a length of plaited rope hanging from the back of it. His hands were tucked up his sleeves.

“Ah . . .” he said. “My name is . . . ah . . . Sung Set Song.” There was something in the way he hesitated with the “ah” that made me feel even more uneasy, what with the wind and all. If he could help us however it would do no harm to listen.

“Centuries ago, ah, my people built great wall to keep out the wind. We came across it some time ago during our long march south, and as soon as we crossed it the wind troubled us no more.”

Fred did not doubt him as I did. "Tell us where it is, and Reg will write it down on rice paper."

Sung Set Song said “Go north young man. Fly fast over the flied lice fields until you cross the boulder where you will find many more boulders and this is the great wall that the north wind cannot pass. You will be safe there and the wind will wane”.

Reg wrote rapidly on the rice paper so that the precious directions would not be lost. Little did he know then that it wasn't rice paper he was writing on.

I'd heard rumours in Rangoon that a Japanese ex kamikaze pilot who couldn't be killed even by himself was posing as a charming Chinese, luring our lads and their Hawks to destruction.

This wasn't Sung Set Song. This was Muchashita the gentleman Jap. He was after my Shitehawk and that was why the paper was perforated. I didn't hesitate. I whipped out my weapon and shook it violently at him.

“You’re not Sung Set Song,” I screamed. “You are Muchashita the kamikaze killer and I claim the £5 prize for having unmasked you.” I hit him with my Hampton and he crumbled to the ground with a faint “Ha” as his cranium cracked under the mighty blow.

Fred hit him with his rhythm stick for good measure, while Reg was rummaging around for his rifle.

"Good God" said Fred. "How did you rumble the rascal?"

“Elementary. Had we flown fast to the wall we would have been whipped away by the wild wind. If you’d looked carefully at the paper Reg was writing on, you would have seen that the wall was full of holes. Please pay more attention in future and do not be fooled by funny fakirs.”

This was the end of our far eastern adventures, and if anyone wants to write in and correct the facts they are a better man than I am. Oh yes, we also sung a song on the way home.

In the street of a thousand "Ah so's."

By the sign of the swinging twit

Lived a slant eyed chinese maiden

By the name of Hu Flung Slit.

Enter Dennis

This should really be entitled "let the heartache begin", because until Dennis brought in that GEC 2121 I didn't know what heartache was. On a Saturday, just to make things worse. Well it looked innocent enough at first: a blown 3-15A mains supply fuse. Naturally we checked the filter capacitors and then headed straight for the thyristor rectifier. No joy. "We're not to blame" they shouted.

With some trepidation, we took the top screen off the line output stage. Both the small 4.7kΩ resistors R609/R611 (see Fig. 1) were blackened, and at the same time we noticed that the rear wirewound spring resistor was sprung – R601 to the 12V line. Now the fact that one or the other of these thermal cutouts is found sprung does not necessarily mean that there is a short in the circuit it supplies. More often it means that the associated zener diode has been asked to zener too much (you see).

This can happen in particular if the 40V supply rises much above the correct 40V. This supply is provided by D601/C601, and a small 47V zener diode (D51) is

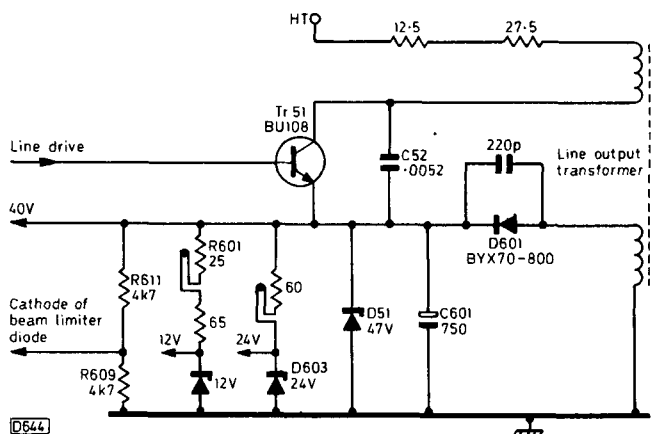


Fig. 1: Line output transistor circuit, GEC C2110 series. The transistor sits on a 40V line produced by D601/C601. 12 and 24V supplies are derived from the 40V line via droppers and zener diodes. D603 is often responsible for no sound or distorted sound.

**Which is French for hit 'em, in case like me you didn't know
– Editor.*

connected across the supply to prevent it rising above 47V – it's designed to short out, which is why it is not of a more manly type. When it's found shorted (as we found it) one tiptoes around a bit. Whilst the makers say that failure of D51 can be due to C601 becoming open-circuit, we're more inclined to look closely at the line output transistor since a collector to emitter short here will slap a sizeable chunk of h.t. straight on to the poor little zener. Sure enough, the BU108 was short-circuit.

A new one was fitted, after a struggle, at which point Dennis departed to do some shopping: he said he'd call back in an hour or so. The agony then started.

We thought we were being careful, unhitching the tripler and checking the lines before chancing mains application. All seemed well, so we connected a meter across the fuse holder and switched on. The meter swung across to over 3A, and instead of falling started to rise. We hurriedly removed the prod and carefully rechecked the h.t. line and the line output stage. The new little zener was short-circuit, but the new BU108 seemed o.k.

We next decided to chase the cause of the burnt 4.7kΩ resistors on the top of the transformer, though we were inclined to think that this was a legacy from some previous incident. The resistors read right, but we thought we'd change them and check the circuit with them out. There appeared to be a resistance reading where there shouldn't be one, and step by faltering step took us to the line output transformer winding – which had a leak to the core. "Oh dear" we said, "fancy that. Dennis will be pleased."

We had a replacement transformer in stock, and after a tussle it went in. I still don't like double-sided print, and will tell Arnold one of these days when and if I tie up alongside him. So the transformer was fitted and we decided that it would be better to fit a 3.15A supply fuse and stick a voltmeter on the emitter of the BU108 instead of a new zener. We crossed our fingers and eyes and switched on. The meter said 40V, and the sound came up normally. "Oh goody" we said. "Now we can hook up the tripler."

So we did that and fitted a little zener. This was a bad mistake. There was a hum and the zener burnt out. The tripler was faulty after all, the new BU108 was no longer new.

Dennis appeared with his shopping and his wife. "Not finished it yet?"

I looked sick. "I hope you've got plenty of money left after your shopping." He looked sick.

I told him the sorry tale. The tripler felt sick and this made the output transformer and the output transistor feel sick which made the zener and fuse fail and now I'd just lost another transistor and zener so I felt sick. While this was happening other sick sets were coming in, and I felt like volunteering to become a kamikaze pilot and end it all in one reckless dive. Actually I didn't, which is why I'm sitting here tapping away on this typewriter. We'll draw a veil over the rest of that day's happenings.

Female Logic

Monday dawned dull and drizzly, and whatever good spirits we started with swiftly vanished.

"Our set is too big to bring in. Can you call? It's probably only a fuse." Since they also said it was a 26in. Philips colour set (G8) I was inclined to believe this, but it still seemed a long way to go (several miles) to replace a fuse – at my age. Anyway we set out with our box of fuses etc.

On the way we had to negotiate a roundabout. As there was nothing coming from the right I proceeded around it. A

car appeared from an entry on the left, straight across my path. I had to brake hard and so did the other vehicle – a car driven by a middle aged lady. She looked at me indignantly.

"I nearly hit you. Why can't you drive more carefully?" I thought this a little bit much, since she should have given way.

"It was your place to give way – to traffic coming from the right" I pointed out.

"Normally yes" she snapped. "But certainly not to an old vehicle like yours. Mine is much newer and you should have given way to me."

I'm always defeated by feminine logic, and this was about the most logical thing I'd ever heard.

"Very sorry ma'am" I said, touching my forehead as I didn't have a hat to raise. "It won't happen again. *I'll smash straight into you next time!*"

So on we went, bawling and shouting obscenities at all and sundry until we finally arrived at Lower Higham.

I rang the bell of number nineteen and waited ... and waited.

Finally a cheerful lady appeared from around the side of the house. "I'm round the back dear, so I didn't hear you round the front."

That's the second one I thought, but meekly followed her around the back and through the kitchen.

The set was in a room leading off the hall, and the hall was cluttered up with bits of central heating gear. This meant I'd be hard put to it to take the set away if I had to. The size of the set was another good reason.

Off came the back and we went straight behind the left side plug cover to the 3.15A fuse. It was intact, and our spirits sank a bit. With the mains switched on the tube heaters lit up and the voltage appeared at the fuses on the power board. This meant that in all probability the 800mA fuse on the right side line scan board was open-circuit. It was.

I removed the screening cover from the line output transformer and put the ammeter across the fuse holder. It read 2A and there was a spark inside the transformer winding. This was as expected and feared, since the one thing I hadn't brought along was a line output transformer. Fool.

I weighed up the alternatives and made the wrong decision. "You need a transformer. I'll have to go back to the shop to get one. Won't be long – I hope."

I was. All sorts of things needed sorting out, but I finally arrived back at Upper Lowham or somewhere, anyway at number nineteen. Round the back and through the kitchen. Hubby had arrived home by this time.

"Transformer eh? Thought it might be. Mind if I watch you fit it?" So we settled down to replace the transformer. Out with the panel and lay it on a newspaper to save the carpet from the droppings of my soldering gun. Make a note of the connections as my memory is feeble. I can still remember some things though. Like it's 1969.

It didn't take long to fit the new transformer, but it was one of those without the tripler nipple. The nipple is easy to remove from the original, so off it came and was swiftly plonked on with no trouble (I thought) and securely soldered into place. Refit the panel, check that all plugs are in position except the tripler (oh no, not again), stick in the 800mA fuse and switch on. The sound came on for a split second and then plonk, the fuse blew. Once again I felt sick.

The tripler wasn't connected so that was out. I'd also checked the line output transistors, the transducer etc.

Investigation showed that one of the line output transistors was short-circuit but not the other. Rummage in

box to find another BU205, thinking why, why, why? Out came the faulty transistor and in went the new one. Check around with the ohmmeter, and get some funny readings as the emitter of the other transistor was correctly connected to chassis but so was its collector, which suggested that it was short-circuit. I'd only just checked it when the heatsinks were off however and it read right then. A shorted tuning capacitor? No.

Just as I was about to die, I looked at the top line drive panel and there on the top right was a thin sliver of solder from the chassis screw to the 1Ω base resistor. I felt a bit awkward.

"Some clumsy bugger has let some solder fall on the panel where it shouldn't be."

"Yes, I saw it drop when you were soldering on that nipple. I thought you saw it too and it didn't matter." Funny how some people are good at things and others never quite get the hang of it.

With the short cleared, the tripler could be connected and a picture displayed. A pretty grim picture it was too.

"We've never had good colour on this set. The other people said there was nothing that could be done."

I couldn't quite understand this, since the tube seemed quite good. Resetting the drive controls and the first anode presets restored a very reasonable grey scale, and a touch

on the convergence made an immense improvement. When the colour was turned up, faces looked like faces and not like burnt toast.

So the job was wrapped up, and we regained a little of our shattered confidence – until we looked at the picture again and found that the red had dropped out. Out tools, off back (again), and check the colour drives. Horrible dry-joint on the red amplifier base. Resolder and recheck. Wrap up (again) and get out quick.

Back at the Ranch

"You've been a long time. I don't know: it seems to take you longer and longer to do these outside jobs lately. Are they all that hard to sort out?"

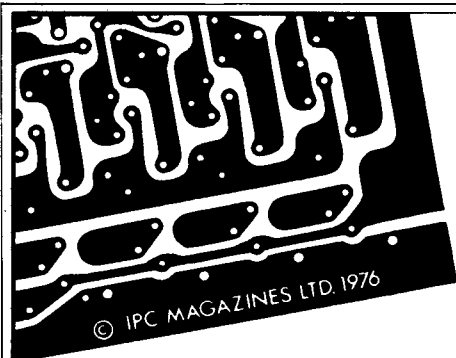
"I don't know either. I never seem to do anything right first time."

"Perhaps it's your age. Can't you take some of that stuff that fortifies the over fifties?"

"I do. Sometimes I take whisky, sometimes brandy. Both fortify me. What does fortify mean anyway?"

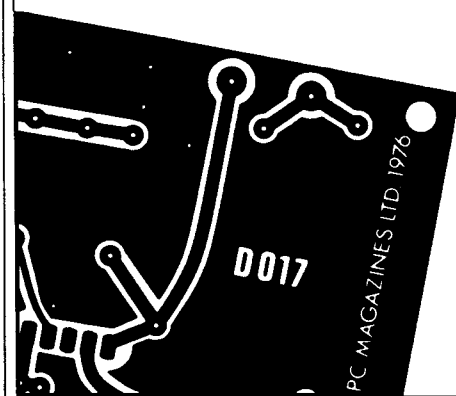
"How do I know? You'd better get on with mum's set though. If she doesn't have her telly tonight she'll go barmy."

Oh! I do love my mother in law . . .



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