

# ***The Flying Scotsman***

## *Les Lawry-Johns*

ABOUT a month ago we sold a Fidelity colour portable (Model CTV14R) to one of our regular customers who frequents our local pub. This means that we see him pretty regularly. He was delighted with his new colour portable, being able to lay in bed with the remote control unit and thus able to switch the set off without getting up as his eyes grew heavy. The other day he popped in to say that it had developed a mind of its own however. Just as he got interested in an ITV programme, the set would change to BBC-1 and wouldn't go to any other setting no matter how many times he pressed the channel change button.

"Bring it in Jock" we advised him. "We have ways of making them change their minds."

Jock McStrap is a fast mover, and while I was pondering on the possibilities he had gone and come back again. He plonked the set on the counter and launched into his theory.

“Say I’ve got it on channel 3, like this. It’ll be all right for some time, then the channel 1 indicator will start to glow and get brighter and then clonk, it changes to 1 and the channel 3 light goes out.” Without a pause he continued “I think it’s a little something touching where it shouldn’t when it gets warm you see . . . Whatever it is, it won’t take you a minute to find so I’ll call back later.”

"O.k. Jock, we'll do our best to make it behave itself."

So off went Mr. McStrap, leaving us to consider the situation and decide on a course of action. He hadn't brought the remote control unit with him, so we watched for the fault to develop and it did. As a matter of fact the channel 1 LED (see Fig. 1) glowed faintly from switch on, even though another channel had been selected and the appropriate LED lit up fully. Within a short time the channel 1 indicator got brighter and the set switched to channel 1, just as Jock said it did. Like a flash I reached a decision – which turned out to be the wrong one of course. "It must be a faulty chip – the ML232B channel selector" I thought.

Bearing in mind what sort of a device it is, I took all the usual precautions, earthing everything to make sure that no static charges could ruin the new chip. We then set about removing the front control panel where the chip lives. After

a bit of swearing and cussing at everything and everybody, the new chip was installed and we were ready for testing. The channel 1 LED still glowed faintly when another channel was selected, so we knew we'd dropped yet another clanger.

I then did what I should have done in the first place and studied the circuit. Transistor TR3 is linked to the channel 1 indicator, and it seemed likely that if slightly leaky it could be responsible for the symptoms. A new BC157 was fitted and proved to be the answer – to the defective channel change that is. (Note that the provisional circuit shows the type incorrectly as BC548, which is an npn device: the full manual gives the correct pnp type, BC157 or BC557.) Having refitted the panel and wrapped the set up we felt satisfied that the job was done. Jock came back and satisfied himself that the channels changed as they should do.

"Was it a wee something touching, Lawry?"

"Leaking, Jock. It was a wee leak after all."

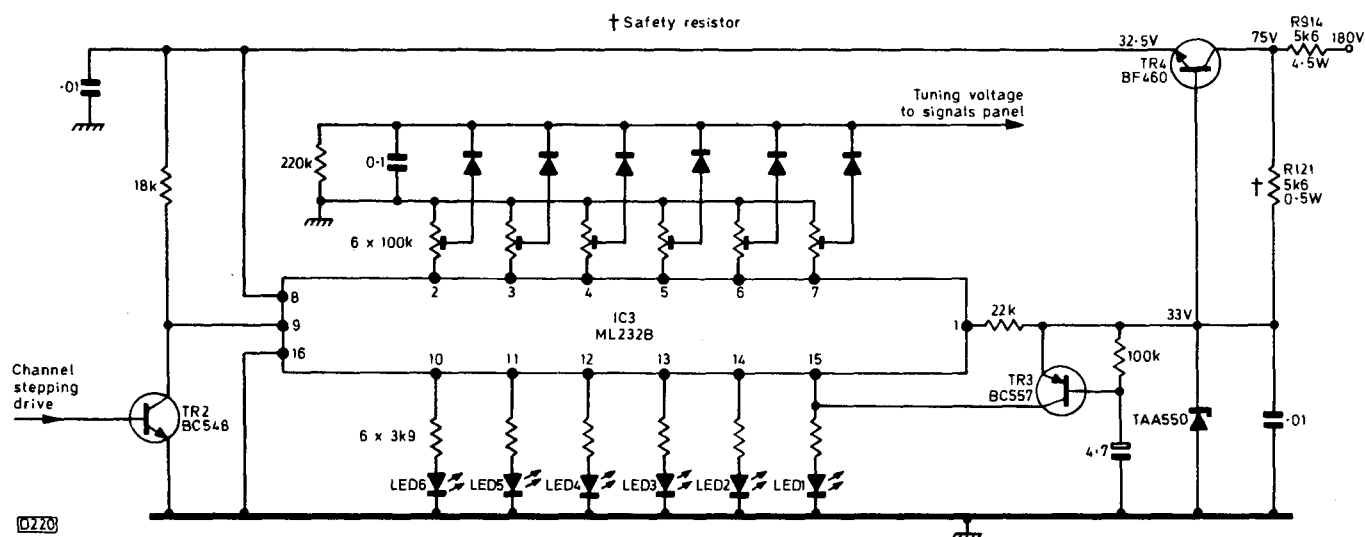
So off went Jock, only to return next day.

"It's doing it again Lawry, but it's now worse. It won't even stay on channel 1."

My heart sank. What now?

Investigation proved that over a period all signals were lost and that the tuning voltage to the tuner fell to zero intermittently. The supply to the TAA550 30V stabiliser on the front panel remained steady, and seemed to be present at the ML232B i.e., though it was difficult to tell because the fault was coming and going rapidly. Like the fool I am I again accused the chip, and went through the rigmarole of changing it – only to find that the fault was still present. I then found that movement of the panel prompted or cleared the fault, suggesting that we had either a poor connection or perhaps a crack somewhere. I eventually found the crack – through three tracks – though it was almost too fine to see. It had apparently occurred when I'd refitted the panel on the first occasion and had difficulty aligning it with the fixing holes. Having repaired the panel we put the set on a prolonged soak test and experienced no further trouble.

We've sold dozens of these nice little sets, and this was



*Fig. 1: Channel selection circuit, Fidelity Model CTV14R.*

the first bit of trouble we've had, so we mustn't complain. Jock seemed happy enough anyway, and his friend Chip Fryer has come in to buy one as a present for his wife. All quiet on that front.

### The Waltham W125

I'd sold this 24in. Waltham monochrome set some five years ago to an elderly lady who'd brought it back and made me an offer I couldn't refuse: if she had it back before evening, I could live. This precluded sending off for spares, and it was an unfortunate fact that the e.h.t. overwinding on the line output transformer was running warm even with the stick rectifier disconnected. The spark at the overwinding output was less intense than the one at the top cap of the PL504 line output valve, so whether I liked it or not the transformer was faulty and my time was running out.

I searched through my stock of transformers, but I knew I didn't have one. The only alternative was to remove the faulty winding and fit a tripler, or to strip down the transformer and fit another overwinding. Being a lazy cove I chose to cut away the faulty winding and fit a tripler – using one of the Thorn five-stick replacements with a short connection to the PL504 anode connection point on the transformer (with a PP3 battery stud to fit to the tripler). As expected, the resultant picture was lacking in width: the correct tuning capacitor turned out to be a 35pF 8kV working disc type, from the anode connection to chassis. This low value was in fact a surprise, as I'd expected to use a value more like 100pF – but the width was then excessive.

So we made the tripler secure and checked the rest of the set before returning it to the old dear. It was late afternoon and already dark when I arrived at her house. The full moon shone brightly in the clear sky, and an aircraft had left a

vapour trail that seemed to skirt around it. "Oh look" said the old girl, "if he hadn't seen it in time he'd have flown straight into it." Honest.

### Late Night Final

I arrived back at the shop expecting it to be closed. The lights were on however and there was a car outside. A lady had brought in a large, 26in. ITT set (FT110 chassis) with the help of her son and daughter. We'd last repaired it about a year ago, when her husband had brought it in. This time he had elected to stay at home watching the portable rather than risk having to listen to me moaning about the difficulty of diagnosing the cause of the trip circuit tripping. And tripping it was. Not the full-bodied hrrump-bonk some sets produce, but more a sort of soft tick tick.

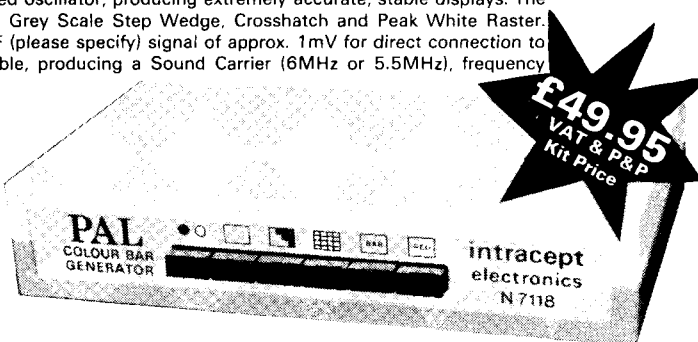
I disconnected the tripler as a start. That didn't make any difference, so I set off on a wild goose chase trying to find a shorted diode. "Perhaps it's the transformer" said Honey Bunch helpfully, thinking of the long line of transformer failures we've had of late. This jolted me into thinking a little more rationally: I hadn't checked the line output transistor, which turned out to be dead short collector-to-emitter. We removed the BU208 with some difficulty, and with much cussing and blinding about accessibility fitted a new one together with two new 0.005µF (to make up 0.01µF) pulse type flyback tuning capacitors just in case.

Knowing my luck when performing before an audience, I switched on with fingers, legs and eyes crossed. It worked, and worked well enough apart from a little misconvergence on the left-hand side. This seems to be a common feature of these sets however, and by this time it was getting late and the family were only to pleased to cart the set off back to dad.

## N7118 PAL COLOUR BAR GENERATOR

An extremely light, compact and durable instrument, designed for mobile Colour T.V. Maintenance in the customers home. The basic model includes a built-in rechargeable battery plus a Power Unit/Charger. (A fully charged battery gives 10 hours continuous use). All patterns and sync. pulses are derived from a single crystal controlled oscillator, producing extremely accurate, stable displays. The patterns available are: Standard Colour Bars, Red Raster, Linearised Grey Scale Step Wedge, Crosshatch and Peak White Raster. A Coaxial Socket on the rear panel provides a modulated UHF or VHF (please specify) signal of approx. 1mV for direct connection to Receiver Aerial Socket. An (optional) integral Sound board is available, producing a Sound Carrier (6MHz or 5.5MHz), frequency modulated by a 1KHz Sinewave. The N7118 will also house a third board that provides a 1 Volt p to p, 75 ohm Video Signal to a rear panel B.N.C. Socket.

Complete kit, including a professional finished case, screen printed P.C.B., Ready Built P.S.U., and all components – **£59.50** inclusive. Sound and Video Boards, add **£10.29** per board. Ready Built – **£88.25** inclusive, Sound and Video Boards add **£11.45** per board. S.A.E. for details and specification.



## N7121 VIDEO PATTERN GENERATOR

This Generator, based on the N7118 is designed for the mobile servicing of Colour Monitors and V.D.U.'s. It produces three separate Colour output signals at 1 Volt peak to peak into 75 ohms. Also provided is a separate sync. output which may be adjusted for positive or negative-going sync. tips. The Generator may be operated at 625/50MHz or (by operating a push switch on the rear panel) 525/60Hz.

The patterns available are colour bars, crosshatch, 8 step grey scale wedge, peak white plus many other combinations i.e., red raster, blue raster, yellow crosshatch etc., as defined by the three (red, green – blue) beam switches on the front panel. The generator is powered by an internal Ni-Cad battery and is supplied complete with the Charger/Power Unit.



Price (Built & Tested) **£75.00** + VAT & p. & p. Total **£88.25**.

All goods despatched within 14 days.



# INTRACEPT ELECTRONICS LIMITED

203 Picton Road, Liverpool L15 4LG.

Tel: 051-733 3042.

# How to be Tetchy

Les Lawry-Johns

I AM one of the most pleasant of people – easy to get along with, understanding and tolerant, helpful and constructive, with never a nasty thought in my head except on rare occasions. It's worrying therefore to find these occasions becoming less rare and my tolerance increasingly strained. I'm aware that I'm not as young as I once was, and that to the above list could perhaps be added dodderiness. But I don't somehow think that age has too much to do with this subtle change of character, which has me contemplating bashing people over the head with a blunt instrument and then dancing at their funerals.

You see what I mean. It is rather worrying – especially since I don't seem to worry about it all that much. Our dog Ben and I seem to share one trait in common: we snap at people even though they appear to be kindly souls, just in case they're not I suppose. Take the other day for example.

## Plug Play

A chap brought his set in for repair just as we were closing. I had a quick look, but as it was a case of intermittent field collapse and it wouldn't collapse for me I suggested that he leave it and take one of our loan sets home with him so that his wife wouldn't miss Crossroads and he the football.

When he came back the following day to collect his own set he brought ours back and dumped it down. He surveyed it for a moment and then came out with "did it have a plug on it when I took it?" This annoyed me and I snapped "yes it did and you're not having that one." He'd had his set repaired at a very reasonable price, he'd been lent a set for nothing, and here he was scared stiff or loosing a plug, even though a moment's thought would have confirmed that it did have a plug when he took it away the night before. Only a little thing, but it did get me going for a moment.

## Enter Mr. Doubleday

We hadn't seen Mr. Doubleday for quite some time. He showed up the other day and needed a bit of help in getting the big Ultra colour set out of the back of his estate car. "This is a 26in. set" he panted quite unnecessarily. "It belongs to my neighbour, my neighbour." To cut the story short and avoid all the repetition to which Mr. Doubleday is prone, it seems that the neighbours were watching the set when it suddenly went off. And now here it was waiting for the little thing that would start it up again.

Quite unsuspectingly, I took the back off the Thorn 3500 and immediately started to check the usual things in the power supply before applying the juice – the rectifier diodes, the cut-out, etc. These were all intact, so we plugged the set in. The degaussing buzz occurred and the tube heaters lit. There was a hefty h.t. present at the body of the chopper transistor (see Fig. 1) and the 30V supply was present. There was no 60V h.t. supply at the centre fuse (F603) however, i.e. no output from the chopper. When the meter was applied to the end, right-side tag of the dropper resistor to see whether the 12V supply to the chopper driver transistor was present, we found only about 3V.

This was obviously a starting point. We lifted up the power unit to start checking – and found the timebase plug

hanging free. Incredibly, I didn't immediately notice that all the other plugs and leads from the field and line timebase panels were also hanging free – I suppose because I was concentrating on the power supply panel. Taking this out (having plugged the timebase plug in and got no results) we followed up the low voltage. Was the chopper driver transistor short-circuit or permanently on? Check the drive from the monostable circuit. Whilst we were attending to this our eyes were attracted to R620 in the monostable circuit. The resistor looked a bit sick, and measured only a couple of hundred ohms instead of  $2.7k\Omega$ . So we replaced it and on putting the power supply panel back we found we had the correct 12V at the end of the dropper and 60V at the centre fuse. So the power supply and the line oscillator were working (the trigger pulses for the monostable come from the line oscillator). There was no sign of line output stage operation however, and no voltage across R907 in the beam limiter circuit (this resistor is between the line output stage earth line and the rest of the chassis).

It was then that I turned to the line output stage and found all the leads off and the tripler disconnected. "Someone's been at this" I growled at Mr. Doubleday. "Oh no, it just went off, went off" he protested. By this time I'd removed the line timebase panel and looked at it a little more closely. The R2008 line output transistor was completely disconnected, leads were off the two transformers and, looking just a bit more closely, the line driver transistor was seen to be missing along with several capacitors and diodes.

"Look at this" I bawled, making the cat beat a hasty retreat.

"I don't understand these things, these things" said Mr. Doubleday.

"Perhaps you don't, but see all these leads hanging free and these empty spaces. It means someone's been here before us, and a bloody fine mess they've made of it too. Your neighbours are having you on. Sorry Mr. Doubleday, but I don't want the job putting this lot right."

"They wouldn't mind spending a tenner on it, a tenner on it" bumbled Mr. D. "I shouldn't think it would cost much more than that."

I finally lost my cool at this and slapped the bits together and the back on. Before he could say another word, I'd the set outside and in the back of his car. "Cheerio Mr. Doubleday, it's been nice knowing you, knowing you."

When I got back into the shop Honey Bunch was giving me that look. "I don't know what's got into you lately. Mr. Doubleday was quite upset when he left. You won't have any customers left if you carry on like this, carry on like this."

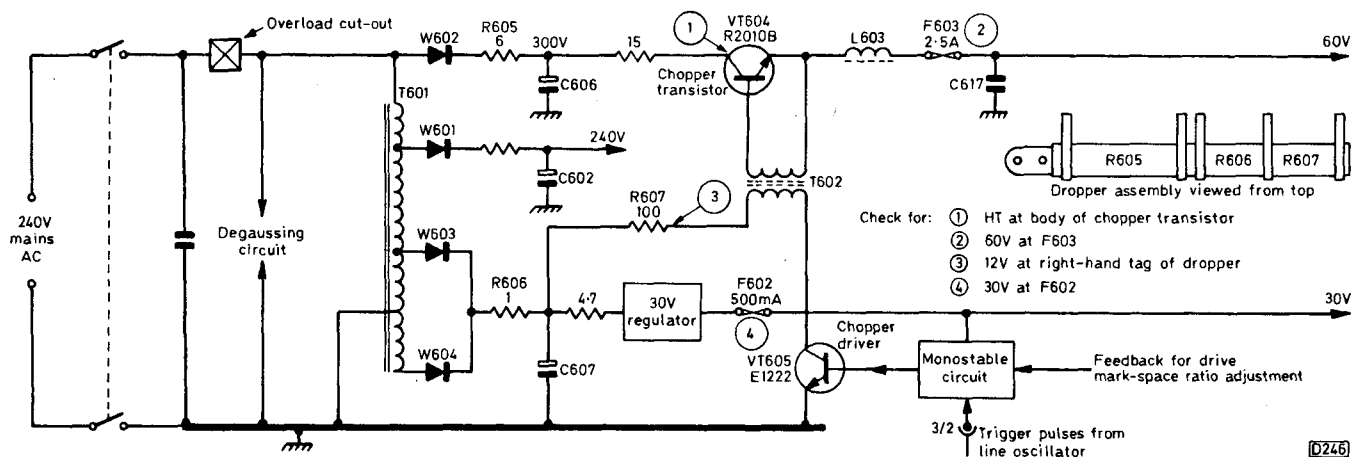
"\*\*\*\*\*" I said nastily.

## They'll Never Believe Me

Hardly had we had time to drink a cup of coffee than a young fellow struggled in with another 3500 – a 22in. Ferguson set this time. "What's wrong?" I asked carefully.

"We were watching it and it suddenly went off."

I took the back off and carefully checked all the plugs and sockets. They were all connected and hadn't been disturbed, so we started the routine. 30V line o.k. 240V at



*Fig. 1: Quick checks on the Thorn 3000/3500 chassis power supply module (simplified circuit). H.T. at the body of the chopper transistor but no 60V supply at F603 means that either the fuse or the transistor is open-circuit or the transistor is without drive. If the fuse and chopper transistor are o.k., check the 12V supply to the driver transistor, the 30V supply to the monostable circuit etc., and for the presence of trigger pulses at connector 3/2 and drive to VT605.*

the body of the chopper transistor, nothing at the 60V fuse. Also nothing at the extreme right-hand tag of the dropper resistor though there was 45V at the next tag. Like a fool I started to try to find out what was pulling the voltage down and had got to the point of taking out the power pack when a voice inside my head said "why isn't the dropper section hot if you think it's overloaded?" I suppose I was still thinking of the previous disaster. So I checked the continuity of the 100Ω section with the ohmmeter and of course it was open-circuit.

Back went the power unit and in went a new dropper section. On went the set and up came a pink picture (no green). A quick check revealed that there was no supply to the tube's green first anode, due as usual to leakage in the beam switch. This was soon dealt with and everything seemed fine except for an intermittent flash of bright blue. Moving the thick-film video load unit proved that it was at fault since the picture remained bright blue now that the intermittent open-circuit had become a permanent one. A new thick-film unit was put in and everything was now fine.

"Lucky you had those parts" said the young man.

"Luck had very little to do with it" I said. "I have to order them and about ten million other parts at a cost of billions of pounds so that you and those like you don't have to be kept waiting."

"Thanks" said the young man. "Would you mind if I took the set and paid you at the weekend, because I'm a bit short at the moment?"

### ***Furious Frank***

Frank is (or was) a regular customer of ours. For more years than I care to remember. He'd bought a colour set from us several years ago, and it had proved to be very reliable. He often pops in with various bits and pieces however and waits whilst I fix them for him. During this process he talks incessantly about things which are of interest to himself only, smokes incessantly, and incessantly flicks the ash on the shop floor despite the fact that I put an ash tray under his nose. This time he brought in his sister's old ITT monochrome set (VC200 chassis).

"It's the aerial socket Les" he told me. "The picture goes off and when you pull out the aerial plug and push it back in the picture comes on again." So we switched the set on and in due course quite a good picture appeared and didn't vary however much I messed about with the aerial plug. "Seems all right to me" I said.

“Oh yes, it is for about five minutes or so” said Frank. So we waited a bit while he filled in all the details of what had been happening to him workwise and homewise and I tried to serve customers with their odd bits and pieces, attempting to listen to them as they explained what they wanted.

“There you are” Frank suddenly shouted, scaring me out of my wits. The picture had gone off, leaving a very dull raster which looked ominously familiar to me. I turned the brightness control and the dull raster didn’t vary one iota whether it was turned up or down. “You just push the aerial plug” said Frank.

Without much hope I pulled the plug out and pushed it back in again. No change.

“Not like that. Like this” said Frank, grabbing the aerial plug and wrenching it out and in so that the whole set vibrated. The picture appeared with a flash and went off again.

"You can get the same effect by tapping the cabinet" I said wearily.

"No you can't" said Frank, gently touching the cabinet.

I started to lose my cool again and whipped the back off. "This is where you tap if you really want to see what's wrong" I said, tapping the neck of the tube with a screwdriver handle. The picture flashed on and off as I tapped.

"You can't mean it's the tube" said Frank. "You put a new one in only a little while ago." I looked at the label on the tube. It said 1975. "Over six years ago to be exact."

"Well it shouldn't go so soon," he moaned. "What's my sister going to say? She'll have to go without her gin for a week, and she won't like that."

So I put the set to one side as Frank slid off to consult his sister. He phoned later to say that they were still thinking. The next day he came back and purchased a 24in. Philips monochrome set we'd taken in part exchange – the cost was less than installing a new tube in the ITT set.

### *In the Meantime*

Meanwhile two sets fitted with the Thorn 8500 chassis had come in. One had a blown fuse, and before that had exhibited colour bars, i.e. no colour lock. The other was working but again with no colour lock. The blown fuse was no more than a short-circuit mains filter capacitor, but the unlocked colour was a rather more stubborn problem that couldn't be resolved until the 4.43MHz reference oscillator

crystal had been replaced. We checked the decoder presets on the second set without result, and again had to replace the crystal in order to get the colour to lock. Funny how this decoder seems to need crystal replacement so often – the crystals seldom seem to fail in other chassis.

### A Bouncer

Last month I mentioned the lady whose Waltham W125 had given her trouble – she'd wanted it fixed in a hurry. So we'd snipped off the line output transformer's e.h.t. overwinding and fitted a tripler to get the e.h.t. back quick. I had another call from her the other day. The other windings on the transformer now had shorted turns. No problem this

time, as we'd now got a couple of spare transformers in stock. Once again she wasn't without her set for long: there's a moral here somewhere, if only I could think of it.

### Philips Cube

Finally this month those Philips black box "entertainment centres", with TV, radio, cassette recorder plus clock, all in a compact square (Model 9TC2100). We've had a couple in with field collapse. If you trace the leads from the field scan coils down to the right-hand side, you'll find that they terminate in a plug and socket. Nearby are the two field output transistors. In both cases the BC338 (TS560) had gone short-circuit.

## Simple Variac

Victor Rizzo

IN these days of semiconductor devices that go dead at the drop of a hat, a variac is one of the most desirable items of equipment either for servicing or for experimental purposes. Many are deterred from buying one however because of the cost. The present article describes a very good one which, given a little patience, can be constructed at a fraction of the cost of a commercial variac. The one I made may not be a beauty, but is safe and serves its purpose admirably. It uses tapings to enable all the decades except three in the range 10V to 240V to be obtained. Voltage selection is done by plugging two flying leads into a robust octal valve base socket.

The first step is to find a serviceable double-wound mains transformer, i.e. not an auto-transformer, from an old TV set. Many an old set is rated at 200W, with all the power

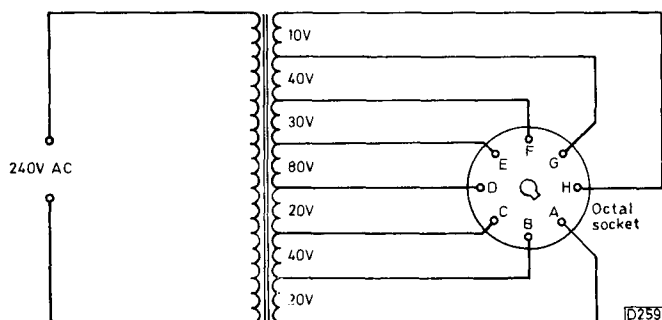


Fig. 1: Circuit diagram showing voltage taps.

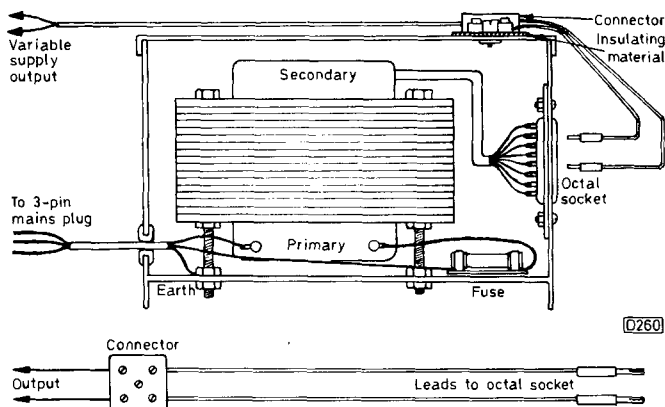


Fig. 2: Cross-sectional view of the prototype.

used provided by the mains transformer. This should be more than adequate for our purposes.

Next try the transformer and check the turns/volt ratio. This is very important, and can be done by noting the heater voltage provided by one of the windings and seeing the number of turns this winding consists of, then dividing the number of turns by the voltage. In the transformer I used the ratio was two.

Remove the laminations and the secondary windings from the transformer. Don't disturb the primary winding, and don't remove the insulation which separates it from the secondaries. Sand the laminations very lightly, wipe them clean and smear lightly with grease to facilitate reinsertion.

Now make up a new secondary, using wire of the same gauge as the primary winding – the wire must be new. In the arrangement I used (see Fig. 1) this winding consists of seven sections (A-B, B-C etc.) with eight terminals. The number of turns in each section depends on the turns/volt ratio: multiply the voltage required by the ratio and you get the number of turns required for each section. The tapings should be well sleeved and left long enough to be soldered directly to the voltage selection socket. Letter the tapings to avoid confusion later on.

When the new secondary winding has been finished, replace the laminations and tighten them up. The whole transformer can be impregnated with wax.

How you arrange the rest of the device depends on what you have available for the purpose – Fig. 2 is included as a general guide. If the transformer chosen has its own fuse and mains tapings, these can be retained. I housed the transformer in a biscuit tin that happened to be around. A hole was cut in one side for the voltage selection socket, the connector for the flying leads being fixed to the lid. Glue a table showing the voltages available in a convenient place. Include a mains on-off switch if you want, but do make sure that the whole thing is well earthed.

On completion of the device, try it out to check on the voltages available. It's these readings that should be written down on the voltage table of course. Due to mains voltage variations, the voltages will never be spot on. There are so many possibilities to choose from however that this will present no problems in practice. ■

Table 1: Voltages available.

10V G-H	80V A-D, D-E or E-H	170V B-F or C-G
20V A-B or C-D	100V C-E	180V C-H
30V E-F	110V D-F	190V A-F
40V B-C or F-G	130V C-F	210V B-G
50V F-H	140V B-E	220V B-H
60V A-C or B-D	150V D-G	230V A-G
70V E-G	160V A-E or D-H	240V A-H

The voltages not available are 90V, 120V and 200V.

best I could do was to dangle a short length of wire from the r.f. output socket of a Secam test generator near the CX610GB's whip aerial. Under these conditions the set was found to be able to discriminate between PAL and Secam signals adequately, though weak signals could confuse it. System L test signals couldn't be detected of course.

With a video rather than an off-air input, PAL and Secam signals were both well displayed with the auto switching working excellently. The audio and video outputs from the set were clean and recorded well on a dual-standard VCR. Incidentally, when switching between off-air and external inputs with the same signal source applied to both, the impairment of the signal at r.f. was quite evident – so if your set and VCR have video/audio connectors, use them in preference to routing the signals via the u.h.f. modulator.

### The Innards

The interior is neatly arranged. A combined u.h.f./v.h.f. tuner drives a conventional i.f. chip via a SAW filter. The demodulated signals are filtered by 5.5, 6 and 6.5MHz ceramic filters to remove/extract the sound component, the latter going to a standard intercarrier sound chip. The signals are then passed to the audio/video input/output board, the outputs being a.c. coupled via suitable switches.

The audio signal, either internal or external, is fed to a simple resistive volume control and then to an i.c. audio section driving an 8Ω loudspeaker. There's also an earphone socket.

The video signals are fed to a combined video amplifier/sync separator/pedestal clamp i.c., then pass to separate PAL and Secam decoders. The rest of the RGB and timebase circuitry is conventional.

### Summary

In conclusion, the CX610GB is unique in the low-cost, small-set market. In fact if you need a mains/battery portable colour receiver/monitor you don't have much choice! If you add in the multistandard sound and colour facilities however the set is a winner. It's a shame that the battery capability adds so much to the basic price, but probably most users won't find this essential. From the technical point of view the set is well designed and easy to service, though as one would expect with such a small chassis there are a few tricky bits.

All in all however I'd thoroughly recommend the CX610GB. It would seem to set a trend that other manufacturers with domestic video interests will surely follow. ■

## While the Blizzards Blew

Les Lawry-Johns

WE'VE had one or two unusual faults of late, also one or two unusual customers. This is not so surprising perhaps, because the world sometimes seems to be populated by weird people. I have a message for you from one of them. "Repent now. This is the last year. There won't be another Christmas. The year will see a series of disasters unlike any before, culminating in the final catastrophe. You had better be prepared." In view of all this I wondered why he found it so important to have his little Indesit T12SGB portable repaired. He did however, so I tried to oblige.

### Loss of Signals

The one concerned is the one with push-buttons at the top rather than a rotary tuner at the side (Model T12LGB). The symptom was that the screen lit up, with a trace of grain to show that the i.f. stages were active, but with no signals. So we turned our attention to the tuner, which seemed to be getting its supply voltage but not much by way of a tuning voltage. At the top push-button panel we found we could get only about 2.5V instead of the 30V expected. The suspect components are on the main panel, and we thought we would find that the TAA550 tuning voltage stabiliser i.c. was leaky. It's fed from a line output stage derived 125V rail via an 18kΩ, 2W resistor (R103), and we were surprised to find that the voltage at the h.t. end of this resistor was also very low.

The relevant circuitry is shown in Fig. 1, and what particularly surprised us was that the supply to the video output stage was correct – 125V across C914. As you'll see, two diodes in series rectify the pulses at the collector of the line output transistor to produce the h.t. supplies for the video output stage and the tuning voltage source (the TAA550). If the video output supply was o.k., why wasn't

the supply to the tuning circuit? Then the penny dropped. Not something short-circuit, rather something open-circuit. Like the first diode's reservoir capacitor C911. Slap another 0.1μF capacitor from the cathode of D910 to chassis and back comes the voltage and the ability to tune. An unusual one I thought.

### The Next Oddity

The next odd one was a colour set with Baird on the front, though it was actually a Körting 51763. The complaint was severe interference on the picture. This turned out to be sound on vision, the picture being completely clear when the volume was turned down. At first we thought the cause might be vibration, but disconnecting the internal speaker and using an external one left the trouble just the same – and it really was intolerable.

As a next step we checked the 470μF electrolytic that decouples the l.t. supply to the audio output stage. This was o.k., but at last we were on the right lines, since the l.t. voltage was higher than specified – and varied with the

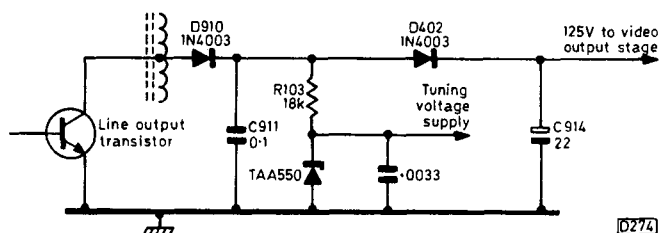


Fig. 1: Method of obtaining the h.t. supplies in the Indesit T12SGB monochrome portable.

volume. The audio circuit is fed from the l.t. bridge rectifier, which also feeds a 24V series regulator circuit. Something must be wrong here we thought, and we proceeded to check the transistors. What we discovered was that the BC178 driver transistor was short-circuit. A replacement restored correct working with an interference free picture – another one we've not had before.

## Don's Diagnosis

Don is another of our local characters. Retired now but as lively and cheerful as ever. Except that is on the occasion when his daughter got married. The shock of the expense made him look miserable for a month either side of the event. "You save up all your life to make sure you'll be all right when you retire, and what happens? Your girl gets married and expects a royal wedding. Don't you worry Dad, just sign each cheque in the book and I'll fill in the rest. Murder it is. Extortion. Robbery. I hope the divorce won't cost as much."

"What divorce, Don. Yours?"

"No. Hers. They demand all these posh weddings and six months later they blame you for helping them get married and want your help with the separation. Mad they are. Mad. And we're just as mad."

"Never mind Don. It'll teach you not have girls late in life next time."

"Next time? You mean we've got to go through this again?"

"So they tell me Don. When you die and think you're going to have a nice long sleep, they add up you're score sheet and send you in to bat again."

"Bloody hell. I hope not" said Don mournfully.

But the months passed and Don now seems as cheerful as ever, threatening to sue all and sundry. "Sue you later." "I'll be suing you." "Sue you in court" and many more in like vein. The other day he came to see us, carrying his Thorn 3500 colour set as though it weighed a few ounces. He exercises with weights each morning you see, which I suppose is why he kept on having daughters until late in life. Maybe if I . . .

My thoughts were cut short by Don's rapid diagnosis of the set's ailment. "It doesn't go Les. Probably a small resistor gone."

"You'll be lucky" I said. "Had one in the other day and it cost the owner a small fortune to put it right. Broke his heart having to spend all that money he'd been saving for his retirement. It looks as if I'll be all right though, with all these sets needing lots of money spent on them."

Don blew on his pipe, and ash scattered all over the place.

"Just have a look Les and see what the time is."

So I took the back off and whilst Don talked to the cat I tried to find out why the chopper wasn't chopping. Now you'll remember the drill. Plenty of h.t. on the body of the chopper transistor, but no 60V supply. 30V supply o.k. So I took the power unit off and turned it up. The chopper transistor read all right, but the diode in series with its

emitter was open-circuit (W609 – we didn't show it in our simplified circuit last month). Out came the TRC100P diode and in went a pair of 1N4002 diodes twisted together in parallel. When the unit was refitted the set functioned quite nicely, needing only a few adjustments to make it 100 per cent.

"What was it? I knew it wouldn't be much."

"Just this little thing Don. You were dead right as usual."

"Thanks a million. Better whip it back home. I'll be suing you."

Don's wife popped in later. "Don forgot to pay you. I don't know what's wrong with him lately. He's not been the same since the wedding."

## Resistors

As a matter of fact Don could well have been right in his diagnosis of a faulty resistor, since it seems that every other set that's come in recently has needed a low-value resistor to put it right. For example, at least three Bush sets (T20 chassis) came in during the last week requiring a new line output transistor base current stabilising resistor (5R8, 1Ω) to get them going. The first time this happened we spent a lot of time checking over things before we got to the real cause of the trouble. It went like this.

Set dead except for h.t. at the collector of the line output transistor. Check the driver transistor's collector voltage. High, showing that it's not being driven. Shunt a resistor across the line oscillator start-up capacitor to keep the line oscillator going despite the absence of the line output stage derived 12V line. Voltage at the collector of the driver transistor falls to 125V, thus proving that the line oscillator and driver stages are o.k. Check the EW modulator diodes 5D6/7 because one of them is nearly always at fault under these conditions. This time they were all right, so we made checks on the line output transistor. Surprised to find that the reverse base-emitter resistance is 22Ω, which is high considering that the base and emitter are linked via the secondary winding of the driver transformer and 5R8 (see Fig. 2). 5R8 was open-circuit of course, so that the transistor was receiving no drive. Needless to say, the next one didn't take us nearly so long to find.

As another example, a couple of Thorn sets (9000 chassis) came in with R726 (2.2Ω) in pieces but with no apparent cause. This resistor is in the collector circuit of the diode modulator driver transistor VT702.

## 'Sno Joke

We've had some pretty cold weather lately, with the cold intense enough to . . . well, you know what. There was a blizzard when friend Ridley popped his head into the shop.

"If we keep burning fossil fuels at this rate Leslie, the greenhouse effect will become so serious we'll all be dying with the heat." So saying he retreated into the snow and fought his way homewards. I went out later to take the dog for his walk. On the way back we had to cross a car park that was a sheet of ice. I slipped and crashed down painfully. It was a few seconds before I was able to scramble back to my unsteady feet. The dog just carried on sniffing, not caring what had befallen me. Two buttons had been torn off the front of my sheep skin, and I managed to find only one of them. I then picked my way painfully homewards to tell Honey Bunch of my misfortune. I'd hardly got the words out when she hit me. "That'll teach you not to fall over and get your coat dirty." Is there no justice at all in this world?

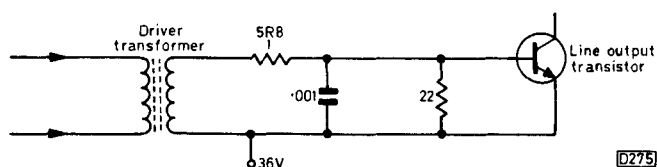


Fig. 2: Line output transistor base drive circuit, Rank T20 chassis. The 36V supply comes from the EW modulator.



where one is attempting to resolve a signal of only a few  $\mu\text{V}$  – often adjacent to the signal from a local 500kW e.r.p. transmitter – this bandwidth reduction is essential.

Once the alignment of the U800 module has been completed, the gain preset can be readjusted to get the correct i.f. levels with the two settings of S1. It is essential to avoid any retuning of the tuner unit during alignment.

The use of the i.f. processor and pre-processor gives three i.f. bandwidths – 6MHz, 3MHz and 2MHz. We thus have a system that will receive the weakest signals at reduced bandwidth and strong signals at the full bandwidth, i.e. at optimum picture quality. The processor and pre-processor can be housed in matching diecast

boxes (three of each in my own installation, with three preset gain, attenuation level and wide/narrow controls, feeding three Thorn portables).

Some final notes. First, respect the 240V a.c. mains input! Secondly, depending on the tuner in use it may be found that patterning occurs when both tuners – the one in the DX unit and the one in the receiver – are operating at the same frequency. In this event, first check the continuity of all coaxial screens. If the problem persists, insert an in-line notch filter at the output from the DX tuner. U800 selectivity modules can be obtained from Hugh Cocks Television Services, Cripps Corner, Staplecross, Robertsbridge, E. Sussex TN32 5RY at £1.80 each including VAT and postage.

## No Mend NordMende

*Les Lawry-Johns*

It all started innocently enough. A middle aged man came in and asked us whether we would repair his daughter's Ferguson colour portable. It had been going all right, but now there was only a white line across the centre of the screen.

"Certainly sir. Just pop it in and pop back later. No trouble."

So off he went and about an hour later a young fellow came in to enquire whether we would handle a Ferguson colour portable which had a white line across the centre.

"Certainly sir. Just pop it in. By the way, are you any relation of the chappie who came in a while ago and asked about servicing his daughter's Ferguson colour portable?"

"Probably my father-in-law. He's going to buy the set from us when we go to Australia in the spring."

It was the young chap who brought the set in later, and my heart sank just a little when I noticed that it was a 3787 – the 14in. colour portable made in W. Germany by NordMende. We'd had heartaches with these before, but after all the trouble was only field collapse, and a new i.c. and a fuse were probably all that was needed. So we put on a cheerful face and asked him to collect it later in the day.

A little later we turned our attention to the 3787. The rear cover was removed, the wing nuts slackened, and the chassis let down. The far right side fuse (there's one nearer) had gone open-circuit, and sure enough it was VU09 (630mA) in the 22V supply line (U3) to the TDA1170 field timebase chip and a couple of other circuits. Not wishing to waste time, we removed the bottom centre field timebase panel and set about removing the TDA1170 chip with its screening heatsink. A new chip was speedily fitted and the heatsink soldered in place. The blown fuse was replaced with an 800mA one, which we understand is the correct and proper thing to do. Switching the set on produced a lovely picture, and we left it on for about an hour just to be sure.

The owners collected it later, and were quite pleased that the job hadn't been a complicated one. Some time later however they phoned to say that the set had worked for about half an hour and had then gone off with a display of coloured splashes and noises. The net result was a white line across the screen again. They brought it in next morning, and said they'd leave it for a

couple of days so that I could make sure.

Investigation showed that the fuse had failed again, so as a start I thought I'd better check out the other lines supplied from the 22V source. Everything o.k., so the next step was a check on the current, which was not at all excessive. Another fuse was fitted (reverting to 630mA just in case) and the set was kept running while I got on with another awkward job that had been bugging me for some time – an amplifier which kept blowing its output transistors every few hours or so.

Whilst engrossed in taking voltage readings in the amplifier, I heard a funny noise coming from the portable – sort of plastic clicks, as though the line output transformer was breaking down. Before I could do anything there was a shower of colours on the screen, with drastic picture size variations – both width and height. It then went off with a dying croak.

Sure enough the same fuse had failed, but this time the difference was that the set was completely out of action and my attention was caught by the rearmost thermal wirewound resistor which had "thermalled". This was RU05 (680 $\Omega$ , 11W) in the soft-start circuit (see Fig. 1). Resoldering this resistor's contacts brought it back into circuit, but it was overheating and would have opened again had I left the set on.

My ice cold logical mind told me that something was wrong. It didn't suggest a solution however. So I checked across the output from the resistor, and there didn't appear to be any shorts. I then started to think. Painfully. The 22V supply is obtained from a winding on the line output transformer. The line output stage had probably suffered when the short (blowing the fuse) had occurred. It was probably still suffering. It's a thyristor line output stage, with the usual flyback and scan thyristors. Hmmm. We disconnected the h.t. feed to the nearest thyristor, the flyback one, and the start-up feed resistor RU05 no longer overheated. Ha we thought, these thyristors are not as tough as they're reputed to be. So I put another one in and switched on. Bang! The mains fuse had blown. I stared at the set and it stared back. With a blank look on its face.

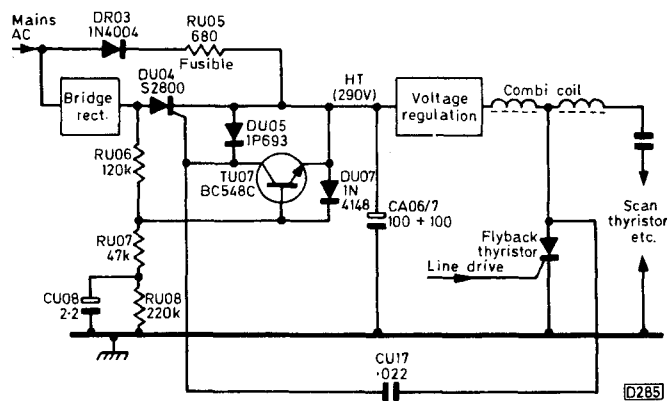
"Now what are you doing?" I asked it desperately. The only difference this time, apart from any accidental wrong connections or maybe another fault developing, was the new thyristor. For want of other inspiration I



To cut a long story short, it was not until both line output stage thyristors had been replaced, with a different type and encapsulation, that we returned to something approaching sanity. The original conditions were then restored, which meant that we were no nearer to solving the field collapse problem, or rather the firework display which preceded it and could happen at any moment.

Three days on test seemed to prove that the problems were over, so the set was returned to its owners. I still feel that it could bounce back at any time though – Not-Mended?

Then on to the afternoon's outside calls. The first one



The circuit also provides protection in the event of a short-circuit across the h.t. line — say the flyback thyristor going short-circuit. In this event TU07's emitter voltage will fall below its base voltage and thyristor DU04 will switch off — as during the soft-start cycle. DR03 will try to supply the h.t., but the fusible resistor RU05 will go open-circuit.

I'd brought a decoder panel with me just in case I got into trouble, but it was the early one (as I'd thought the set was) with no provision for the flyleads. I'd no alternative to repairing the set's own panel therefore – assuming that the fault was not in the chroma amplifier section on the i.f. panel. We managed to fit some extension leads to enable the panel to work outside the set, and a couple of checks brought us to the fact that there was no voltage at the emitter of the 11V regulator transistor 3VT2 (BC148). A cold check on this showed that it was open-circuit. It didn't take long to fit a new BC148, when back came the colour and my confidence. The panel was back in a jiffy, and we didn't forget to put the black plug back in to complete the degaussing circuit (we still forget now and again, producing clouds of smoke from 8R5 on the power supply panel). So the job had been wrapped up and the young man came over to enquire how much he owed us.

He was gone for a few minutes and returned with a pound note. "Keep the change" he said.

The young man apologised and said he'd thought twelve pence was a call out charge since the repair had been done so quickly. . . .

Sneezing and coughing, I made my way to the next call. The young lady who opened the door was passing fair in more ways than one. Her blonde hair was plaited and piled up on top, and her smile was welcoming as she lead me to the lounge where the set lived. It was a Thorn 9000 which didn't appear to do anything.

“Some people are troubled by conscience” she was saying, and I was also aware that she’d been talking for some time though I’d not been listening. “Conscience has never bothered me” she continued. “I always do what I want when I want and it seems to work out all right.”

"What you need is a large scotch and some sympathy. Would you like me to get you a drink?"

315

tuning operates, as shown by the indicating digit on the display, but the tuning voltage flattens out at some 15-20V instead of rising to just above 30V), or if the leak is severe the station going off when the store button is depressed. Otherwise these machines are very good: the picture is excellent, there's noise-free fast search and stop frame, and the simple mechanism that provides cassette loading and tape threading with a single motor is a masterpiece of ingenuity.

M.P.

### Sony C7

The problem we had with a Sony C7 was that the tape would thread but would not play. Fast forward would not operate either. If the end alarm switch was on, it would sound and the tape would rewind. Having had the problem of auto-stop on the Bush BV6900, I went immediately to the forward oscillator circuit, hoping to find an adjustment. There isn't one on this machine however. Circuit checks were then made and we discovered that the voltage coming from pin 8 of the sensor oscillator i.c. (IC8 on the SY11 system control board) was incorrect at 10V. The circuit is basically a metal detector, so I checked the sensing coil. The resistance was the same in both cases, but when checked back to the board was 35Ω instead of 2.5Ω. This turned out to be due to a build up of oxide deposit on connector CN4013. All was restored to normal after cleaning.

M.S.

### Sony C5

The fault with a Sony C5 was a line drifting down the screen, on record only. Playback with a test tape was o.k., and on looking at the fault it was clearly due to the head switching point shifting. RV3 on the AS6 board was found to work but was not able to compensate for the problem.

While making a recording and checking with a scope I changed channels. The servo reference pulse didn't attempt to lock in at all, and on tracing the pulse back towards the video signal I found some minor discrepancies between the board diagram and the circuit diagram, in the sync switching between record and playback. It

appears that the block diagram had been taken from the C7 manual. On checking around this section I found that D27 was connected to C403, but neither were connected to pin 4 of IC12 (internal switch for record/playback reference). Making this connection removed the fault.

There was also a voltage discrepancy at Q69. Perhaps a corrected diagram should be issued.

M.S.

### Philips VR2020

Here are a couple of symptoms we've had with Philips VR2020 head faults. The first was playback of pre-recorded tapes o.k. but a tracking error on record. One of the actuators that moves the heads up and down had failed. The other symptom looked very much like open chicken netting, affecting the chrominance only. A new head drum cured the problem.

M.S.

### Ferguson 3V30

A Ferguson 3V30 we had in recently would thread up and produce a static picture but wouldn't run. Rewind and fast forward were o.k., but once the tape threaded up the usual clunk, i.e. the pinch roller engaging, was not heard. On removing the cover we saw that the pinch roller was indeed disengaged. I then threaded up the tape and found that the roller would hold in if pushed towards the capstan. There are two transistors in the control circuit, Q4 and Q5. The latter is fed with a pulse at the end of threading up, to supply enough power to pull the solenoid in, and was open-circuit base-to-collector.

M.S.

### Philips N1700

The fault we had on a Philips N1700 looked like the line hold being out on playback only. The servos were all locked rock solid to the reference signal, and after changing the servo panels the fault was still present. I was wondering what to do next when I noticed that the 50Hz reference signal was not synchronised to the 50Hz mains (generated from my hands holding the scope lead). The cause of the trouble was a break in the wire that carries the 50Hz mains signal to the servo board.

M.S.

## Raising the Dead

*Les Lawry-Johns*

A LITTLE while ago a chappie came into the shop and asked whether we'd be interested in buying a colour set for which he'd no further use. We cautiously asked what make of set it was? Philips was the reply. "Does the sound come on as soon as you switch the set on?" "Yes." So it was probably a G8 and thus a viable proposition to fill the role of a loan set, of which we had a need. A deal was struck, and later that afternoon I climbed six flights of stairs to the top flat, where the set lived. Narrow stairs I noted.

He showed me the set working, and whilst the cabinet was in good condition the picture appeared to be a bright cyan, with not a trace of red in sight. Even so I thought it was worth taking a chance, so I paid him and removed the screws which secured the set to its stand. Then came the task of carrying the set down to ground level. He offered to do this for me, but seeing that the set was now my

property I declined the offer and asked if he'd be kind enough to bring the stand down for me?

### Return to the Ranch

So I picked my way down the stairs, carrying the 22in. set at an awkward angle. Now I'm well aware of what you're hoping or at least expecting me to tell you next. Well, there were a few moments when I thought it might happen – the set tumbling down with me tumbling after it – but don't forget that I always put my socks on standing up. I was as sure footed as a mountain goat on those difficult bends where the right foot had plenty of space but the left foot had only an inch to feel for. Huffing and puffing, we eventually made it out to the front of the house, just in time to see a traffic warden taking notes just because there were these double yellow lines.

"Oh it's you" she said, putting her pad away.

"Don't just stand there" I wailed, "open the back up before I drop this thing."

She did as she was told, as all women should, and muttered in my ear "one of these days I'll catch you when there are lines on the pavement as well."

"One of these days I'll catch you when you haven't that uniform on" I said, "then I'll have my wicked way."

"Who would help you then?" she said.

At this point I remembered the stand. "Keep an eye on the van love, something's missing."

I nipped back in to find him laying at the foot of the stairs with the stand around his neck, mumbling something to the effect that the stairs would one day be the death of him. Apparently he'd stopped to have a word with someone on the first floor, and by the time he started down again I was out at the van. Which was why I hadn't heard the crash. What a good job he'd not been carrying the set. Oh yes: was he hurt? Well I don't think he suffered any lasting injury, and the stand was still in one piece. So, wishing everyone the best of good luck, I departed for the shop to make sure that everything there was going according to plan. I found Honey Bunch listening patiently to a customer who was describing what was wrong with his set.

It was a portable, and apparently wouldn't go unless turned over and slapped on the bottom. Honey Bunch seemed to find this very interesting. "I see. It won't go until you smack its bottom. Fancy that! Well I never!"

It transpired that the line output transistor was bolted to the bottom panel on a heatsink and that the nut was loose. A jolt was necessary to complete the path to the collector of the transistor. A turn with the pliers was all that was required. This made the customer happy, but Honey Bunch kept on about it. Her comments were interrupted by a loud noise outside.

### **The Wheelbarrow**

We were somewhat surprised to see a large iron wheelbarrow being humped up on to the pavement by two chaps. In the barrow was an object covered by a piece of black plastic sheeting that was secured by a number of house bricks. They brought the barrow over to the shop door and proceeded to remove the bricks, dropping them on the ground. Eventually the object was uncovered. It was a Decca 30 series set (Bradford chassis) which they then carried into the shop. They were apparently father and son, and father did the talking.

"I came in last Saturday and told you the sound had gone off on my TV. I asked you which valve it was and you said it could be the PCL82 or something that carried the juice to it – perhaps both." He talked on without a pause. "The valve I paid you one pound sixty five for hasn't done the job so we've brought the set along. We live at Meopham (about six miles away) and I know you'd charge if you came out. Can't see me paying through the nose if I can bring the thing in myself, so here it is. Picture's lovely – isn't it son? Sound's gone off, that's all."

Six miles. Through rain and wind. What courage! What fortitude! What an idiot! The poor old set must have been shaken out of its life after all that way on an uncushioned metal barrow.

With some misgivings I took the back off and plugged it in. The valves warmed up but there was little other sign of life.

"Where's that lovely picture you mentioned?" I asked.

"Something must have happened on the way" he moaned. "Anyway, here's the valve I paid you for. If you give us the money back me and the boy will go and get ourselves a cup of tea while you do the set." I wondered about the import of this statement, but gave him his one sixty five and off they went.

Pulling the chassis back I was able to reach the h.t. fuse which had failed. With a new fuse fitted the e.h.t. rustled up once the valves had warmed, but there was no sound. The 1.8k $\Omega$  resistor that supplies the h.t. supply to the PCL82 audio amplifier/output valve was open-circuit. It had died a natural death rather than being killed by the PCL82, so we wrapped the job up and found a nice piece of packing for the set to travel on more comfortably.

A little later the owners returned from their refreshment. They didn't argue about the service charge (much to my surprise), so apparently they hadn't needed the one sixty five to pay for the tea.

### **Red is Dead**

At last I could investigate the newly acquired G8. Voltage checks on the base revealed that all three guns were receiving equal voltages, but there was no sign of red. So we asked the tube tester for help. It said blue gun good, green gun good, red gun nothing. We then employed the tester's reactivation section. Still nothing.

So we brought into action the reactivator we built from the *Television* design published back in April 1978. With a meter in series with the red cathode and boost applied to the heaters we got a reading of only a few microamps. Left for a bit the needle climbed a couple of microamps and then fell back again. Clearly the red gun was bugged. We would have to fit a new tube, but meanwhile we could hardly hurt this one so we decided to carry out a couple of experiments. The normal heater supply from the tester is 6.3V, the boosted supply 8V. How about some more? We've a bench supply for checking car radios, cassette recorders, etc. This normally supplies 12V at 1A, but can provide more – up to about 15V.

With nothing to lose we applied 12V to the heater pins, with the red grid and cathode still connected to the reactivator via the meter. After a few seconds the heaters glowed very brightly. A few seconds later a nice spluttering came from the red cathode and the meter's needle swung over to 60mA, with the lamp lighting just to add fun to the proceedings. We immediately removed the 12V supply and reconnected the reactivator's heater supply. The heaters dimmed nicely, but the needle still maintained the full reading and the lamp remained alight to show that the red cathode was alive indeed, as were our hopes. The set is still giving a reasonable picture in fact, and we hope it will continue to do so for a while.

Thus encouraged, we decided to try the process out on another duff tube – one whose green and blue guns had both gone. This time the results were not as hoped for, and we realised that our first experiment had been a lucky one.

Finally, if you try this excess heater volts lark don't blame us if the heaters fail on you. Do it only if you've nothing to lose.

### **Footnote (ha ha!)**

Oh yes, and Honey Bunch says if he's as sure footed as a mountain goat how come he falls over a snow flake and rips his sheepskin?

# Mr. Daines' Dynatron

Les Lawry-Johns

BY and large Dynatrons are not sets that lend themselves to being carried about, at least not far. So when Mrs Daines phoned to say that her fairly new Dynatron was giving trouble I packed my bag carefully so as not to get caught short as it were. The initial complaint was of intermittent sound, so we were fairly confident that we wouldn't have to hump the set about too much.

We arrived at the house and exchanged pleasantries with Mrs Daines, her small daughter and her large red setter which appeared to me to be the largest of its breed I'd ever seen, height and lengthwise that is as they are pretty lean dogs. Suffice it to say that when I bent to remove the screws from the back of the set his head and mine were about level – so I was glad his tail was wagging. Since the set used the Philips G11 chassis the number of screws that had to be removed was limited (unlike the twenty million that secure the backs of earlier models).

As I removed the rear cover Jason's tail stopped wagging and he started to bark angrily in my ear. I moved smartly to one side to allow him full territorial rights. I wasn't quite sure what was upsetting him, but in retrospect I can understand: he knew what I was letting myself in for and was warning me off.

"Shut up Jason" I asked him nicely. Bark, bark, bark.

"Sod off then" I said not so nicely. Bark, bark, bark.

Mrs Daines appeared and dragged the irate Jason off. She then shut him in the kitchen and returned to find out what all the fuss had been about.

"What did you do to him?" she demanded.

"I didn't do anything. I just took the back off the set and he started up."

"You didn't kick him or anything?"

"Nope. It was something in your set that upset him. Probably that diode sticking out up there – some lazy bugger's stuck it on the wrong side of the panel and used the wrong type into the bargain."

"You're the first one who's taken the back off: it's practically new and we bought it in the West End, from a very well known store."

"In the sale?" I queried.

"Yes. What difference does it make?"

## Audio Output Transistors

"None really I suppose" I said doubtfully. "Anyway it's nothing to do with the sound." So saying I shone my little torch on the lower left centre where the audio output transistors live and there, on the base of one of the BD131s, was a classic dry-joint. I soldered it up properly and tried the set. The sound came on loud and clear. My job was done – so I thought. We let Jason back in and his tail wagged to see the back on again. "Funny dog that" I confided as I took my leave.

## A Funny Noise

I'd hardly got back to the shop when she rang again.

"There's a funny noise on the sound, a loud rustling noise."

So back we went and having ensured that Jason was safe in the kitchen we took the back off to try to locate

the source of the noise.

It was a remote control model, so there was a small extra panel fitting into a socket which in ordinary models has two of the pins shorted across. When this small panel was removed the noise stopped, so we were sure the trouble wasn't anything to do with the BD131s that had received attention earlier. The noise was also absent when we shorted out the two end pins, so it seemed likely that the trouble was on the panel we'd removed. We put it back and the noise returned, stopping when we shorted the base and emitter of the BC158 on the panel. I searched through my untidy spares box and at last found the required transistor. In it went and the sound was no longer disturbed.

## It's Gone Right Off

I was just getting into the car when Mrs Daines called out.

"It's gone right off now, picture and all."

Heaving a sigh, I carried my little boxes back in again.

This time one of the 3·15A mains fuses had blown. Now this normally means that one of the bridge rectifier diodes on the bottom right power supply panel has gone short-circuit. Remove panel and check diodes. As they seemed to be all right I then had a quick run over the thyristors etc. No joy. Change diodes anyway since they are suspect and if the fault lies elsewhere, say on the upper line output panel, the 1A h.t. fuse would have blown. So with four nice new diodes fitted we switched on confidently. Hrrump bonk it went. Now this is not the sound of a direct short – you just get bang in that case. My decision was lightning fast. "Fetch Jason in."

Mrs Daines shook her head in resignation but still fetched Jason. In he came, tail wagging and friendly. Until he saw the back of the set exposed. "Bark, bark, bark. Bark, bark, bark."

My eyes narrowed at this fresh evidence. So out came the supply panel and we examined the h.t. fuse closely. It was a 3·15A type. Swine! In a trice I'd slapped the meter across the protruding diode. Dead short. Now it's one of the EW modulator diodes and although it had no marking it closely resembled a BY127. It should have been a BY223. I showed Jason the shorted diode and he barked at it. "Good boy" I said. "Clever boy – you knew it shouldn't have been there."

So with high hopes we fitted the required BY223, a 1A fuse and two new 3·15A fuses. On came the set as good as gold. Or so it looked to me.

## Bowed Sides

Later that evening Mr. Daines phoned. "Thank you for doing our set. But should the sides bow in so much? – the snooker table looks like an hour-glass."

"See you tomorrow Mr. Daines." Why hadn't Jason noticed the concave sides?

Mr. Daines was there when we arrived. He said his wife had popped out just before I was due to arrive as her nerves weren't too good lately. He would watch how Jason behaved.

I took the back off with Jason sitting beside me. His tail wagged all the time, seeing that nice smooth vista of panels. Not one bark passed his lips. When an ordinary picture was examined the edges could be seen to be bowing in, but it was when verticals were displayed that the fault was most obvious.

The EW centre shaping control is on the top left side, just inboard of the width control. Neither control had any effect, so we checked the following transistors and found that the extreme left side one, T150 on the heatsink, was open-circuit. We raked around in the spares box but couldn't find a BD238 and had to settle for a BD428. It seemed to be quite happy in this position, and the width and EW shaping controls now functioned as they should. We asked Jason if he was happy, and as he said he was we had a quick check up for dry-joints on the line output panel (a happy hunting ground for poor connections on this chassis) and at last wrapped up the job.

We haven't heard from the Daines' since, so we must conclude that all is well. The moral of this story seems to be that if you have to go out to a G11, take a red setter with you.

### The Philips TX Chassis

We now have to relate the sad story of a set we couldn't do. It was a Pye monochrome portable using the Philips TX chassis. We've serviced lots of these, all with no trouble at all. Most of them have suffered from poor smoothing, which has been put right by replacing the BD434 series regulator transistor or an associated component. When we were presented with this one we were informed that it had been obtained from a club and that it was still under guarantee. We were not wholly enthusiastic about taking it on therefore, but as it was suffering from what seemed to be poor smoothing we thought we might be able to help out with a quick job.

"Call back in an hour or so" we said recklessly.

The heartache then started. We checked the regulator. No fault here but change the transistor just in case. Check the reservoir electrolytic. No fault but change it just the same. Check the voltages and note that the 10.5V preset R113 has no effect at all. Also find that the input to the regulator is little more than 11V instead of 15.3V. Ah ha! A regulator cannot perform its regulating and electronic smoothing functions when the input is low. So why is it low? Check the bridge diodes and change them just in case. Still a horrible hum bar.

Check carefully through the regulator's control circuitry. Everything in order. Note that the 47Ω resistor (R110) in parallel with the regulator transistor is not fitted as the set has remote control. Check the 100μF 10.5V line decoupler (C113) and find it o.k. Begin to sweat. Check everything again. Start to swear. Owner returns and note that he's driving a Decca van. "Sorry" I say. "Can't find the trouble."

"Don't worry. I'll get the chaps at work to sort it out for me. They told me to bring it to you first."

"When they do sort it out" I said humbly, "would you ask them to let me know what it was?"

About a week later they did ring. After much toil and sweat going over the same ground they chased the grey lead up to the remote control receiver panel – not part of the main deck, but on the upper left behind the tuner selectors. There they found an open-circuit resistor. They were quite pleased to let me know. Well done Racal-Decca. Bad show Uncle Les. Clot!

# next month in

# TELEVISION

## ● THE REDIFFUSION Mk. 4 CHASSIS

Rediffusion chassis always have something a bit different in them. This latest one, which is found in Doric, Murphy and Ambassador sets as well as Rediffusion models, is no exception. It's designed to drive either 90° or 110° tubes with only minor changes, and incorporates an audio/video interface panel as standard. The parallel chopper circuit is controlled by a TDA1060 i.c., and a single 40-pin chip is used as the colour decoder – type TDA3300. A feature of this chip is the use of negative feedback to provide automatic black-level correction.

## ● SERVICING FEATURES

S. Simon on tests for common faults in the GEC C2110 series solid-state colour chassis and Tony Thompson on the Luxor 90° hybrid colour chassis used in many ex-rental Rediffusion colour sets.

## ● VIDEO SYNTHESIZER REVIEW

And now for something different. Eugene Trundle decided to see what the Chromascope video synthesizer could do and subjected it to a number of tests.

## ● EXTRAS FOR THE HITACHI VT8000

Derek Snelling found that the basic VT8000 machine could be easily adapted to get half speed, double speed and tape indexing. The latter puts a signal on the tape so that it stops at the beginning of each recording in the fast forward and rewind modes.

## ● COLOUR PORTABLE UP-DATE

Some minor modifications and a new line drive arrangement. Also the latest on the BTW58 GCS and using the TDA3561 in place of the TDA3560.

**PLUS ALL THE REGULAR FEATURES**

**ORDER YOUR COPY ON THE FORM BELOW:**

TO .....  
(Name of Newsagent)

**Please reserve/deliver the July issue of TELEVISION (80p), on sale June 23rd, and continue every month until further notice.**

NAME .....

ADDRESS .....

.....  
.....

# Ah For Yesterday!

**Les-Lawry Johns**

WE seem to be losing our touch. Sets keep coming in that I haven't the parts for or the problem is one that can't be dealt with in the time available. Like the Bush T20 which wouldn't start until I disconnected the left-side signals panel. I thought that would be easy. Just connect each plug in turn until the one with the short is identified, then check the relevant circuitry through. I subsequently found that the set shut down whenever the signals panel earth connection was made. This was so even with all the other connections except those to the tube base removed. The fault remained when the tube base was disconnected, so what was causing the overload? At this point the owner returned. I tried to explain to him what was happening, but he looked as blank as I did.

"If it's going to be trouble, I'll take it back where I got it. It's still under guarantee you know."

It's a fact that a lot of people think that the four year tube insurance is a four year guarantee on the set, but I kept quiet.

"Oh well, if that's the case I'll put it back together so that you can take it" said this coward. Which I did, and he took it. If the person who finally did the job and located the fault reads this, perhaps he'd let us know what it was all about.

Like the Garrard hi-fi music centre with both loudspeakers faulty and the fuses blown. One output pair of transistors was shorted, and I thought they'd be of the ordinary BD203/204 variety. When I looked up the BDX53/54 devices fitted I found that they were Darlingtons. So I did a quick phone around. Not in stock. Sorry don't keep them. I eventually got the npn half, but nowhere could I find the pnp half (TIP135 etc.).

In the meantime I thought I'd check up on the good side with a new speaker fitted. Someone had been there before me, and although the circuit was working from the output stage back to the audio input there were no signals from the radio or gramophone sections due to a mix up of the many interconnecting leads. I surveyed the whole thing and decided to remove the new loudspeaker, replace the old one and call it a day (to be fair, after a few hours of torment and making up a pnp Darlington pair, then finding that this side wasn't working either). I decided to spend the rest of the day sulking, and immediately got into trouble with Honey Bunch. She put her hands on her hips and launched into a bitter tirade.

## Onslaught

"I don't know what's got into you lately. You don't do anything properly. Most people wash their hands after they've been to the loo. Not you. Oh! no. You have to wash your hands before. How vain can you get? And do you have to put the lead round your own neck when you take the dog for a walk? If you don't pull up those socks you keep mentioning there'll be a change here all right and you'll be sorry."

Well. What an outburst. And so unjustified. Of course I wash my hands before going to the loo. You can't be too

careful. What with all this infection about. And as for the dog's lead, he doesn't want it on and the chain makes it heavy so I put it around my neck to leave both hands free to waive to everyone – and to carry the bottles from the off-licence.

But it was the first bit of the onslaught that gave me pause for thought. Was it a fact that I wasn't doing things properly? I thought it was just a coincidental run of useless jobs that would not have been profitable anyway – and one can hardly be expected to tackle everything that comes along, can one? A tiny voice at the back of my mind said "you used to".

Yes, that's true. I used to work all hours, doing the jobs that didn't pay as well as those that did. Vanity, that was it. I'm not so vain any more, and I'd rather put my feet up for a couple of hours in the evening – and watch television! When I think of all the running around we did in the fifties, working round the clock and actually enjoying it (though we never let on)! We were younger of course, full of vitality and virility. Things were also a lot more straightforward: there was nothing like the almost evil complexity that seems to permeate everything these days. I feel I'm not alone in this weariness of never ending complication, but if anyone feels inclined to disagree I ask one question first – what age are you old chap?

## Mr. Frisby's Murphy

Anyway, that's quite enough of this depressing clapping. Let's get on with some work done properly – this time. Mr. Frisby sailed in carrying, with some difficulty, his 26in. Murphy (Rank A823 chassis). He put it down, again with difficulty, and his trousers split at the rear.

"I thought that only happened to me" I consoled him.

"Bloody heavy set that" moaned Mr. Frisby. Ben, our collie, came round to see what was going on and Mr. Frisby went to pat his head. Ben snapped at his hand and Mr. Frisby jumped back in alarm.

"He only bites men" I explained, having ordered Ben out of the shop in disgrace.

"Do you get many customers in here?" asked Mr. Frisby.

"Not many."

"I'm not surprised if you keep a vicious dog that bites everybody."

"He's getting old and grumpy, and it's taken me a long time to teach him to bite men and not women. Now I've got to teach him not to bite anyone during the day, but it's taking a long time."

Mr. Frisby gave up on that one and explained about his set. Apparently the sound was o.k. but there was no picture (raster). With it up on the bench we found that there was h.t. at the top fuse so we moved across to check the c.r.t. base voltages. Plenty of voltage at the first anodes, cathode voltages slightly high, grids slightly negative. Shorting the common grid point to chassis produced a pale raster with no modulation.

"How much are you going to charge me?" asked the anxious Mr. Frisby.

"You'll get about fifty pence change out of fifteen quid, counting the VAT" I estimated, bearing in mind the cost of the SL901B decoder i.c.

"You charged me only a fiver last year."

"This time it looks like a rather expensive chip, but you can hang around if you like while I make sure."

So he hung around whilst I checked the other possibilities, but as I was getting nowhere I started to unsol-

der the SL901B. He watched this operation, fascinated. "Those pins are close, aren't they? You'll have to be careful when you put another one in. Have you got another one?"

I stopped operations. "If you say another word I'll call the dog in." He started to say something, then shut up.

The new chip was fitted and the decoder panel replaced. I was fully prepared to be proved wrong by a blank screen, but the picture appeared, albeit with the green missing. Fortunately the green output stage is the first one in on the top of the panel, so it was no great task to take voltage readings with the panel in place and wedged open with half a reel of used tape. Collector voltage high, base voltage higher than normal, nothing on the emitter. So in went a new BF337 and the picture looked more normal. As I was putting on the back cover, Mr. Frisby started to get his money out.

"Change out of fifteen quid you said."

"That was for supplying and fitting the chip. Not for the extra transistor, and fitting it."

"Just thought I'd try it on" he smiled. "I called in one of those chaps who advertise in the paper. You know, no call out charge and free estimate. He wanted thirty five quid for a new decoder panel and said that was cheap." So Mr. Frisby parted with half of that and went away quite happily.

### ***The Vet's G9***

Although we've sold more G8s and G11s, plus KT3s and K30s, than I can remember, we've sold only one G9 so far as I can recall. That was to our local vet, and of course we have to keep on the right side of him and his partners. So when he arrived with the set in the back of his car we assured him that he'd be kept waiting no time at all. His description of the fault (sides coming in and going out, then no picture at all) suggested that it was the trouble common to all G9s – the 2,200 $\mu$ F electrolytic on the line scan panel. It did look a bit sick, so we changed it. The no picture condition remained however, and there was a familiar acrid smell . . . Surely not. But it was. The line output transformer was hot to touch, and remained dead with the tripler disconnected.

We had lots of G8 transformers, but not a G9. None of our local friends had one, so all we could do was to order one by phone and wait. The best laid schemes . . . I've since learnt that a new wholesaler has opened up not far away, and that I could have obtained one within the hour, but I didn't think. Isn't that where we came in?

### ***Mistaken Identity***

I was in this queue of traffic waiting to leave a car park and we didn't seem to be getting very far. I noticed the woman in the car in front looking in her mirror – and not at herself. She seemed to be looking at me.

I saw the driving door open, and a pair of shapely legs swung out. An equally shapely lady followed and came straight back towards me – smiling, I was glad to note.

"Hallo darling. How lovely to see you. Just as pretty as ever" she gushed.

"Evergreen" I admitted. The cars ahead then started to move and off she dashed, calling out something about phoning.

I'd never seen her before and can only think I must have a double. Handsome perhaps, on a very dark night, but pretty?!

# next month in

# TELEVISION

## ● SERVICING THE RANK Z718 CHASSIS

The Z718 followed the famed A823 series, being the first Rank chassis to use an in-line gun tube. Large quantities were produced over several years, many being distributed by Comet Radio. Part 1 of a detailed servicing guide.

## ● SATELLITE TV INSTALLATION

Earlier this year Steve Birkill installed a demonstration 4GHz satellite receiving terminal at Sonic Sound Audio Holdings. In describing what this involved, Steve provides much insight into the present possibilities and state of the art.

## ● VCR MATTERS

Part 4 of our series on the Philips VR2020 describes the elaborate motor control system – the machine uses five separate motors. Also the article on modifying the Hitachi VT8000 originally scheduled for publication last month.

## ● ROUTINE TV SERVICING

S. Simon outlines basic servicing procedures to adopt when confronted with an ailing ITT hybrid colour receiver (CVC5-CVC9 chassis).

## ● WIDEBAND UHF AERIALS

There are two basic ways of obtaining wide bandwidth with a u.h.f. array – the long Yagi and the stacked bow-tie. Roger Bunney discusses their relative performance characteristics.

**PLUS ALL THE REGULAR FEATURES**

**ORDER YOUR COPY ON THE FORM BELOW:**

TO .....  
(Name of Newsagent)

*Please reserve/deliver the August issue of  
TELEVISION (80p), on sale July 21st, and continue  
every month until further notice.*

NAME .....

ADDRESS .....

.....  
.....



# All Good Clean Fun

Les Lawry-Johns

FIRST a story about Mr. Bee, a busy little fellow who likes to know how everything works. In other words he pokes his nose into everything, and has a go even at complicated things that frighten lesser mortals (like you and me). His TV set is a 14in. colour portable fitted with the Philips KT3 chassis, and is of adequate size for the small room he occupies. When it went wrong he took it to his friend Raymondo, an experienced engineer who spends his days in a fully equipped workshop surrounded by thousands of TV sets and VCRs that await his expert attention. Mr. Bee complained that the picture had shifted across and couldn't be centred. He then left as quickly as he'd come.

Raymondo spent many hours checking likely suspects, then many more checking unlikely ones. Eventually he cried "enough, enough!", and phoned Philips Service who advised him to check all the things he'd already checked and then suggested he let them know what it turned out to be.

So, lonely and dispirited, he turned once more to the off-centre picture. Quite by chance there was a degaussing coil on the bench, and Raymondo picked it up and shook it at the set in anger, switching it on by habit. To his amazement the set's screen became blotched, with wrong colours. He waved the coil at it again, and the screen became even more impure. This was the last straw, and Raymondo shouted "you're not supposed to do that. When I degauss you you're supposed to become pure, not impure".

Next he turned to the task of purifying the screen, and as he did so the picture shifted over to its correct position. During all the hours he'd spent he'd not thought of the purity magnets. Why should he? Who'd shifted them in the first place and why?

Mr. Bee should clearly be questioned. So when he came back Raymondo pounced. "Why did you alter the purity magnets you silly bugger?"

"I had to. The purity was atrocious after we changed the room around."

"Where did you stand the set?" asked Raymondo carefully.

"On top of one of the hi-fi speakers . . ."

## Fancy Falling for That One

I should laugh at others. Look at the one I fell for the other day. My face is still red.

In came this Pye colour set fitted with the 725 chassis – the one with the vertical boards that always seem to stick in the runners when you're sliding them out or sliding them back in again. It's worse when you take the panel out altogether, because when it comes to replacing the panel you just can't seem to get the angle of the top bit of the jigsaw right to permit entry. I've just about got it worked out now after some four or five years. A bright young lad who had nothing to do with TV work showed me how to do it in thirty seconds a long time ago, but I still had difficulty long after he'd departed. We've handled so many now however that they no longer give us heartaches, and this one wouldn't either if only I'd stopped to think and remember for a moment. But I didn't.

The 800mA h.t. fuse (F971) had failed and I immediately suspected the BU208 line output transistor. A quick check showed that it was indeed short-circuit. I don't like replacing line output transistors in this chassis because the fixing screws are often stubborn and I certainly won't ask son-in-law Dougie to help with their removal again (remember his "no problem" when he hit the screws an almighty bang and bloody nigh shattered the panel?). This time the screws didn't offer too much resistance however, and a new BU208 was soon fitted. There didn't seem to be any shorts, so we fitted a new fuse and switched on. The fuse glowed a pretty red and the new BU208 gave up the ghost.

"Fool" I said, taking the panel out again. In went my last BU208, then I unhooked the tripler and fitted a 150Ω wirewound resistor across the fuse holder to limit the current in case it was still excessive. It wasn't, so like an absolute idiot I fitted a new tripler and connected the meter across the fuse holder, switched to the 500mA range. Switch on and the needle goes right over – I removed the meter probe just in time to save the BU208.

So I started talking to myself. "Disconnect the tripler and we're laughing. Connect it up again and we're crying. There must be a short in the tripler or something it supplies. We've changed the tripler so that's out. What else is there?" Fool, idiot, maniac. The c.r.t. first anode supply reservoir capacitor C563 (0.1μF, or 100nF if you prefer it that way), which is charged by the clipper diode in the tripler. Fancy forgetting a simple thing like that. Easy to do however as C563 hides under the top of the line output stage screening box. It was short-circuit of course, and a 1.25kV replacement put things to rights and allowed us to refit the old tripler – with apologies to it of course.

## Even Dafter

I then went on to commit another howler. On a simple Pye 163 chassis – the large-screen hybrid monochrome one, not the portable. A development of the 169 if you remember. It came in because of intermittent loss of signals, both sound and vision, the screen going completely blank when the fault occurred, leaving a clean raster.

I immediately assumed that the fault was late in the i.f. strip, first because the sound also went, and secondly because there was no noise on the screen as there should be if the i.f. stages were working. So I patiently plodded through the i.f. stages and they all seemed to be in order, confusing me no end. Next I injected signals from my trusty (and old) Advance signal generator. The bars proved that the i.f. stages were in fact working, and that the a.g.c. circuit was incorrectly set up – hence the absence of the expected noise. So I accused the tuner and fitted a new one.

On came the picture and sound. For ten minutes. They then went off again, and a meter check showed that there was no tuning voltage. Shouldn't this have left the tuner operative, albeit without programmes? At last we consulted the circuit, and realisation hit us. The 11V supply for the tuner is also obtained via the 22kΩ, 2W resistor at

the top of the chassis. Once again I'd overlooked a simple and extremely common fault – common because the resistor originally fitted is not man enough for the job. Perhaps the intermittency had led me astray. Perhaps the lack of noise on the screen. Perhaps, perhaps. But the fact is that I should have waited for the signals to disappear and then checked the tuner unit voltages in the first place, not jumped to hasty and wrong conclusions.

### **E. Knell and the Bush Ranger**

Mrs. Knell paid us another visit recently. This time I wasn't frightened of her because I'd found out that her real name was Elaine Knell, not Eskimo Knell as I'd so foolishly thought those few months back. She had with her a small, white Bush Ranger portable, and gave me a radiant smile. "I hope you're feeling better now. You looked a little groggy last time I called" she said in her soft, seductive voice. I looked at her perfect, rather pointed teeth.

"To tell you the truth I thought you were a man eater" I confessed.

"Opportunity would be a fine thing" she said. "I couldn't have frightened you that much surely?"

"Well you see it was the name. I thought it was that lady who lives in the Yukon and eats men for breakfast, and Dead Eye Dick and Mexican Pete rode down to the Rio Grande to get away from her."

"Oh, I see! Those old rugby songs my dad used to sing. Beautiful songs – filthy songs. But haven't you got it mixed up? They didn't ride away from her, they found her near a big wheel that went round and round."

Now she was getting mixed up, so I thought we'd better get down to business.

"When are you – I mean what's wrong with the little white set?"

"Oh, nothing much. It's just that the sound comes on for a second or two and then goes off. Probably something loose."

"O.k. Mrs. Knell. Leave it with us till about five. We'll

make it talk by then."

I could hear Honey Bunch singing softly in the background. "I tort I saw a pussy tat a cweeping up on me." So Mrs. Knell made her graceful exit and I had to explain the whole thing to H.B. "I thought she was Eskimo Knell, but she's only a vampire after blood."

"Don't you worry. The only female that's going to have your blood is me, and if you don't get cracking I'll have it right now."

"You're so sweet" I murmured.

And so I started the long drawn out battle with the Ranger. I removed the rear cover and the aerial panel, slackened the top fixings and the tube base socket, stood the set on its side and gained access to the plug-in i.f. panel – thinking there was a poor edge connector contact. Switch on and the sound comes up loud and clear. Then stops.

I located the intercarrier sound i.c.'s output pin and applied a hum test with my test prod. A loud, clear hum. So the audio output stage was intact. I applied a test signal to the i.c.'s input pin and there was no response. So a new chip was fitted. Not all that simple as there are variants of the TBA120 and the only one I had in stock was of the wrong type. Raymondo was eventually able to supply the correct version (I thought). Still no sound.

I heaved a sigh and started on the tedious business of removing the capacitors around the chip and testing them separately. Two of the 0.02 $\mu$ F disc ceramics showed leakage, one associated with the input and the other with the d.c. volume control. Fit two new capacitors and again switch on. There didn't appear to be any sound until I rotated the tuner slightly. The sound then came in on a knife edge, with a cracked quality suggesting that the quadrature coil L15 needed readjustment. Doing this didn't make any difference. I never thought it would.

So I gave up and refitted the original chip. The sound burst through loud and clear and stayed on. I hate disc capacitors marked 0.02.

Mr. Knell came in at five o'clock. A little grey man. Looked as though he needed a transfusion.

## **Letters**

### **NEON TESTERS**

It is not true that with a neon tester "the only insulation between you and the live test point is the neon itself" (letters, June). When a neon strikes it becomes a virtual short-circuit, the only limit on the current flowing through the user's body being the high-value (1M $\Omega$ ) series resistor in the body of the screwdriver. Without this series resistor, the user could experience a severe if not fatal shock depending on the voltage being tested. The series resistor will provide protection should the type of neon your correspondent regards as unsafe go short-circuit. I feel that these points should be made in the interests of safety.

K. C. Duncan, F.S.E.R.T.,  
Bolton, Lancs.

### **LUXOR AND PHILIPS**

Reference was made in the *Teletopics* column in your May and June issues to relations between this company

and Philips. The discussion to which you refer in your June issue took place many months ago, and I would like to emphasize that the two companies are no longer talking about mergers or takeovers or, as they say in Sweden, "any kind of fusion".

Dennis Swannack,  
Managing Director, Luxor (UK) Ltd.,  
Slough, Berks.

### **WHERE DID WE GO WRONG?**

Your leader "Backing and not backing winners" (June) brought back several recollections. In the late 50s and early 60s for example EMI produced some of the best early computers – I maintained one of them, a hybrid valve/transistor device code named CP407, for two years at British Leyland. We had some funnies due to heater-cathode shorts in the double triodes etc., but the germanium transistors used in the card reading buffer stages behaved wonderfully. The clock frequency was only 100kHz, and the printers and tape decks were weird and wonderful – 4in. tapes and printers run on a system of Bowden cables. We nevertheless managed to do the whole payroll for BL on the machine in the early 60s. The machine was then improved, with much faster card read-

R749 to 680k $\Omega$  and the balance potentiometer R752 to 220k $\Omega$ , results in solid, stable line sync.

Now for some general comments. First, although I agree that a smoothing electrolytic can should be replaced complete I have on numerous occasions fitted separate 33 $\mu$ F, 470V electrolytic capacitors to decouple the 220V supply to the luminance output valve on the CDA panel and the 240V supply to the PCF802 line oscillator on the timebase panel without any problems.

Secondly, taking the earth off test equipment is not the answer to workshop safety – the aerials and many other things are earthed. All workshop benches, or at least the set being worked on, should be fed via an isolating transformer to remove any risk.

Thirdly, I've been covering these sets successfully for many years. If a few rules are followed the results are excellent. First remove all old polish using a foam cleanser, then give all the edges a thin coat of Evostik contact adhesive and allow it to go off – this will ensure no curling at the back and front. There's a contact material available that matches the wood perfectly.

A last but most important point. Many of these sets have been used on stands with the feet removed. If the set is then put on a flat surface without some type of replacement feet being fitted the result will be overheating due to poor ventilation.

*Steven Howard,  
Ashford, Middlesex.*

---

## Ripples on the Mill Pond

**Les Lawry-Johns**

IT'S been very quiet around here lately. Not many laughs, but quite a few headaches with some of the sets that have come in. The chief trouble maker at present seems to be the Rank Z718 chassis (Bush Model BC6100 etc.), closely followed by the Philips G11.

### **Mr Nosegrinder's Z718**

Take for example the Z718 Mr Nosegrinder brought along.

"There's not much wrong" he said helpfully. "You're watching a good picture, when all of a sudden it goes down to a short, dark picture – mainly blue."

I closed my eyes in apprehension. Whenever someone tells you not much is wrong, you can bet your life you're in for a nightmare – albeit one probably helped by you not thinking carefully enough about the symptoms. This was a classic case, and I never seem to learn since I made the same mistake later with a G11.

I hooked up the Z718 and studied the picture it displayed. Not much to complain about. Ten minutes later it suddenly went dark and the height shrank to a little over half. My reaction was to assume (wrongly) that there was a fault in the field timebase, and that this was pulling down a supply line going to other sections of the set. The obvious step to take was to check out the field timebase circuit, preferably with a can of freezer since the fault seemed to be heat sensitive.

So I squirted away with the aerosol, first at this, then at that. Output transistors, drivers, amplifiers and oscillator transistors were all subjected to the freezing blast, until I began to feel cold myself. Needless to say it made no difference, so I started to make voltage checks on the output and driver transistors. The voltages didn't seem to be far from what was to be expected, so we moved over to the field scan generator department (another five transistors). The voltages here seemed to be a little on the low side, but the relationships between the base and emitter readings were right. I then switched off and checked every transistor, each one proclaiming its innocence. Switch on again and everything's back to normal, so the transistor checks had been inconclusive. Again the height shrank and the brightness went down.

In desperation I checked the voltages on everything in

sight on the timebase panel – and found a wildly incorrect reading between the base and emitter of 4VT21. Take a look at the circuit and find that this transistor is part of the 12V regulator circuit. Bloody fool! All that mucking about and you didn't stop to think of a possible common cause for all the symptoms. Check both transistors in the circuit and find them to be o.k., though the reverse reading between the base and collector of the regulator transistor 4VT20 wasn't the expected 910 $\Omega$  (4R77). The reading was very high in fact, gradually falling to something like 2k $\Omega$  as the set cooled. So out came 4R77 and as the nearest value we had was either 820 $\Omega$  or 1k $\Omega$ , in went 820 $\Omega$ . The set then worked very well, and continued to work for as long as it was left on.

I made a mental note of that one, but later discovered that everyone else in the world already knows about 4R77 going high in value. Funny that.

### **And the Next Gent Please!**

A Philips G11 was next. Mr Dry Joint himself. The set, not the owner. The symptoms were that the picture would come on all right for about five minutes, then fade – at the same time losing colour. On the bench this was indeed what happened, and we noticed with our eagle eye that the picture also became grainy and the sound went down slightly. "Tuner or early in the i.f. strip" I said, so I checked the operating voltages in the i.f. unit and went over the joints carefully. No joy. Next fit a new tuner. The picture seemed to stay on longer, but faded nevertheless.

I looked hard at the suspect lower panel, and noted the sound output transistors on their heatsinks and the single power transistor below them. "I wonder what you do?" I thought. So I checked the voltages around it and found that they were wrong. Better look into this. It's not a transistor! It's an i.c., type TDA1412 – the 12V regulator. Oh no, not again.

Look around for a replacement, but none in stock. The stock book said no, but it sometimes lies. Anyway we didn't have one, so I carried out a check by bridging it with a 120 $\Omega$  resistor and connecting a 12V zener diode from the low voltage end to chassis. The picture remained perfect, and the rail remained at less than 12V – so the

zener diode wasn't being asked to do anything much, but it was comforting to have it there just in case of a sudden rise. It would have to remain there for only a couple of hours, until I could con someone into nipping out to the wholesalers for me – my friends didn't seem to have one either.

"Hallo Geoff. Have you a 1412?"

"A what?"

"You know. 1412 as in the French retreat from Moscow overture."

"That's 1812 you nuthead."

"Sorry Geoff. What I want is a TDA1412."

"Well I haven't got one and if I had you wouldn't get it. Not after telling that pretty redhead I was queer."

"I meant you were unwell, Geoff, honest."

The phone went down so I tried Raymondo who didn't have one either, which is why we have to go to the wholesalers. O.K., so what have we learnt from this time wasting exercise? Simply that to check voltages approximately is not enough. A fall of something like 2V on a 12V line is enough to affect the whole set badly. A drop of 2V in one stage would perhaps not be noticed, but when all the i.t. fed stages are affected equally a far more dramatic effect is to be expected.

In future I'll pay more attention to the exact readings, even if it means putting on my glasses and taking them off again more often than I do now. We don't want to make any more boobs, do we? Which reminds me that a pretty little redhead is expecting me to call and check her remote control.

### ***The Pub in a Field***

When Mr Piddlewell popped in we thought it was his Thorn 8000 that was giving trouble again.

"Has it gorn again?" we asked, with bitter memories of the set's history of intermittent starting.

"Na. It ain't mine this time. It's a customer of mine out in the sticks." He gave me directions on how to get there, "so that even a fool like you can't get lost." Nice fellow, Mr Piddlewell.

It turned out that our destination was a pub, and the directions sounded weird to me though I knew the locality well enough. It was just that I'd never seen a pub there.

I decided to make an evening call of it (for once), and since it was a pub several miles out H.B. said I wasn't going on my own or heaven knows what time I'd get back home. The truth is of course that she likes a drink and a natter in a strange pub once in a while. So that evening we loaded the van, taking everything we could think of since Mr Piddlewell hadn't bothered to ask his friend what sort of set it was. In went triplers and transformers, transistors and transducers, my case of "get you home" i.c.s, droppers, the lot.

Then down the yellow brick road we went, heading for the rainbow. Down the lower road, through the countryside, skirting the marshes, shouting obscenities at the cows and sheep, scattering the crows and rooks in the road, mile after mile. Over the bridge and straight down the road that doesn't go anywhere. Turn left at the end, down the lane that comes to an abrupt end in a field, or rather thick countryside where horses grazed and ducks splashed about on a reed filled pond, quacking at each other and I think at us.

There was no sign of a pub such as you might expect. Just a sort of outhouse – in the final throws of decay. A

board on the front had been weathered away, but we could just make out some words, or part of them, that said "free house".

"Just look at that" I said to Honey Bunch. "They're so glad to see anyone here they give the booze away."

"You daft bugger" said H.B. shortly. "Free house means they can sell any brand they like – and charge what they like. Anyway, I'll have a Vat 19 and coke to start with."

So in we went and found a rather bare room with one customer at the bar or counter. It just had to be one of our own well known customers. He looked startled to see us.

"Hello Bert" I said. He didn't look happy.

"Of all the bars in all the world, you had to pick this one."

A door opened and closed and who should walk in and up to Bert but the pretty little redhead whose controls I'd played with earlier. I now appreciated Bert's discomfort. His wife is a rather handsome fifty or so. At the same time I had to play my cards right, so I turned my attention to the bar.

"Vat 19 please" I asked the robust landlady.

"Ain't no Vat 19. Only Bacardi. That do?"

O.K. love. With a coke and half a bitter please. And could you put some ice and a slice of lemon in the Bacardi?"

"Ain't got no ice yet. No lemon either."

"All right love. Just as it comes then. By the way, I've come to fix the TV, so I'll have a quick swig and then pop through to where it lives."

"He's watching it at the moment. Smoke and all. Mustn't miss his football."

I could see wisps of smoke coming from the back room, and there was a familiar smell. I went through, half expecting to see a hybrid ITT colour set – the ones that emit lots of smoke from the mains filter capacitor occasionally, whilst still working normally in all other respects. I was surprised to see a Philips G8 however, sitting in the corner emitting smoke from the rear while the landlord sat in front wearing a World War two gas mask.

"Switch the bloody thing off" I bawled.

"Any minute now. Wait for the whistle."

Much to my relief the whistle sounded and I knocked the switch off, at the same time trying to wave away the choking smoke. When I'd taken the back off I immediately saw a black hole in the top winding of the line output transformer, with wisps of smoke still issuing from it.

By this time the old boy (I should talk) had taken his mask off and started on about how quickly the job could be done. "About half an hour at normal rate plus fifteen mintes at double time" I told him. "Don't hurry" he said, "I've some cellar work to do before the next match comes on."

He didn't look much like a publican, any more than his wife did, so I asked him how long he'd had the place? The answer was "four hundred years", which surprised me since I'd have thought three hundred a more realistic estimate. I nipped back to the bar to finish off my bitter before getting the transformer, and found Bert long gone.

"His niece seemed a nice girl" said Honey Bunch.

"Er yes, very nice" I replied, wondering whether I'd misjudged poor old Bert. "I thought it was his daughter."

The landlady put me right. "He came in with his daughter last week. A pretty blond girl."

How does he do it?

# Big Boys Don't Cry

Les Lawry-Johns

"Will you pop down and have a quick look at my set? It's fairly new, so there won't be much wrong with it. As you did my sister's the other week and were there only a couple of minutes I thought I'd ask you rather than take it back to where I bought it. I was watching that John Wayne film last night and was just beginning to enjoy it when the set went off."

I scowled at the phone. What she really meant was that I hadn't charged her sister very much since she was getting on a bit, and now she wanted the same treatment. Oh well. So I agreed to call as she had no transport and later that afternoon I arrived at her flat. As she let me in she started off again.

"Just as I was enjoying that John Wayne film, off it went. Makes you sick the way these things let you down just when you're enjoying a film. It's as though they know. Ha, ha."

## Battle with a Pye 184

I made my way to the set, which was a Pye Model 184 – solid-state monochrome 176 chassis with 24in. c.r.t. A set in fact with which I'd rarely tussled. It was on a stand, and had about twenty thousand ornaments and photographs on top. She collapsed into an armchair and fanned herself with a book. I wasn't going to get any help with the clearance then. I started to remove the paraphernalia, and in doing so accidentally dropped an ornament that wouldn't be damaged by the fall.

"Oh dear!" She shot out of the chair and the top of the set was clear in no time. "You really must be more careful – these things are precious to me."

"I never could be trusted to clear the top of a telly" I admitted.

"I hope you're more careful with the inside" she commented.

"I usually muck up more sets than I mend" I cheerfully assured her. I then removed the rear cover (sliding a screwdriver into each slot fastening) and peered into the interior. A vertical printed panel surrounded the tube, held vertically by two side plastic clips. The panel flopped down when the clips were released, revealing two wirewounds (lower centre) that had sprung their thermal springs. Without the circuit I assumed they were in the feed to the line output stage. My spirits sank: no quick job here.

"Have you done it?" the lady enquired.

"No I bloody haven't" I muttered. I hooked up the soldering gun and repaired the two springs, then on second thoughts unsoldered them to check for shorts. There didn't appear to be any, and as the BU205 line output transistor seemed to be o.k. I once more soldered up the springs and applied the mains. The sound came through and the lady beamed. I waved my neon over the line output transformer and it glowed – but only just.

I looked at the screen with the brightness turned up and there was just a dull glow there also. The e.h.t. rectifier is of the stick type, so I switched off, removed the end cap and tried again. The neon didn't respond any better, and I was aware of heat coming from the line

output transformer's overwinding, accompanied by the smell one gets from overheated plastic. The lady must have been watching my face rather than the set, because she knew the news would be bad.

"Will you have to take it away?"

I nodded. "It wants a new transformer and I haven't one with me. There isn't one at the shop either, so I'll have to send off to Philips for one. That means it may be away for quite a few days."

"Oh. Then I'll have to watch my sister's. It was a good job you were able to do her's, wasn't it?"

## Back on the Bench

So I hauled the set back to the shop, where I stupidly had another go at it instead of leaving it till the transformer came. I had Sam Magrew's Bush in mind, the occasion when we lost three transformers in a row, and didn't want a repeat performance. Also upon looking at the circuit I couldn't quite see why the second wirewound resistor should have gone open-circuit – it was in the feed to the line driver stage, the other one being in the feed to the line output stage. R615 (6.8k $\Omega$ ) and R631 (82 $\Omega$ ) respectively. So I checked the line driver stage carefully, but couldn't find anything amiss here. Whilst in the area I again checked the line output transistor, and was amazed to find that it was now short-circuit. It certainly wasn't so in the lady's flat, so why now? Had the hot line output transformer administered one parting slap in the face before R631 sprang open again, or was there something more sinister here? How could I check without the new transformer?

So I disconnected the overwinding at both ends and made a note of the line output transistor connections – white to the collector, grey to base, red to emitter. With some difficulty I removed the faulty transistor and fitted a new one – leaving three on the shelf with a similar number of BU208As. After making sure that there were no leaks, I switched on and checked the supply voltage at R631: 70V where there should have been 200V or more. I switched off before R631 could spring, and checked the line output transistor. It was short-circuit and the overwinding was still hot, even though disconnected. It would have to come off.

Removing the transformer was easy, removing the overwinding was not. Eventually, by fair means or foul, the winding was rendered impotent (which makes two of us, though I have high hopes of these heart pills I've been swallowing of late). Again with difficulty I fitted another line output transistor, and just to be on the safe side I clipped a wirewound of some 300 $\Omega$  in series with R631. Everything was in place, including the bare looking transformer, and with some optimism I switched on. Clonk. Another dead line output transistor.

Panic set in. Obviously someone up there didn't like me. So I put the set to one side and repaired a couple of sets that had been waiting patiently for attention. They were both despatched in minutes, which meant that in no time I was back to the horrible Pye. I thought I'd better think.

I thought long and hard but I couldn't make any sense of it, partly because I find it hard to think straight and partly because I haven't much sense anyway. So I wearily swung down the panel and looked at the shorted line output transistor. I looked again and then shone my little torch on it. What was that grey lead doing on the collector, and more ominously what was that white lead (h.t.) doing on the base? Surely I couldn't have been such a fool? Yes I could, and heaven only knows what might be wrong now.

I decided to adopt a different approach. The line output stage circuit is shown in Fig. 1, and as can be seen the line output transistor's emitter is connected to the 35V rail. This supply is provided by rectifier diode D631, which rectifies the voltage developed across winding 6-7 on the line output transformer to produce 35V across its reservoir capacitor C626. 12V and 22V supply lines are derived from the 35V supply, the former being stabilised by transistor TS301. If something linked to the 35V line was the cause of the trouble, we could apply an external 25V supply and monitor the current without the need for the line output transistor to be connected. This we did, and after a lot of unhooking this circuit and that we discovered that the 12V regulator transistor TS301 (BC328) was playing about.

A replacement was fitted and the circuit was deemed to be in full working order. Another line output transistor was put in and correctly wired. Some 600 $\Omega$  worth of wirewounds were inserted in the h.t. feed to the line output stage and the set was switched on. The tube heater lit up (much to my surprise), indicating that the line output stage was at last functioning correctly, even at this reduced power. So we took out some of the wirewounds, leaving about 200 $\Omega$  in just in case. The line output stage continued to work, so we took out the rest and soldered the spring of R631. We were still left with no e.h.t. of course, so we tried a couple of experiments with a five-stick tripler. As the results were disappointing, we resolved to await the arrival of the new line output transformer from Philips.

There is one point not so far mentioned. When we applied the 25V to the 35V line for test purposes we also loaded the h.t. supply to the line output stage (with the transistor disconnected), using a 40W light bulb to simu-

late the line timebase load. We did this so that we could monitor the h.t. voltage, which was high and not adjustable (R312, labelled width) until the 12V regulator transistor had been replaced – the 12V regulator, the 35V supply and the h.t. regulator circuit are linked. Once the 12V regulator transistor had been replaced we were able to adjust the h.t., thus making our little light get brighter or darker as the voltage varied between 180V and 240V. We set it for the correct 220V.

When the transformer arrived we fitted it and the set performed quite nicely. We returned it to the lady who had broken quite a large number of the china ornaments that had previously adorned the top of the TV set. This was a blessing in disguise we said, since a lot of bits and pieces on the top of a TV set tend to make it go wrong more often . . .

I've condensed this little story into a few words, but in reality it caused me any amount of heartache and a fair amount of expense – I lost more line output transistors than actually mentioned. I felt like crying.

## Errant Chips

Hard on the heels of the Pye came a Bush set fitted with the T22A chassis – the one with the surface-wave filter and TDA2540 i.f. chip. The complaint was that reception would be perfectly acceptable for some time, after which the picture would fade with loss of colour. The sound and vision would then be completely lost for a period which varied. On test the fault didn't show up for quite a time. The symptoms were then as described – first loss of contrast, then excessive noise followed by complete loss of signals.

I first suspected the 12V regulator, since we've had trouble with the 910 $\Omega$  resistor in this circuit, but a quick check revealed that all was well here. So we checked the voltages around the TDA2540, and found a wild variation at pin 4 (tuner a.g.c. output) where the voltage rose to 8V as the signals faded out. We had one TDA2540 on the shelf, and this was fitted after removing the signals panel and inspecting it closely for any dry-joints etc.

The board was replaced, and we confidently viewed the picture. Like a rock it was, perfect. For a time that is. Then it started to fade again to suggest that we'd made another hasty and inaccurate diagnosis. The voltage at pin 4 was still varying – probably trying to make up for the lack of signals due to a fault in an earlier stage I thought. What precedes it? The tuner, a two-transistor preamplifier, then the SWAF. The two transistors checked out o.k. and I was not inclined (didn't want) to suspect the filter. So the tuner was the obvious suspect (to me). Out again came the panel, and in went another tuner. Again we had high hopes: again they were dashed after two hours.

I then grabbed the hairdryer and freezer and played for ten minutes. The conclusion was beyond doubt. Everytime the TDA2540 was sprayed, the signals returned as good as gold. I searched the shelf but there was no sign of a TDA2540. So I phoned my friend Geoff of Moon Lane and he said "rest in peace my son, for I have two." Off I went on my little roller skate (Renault 5) to see him. When I got there he was in trouble with an ITT CVC30. He was still in trouble when I left, because he said my remarks added to the confusion. I had my chip however, and lost no time in fitting it. This time we were rewarded and the gain stayed steady despite lots of heat and cold.

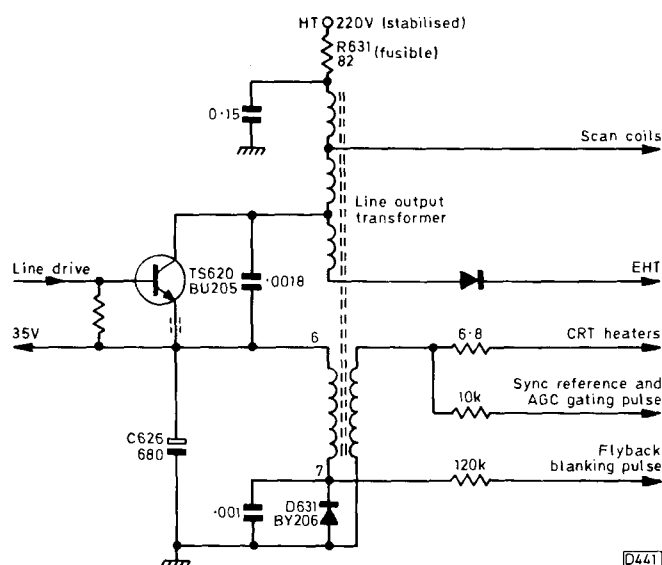


Fig. 1: Line output stage circuit used in the Pye 176 solid-state monochrome chassis (version with A61-520W c.r.t.).

# Hey Constable!

**Les Lawry-Johns**

WE were snoozing peacefully at 04.15 the other morning. Our dreams were then interrupted by this earsplitting crash of broken glass. A horrible noise, difficult to describe and a bit frightening. "That bloody cat" I moaned.

"It's not the cat, it's the shop window" H.B. bawled, reacting quicker than me.

Rush down the stairs and switch on window lights. Just reaching the front door when I realise I'm stark naked (hot night). H.B. now at bottom of stairs with towel wrapped round her. Grab it - quicker than you could unveil a statue of Venus - and wrap it round lower regions. Open shop door and peep outside. No one to be seen. Whoever had smashed the window hadn't hung around for long and was nowhere in sight. Look at main window. Large hole on left side and scene of utter devastation inside. Large double housebrick lying amidst pile of broken glass and shattered display stands. It appeared that a portable TV set was missing.

"What did they get?" asked H.B., now decently done up in her dressing gown.

"The daft buggers have only taken a monochrome portable. Hardly worth the effort" I said, checking to see that the remote control colour portable and the other more important items were still there.

H.B. went to phone the police whilst I dressed and got out the car to take a quick tour round, looking for any likely suspects on foot. Not a soul of course, so back to the shop to find that the police had arrived and were taking notes.

## **Getting the Facts**

"Thirty eight, twenty four, thirty eight" Honey Bunch volunteered. That got me a bit as I couldn't quite see what her vital statistics had to do with it.

"They grabbed a portable TV, not my wife" I told the young officer.

"We have to have all the facts sir. Er, how old was the set?"

"How old! It'd only just been born, that's how old it was."

"Oh I see. It was new then?"

"It was new till that bloody brick hit it. I don't suppose it looks all that new right now. I've the make, model and serial number if that helps."

"Ah yes. Of course. Now how old are you sir?"

"Ninety four. What's that got to do with it?"

"Must keep a complete record sir. Now, do you keep a dog?"

"Yes, but he's not all that brave. Hides away if there's a loud noise. Only thing that upsets him is when someone stands on his mat. He bites them."

"Which mat is that sir?"

"The one you're standing on. I'll call him so that you can take a look."

"Please don't bother. Well, that's about all. If you find out who did it, let us know." And off he went.

Left alone we cleared out the window, swept up the debris and tidied up generally, waiting to get in touch with the glaziers who, bless them, had a new window fitted by mid-day.

## **Italian Interlude**

My friend Geoff sold a TV set to an Italian family that lived nearby. They saw it working and paid the money, then popped it into the car and took it home. That same afternoon the lady returned waving her arms in the air. "Set no gooda. No goodatall. You owe me twelve pounds fifty. I take it now."

Well. Why twelve fifty? The set had cost a lot more than that. When the lady stopped bawling, Geoff ventured to ask.

"Because the set no go I kick electric fire. Now he no go. Cost twelve pound fifty to repair. Hur?"

"You kicked the fire, you pay for it. We'll pop round and fix the set for nothing, all right?" bargained Geoff.

Eddy looked up from the workbench and Geoff nodded to him. Eddy takes over. Soothing Eddy. Smarmy sod. Had the woman eating out of his hand in half a minute. Whipped her round to her house, retuned the set from London to Bluebell Hill in thirty seconds and stayed for two hours. No more mention of the fire. I could do with a bloke like that. On second thoughts, perhaps not.

## **A Couple of Deccas**

I'm not well acquainted with the Decca colour portable (70 series chassis), so when Len brought his in for me to look at I was a bit wary. He's one of our local characters, an electrician by trade. So I guessed he'd already been having some sort of a go at it. I normally only see him in the local when we (me and the dog) pop in for a quick one after our walk. This is early on in the evening, about six thirty, but by that time Len is usually sloshed. It was fairly early in the morning when Len arrived, sober (I think).

"It used to go when I hit it. Now it doesn't. There's obviously a dry-joint" diagnosed Len.

"What did you do to it?" I asked carefully.

"Well, as the picture went off but the sound would stay on till I hit it to bring the picture back, I thought the trouble must be in the tuner."

"Well I never. Brilliant. What did you do next?"

"Took the tuner out. When I put it back there wasn't any sound either."

The chassis swings up. So we did this and took a look at the tuner. It plugs into the panel, and it's possible to plug it in wrong. Not easy mind you, but Len had managed it.

So we took it out and had another go, finally refitting the clip to hold it in position. We now had sound but no raster, due to the line output stage not working. Slight pressure on the line output transistor subpanel restored normal operation, and inspection revealed that the panel could move independently of the transistor which was soldered to it. Resolder the base and emitter legs to the panel and there we are.

"Wife will be pleased" said Len. "She goes to bed early and this keeps her company."

"You don't get home till late then?" I said by way of conversation.

"Most often don't get home at all" said Len. "Usually sort of fall asleep in funny places."

So Len wandered off, leaving me to reflect on the odd



lives some people live. I couldn't ponder long because this young chap brought another colour portable in. Just had to be a Decca 70.

"It sort of went off" he explained. "Mum said if you hummed and harred about doing it, take no notice, just leave it for you to play with."

"I'll play with her if she talks like that" I threatened.

"That's what mum said you'd say. Mum's name is Joyce."

"I see. Yes well leave it for a couple of hours and I'll see what I can do. Give your mum my regards."

Fancy Joyce talking to her son like that. Let's see. How old would he be now? Well, must try to help the lad. Nice looking boy that.

So we looked at the Decca and didn't have to look far. The focus lead from the tripler was welded to a 27 $\Omega$  wirewound which didn't look too happy with the wedding. It was just a matter of re-insulating the focus lead, dressing it away from any warm parts and replacing the 27 $\Omega$  resistor, hoping that no other damage had been done.

Fortunately nothing else had been affected, and a nice picture was produced.

### Another Constabulary Visit

In comes this good looking fellow. Introduces himself as Don Clark, Inspector (technical) with the county police.

"Calling about the smash and grab?" I asked.

"Heavens no. Don't deal with that sort of thing. Technical, electronics and all that stuff. You must come and see our headquarters. Think you'd find some of the things we've got interesting."

"I'd like that" I said, wondering what might happen if I paid a visit to the police headquarters.

"Just passing by and thought I'd pop in to say how much I enjoy reading that magazine of yours. That chap Chas E. Miller kills me. Really does."

"He and his friend Ike Hodge kill me too" I said. "Pop in again next time you're passing Don."

# Focus on Portables

## 1: IF and AGC Circuits

George Wilding

MONOCHROME portables from many countries have been imported into the UK over the past decade, and there is great diversity in the circuitry they employ. To start with, the tuner units: though the varicap type is now the norm – there are still some current models that use mechanical tuners – quite a variety of different types of mechanical tuners are to be found in earlier models. Many use a diode mixer for example, while the simple tuner unit used in the Sony TV144UK dispensed with an r.f. amplifier stage, incorporating just a diode mixer and a transistor oscillator. This was followed by a two-stage, wideband i.f. preamplifier.

The i.f. circuitry employed is also diverse. You may find a couple of chips preceded by a bandpass filter, a single chip preceded by a SAWF and its driver, a discrete component i.f. strip or, as previously mentioned, a transistor i.f. strip preceded by a preamplifier. Whilst the conventional diode is the usual type of vision detector employed in discrete component i.f. strips, it's not uncommon to find that a transistor is used for this purpose.

### Interstage Coupling

Where discrete component circuitry is employed, many different collector load/interstage coupling arrangements are to be found. Coupling involves providing a good match between the comparatively high output impedance of one stage and the much lower input impedance of the following stage. Tuned transformers employing a suitable step-down ratio will meet this requirement, but tuned coils with impedance matching by means of a couple of capacitors or even just one capacitor are equally popular. Alternatively the coil may be tapped.

Fig. 1 shows the basic idea of capacitive impedance matching: the coil is tuned by C1 and C2 in series, the ratio of C2 to C1 determining the degree of coupling to the following stage – the larger the value of C2, and thus the lower its reactance at the signal frequency, the more

closely the tapping point approaches the live end of the coil. By the latter we mean the collector end, since the other end is decoupled by C3. Because of the latter condition, identical results would be obtained by connecting the capacitors between the collector of the transistor and chassis.

When only one capacitor is used to couple the signal to the following transistor, the latter's input capacitance may act as the second capacitor in the coupling/matching arrangement. Transformers and coils are commonly damped with a resistor to broaden the bandwidth – on occasion you may even find that RC coupling is used.

### Neutralisation

Whatever is done earlier in a discrete component i.f. strip, the final stage is usually transformer coupled to the detector. Neutralisation is also commonly employed in the final i.f. stage. The reason for this is that the types of transistor used in the final i.f. stage tend to have a larger feedback capacitance, whilst as the signal is at maximum

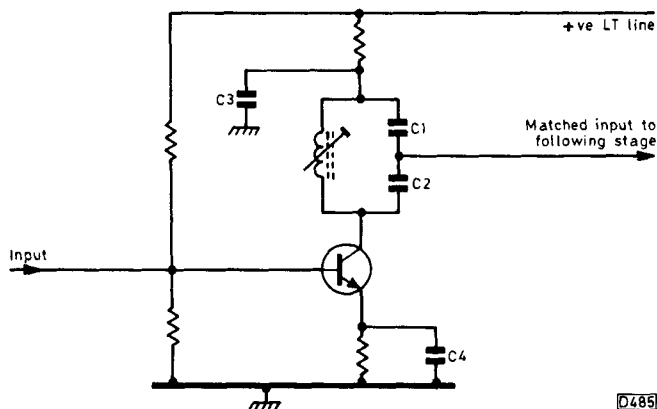


Fig. 1: Capacitive impedance matching between stages.

# Spider Walk

**Les Lawry-Johns**

ONCE upon a time we would carefully unpack new sets, run them up and align the channels as soon as they were delivered. Having satisfied ourselves that all was well we would return them to their boxes until needed. Until recently, that is. Of late we've become lax and left them in their boxes – simply because their track record has been so good.

So in came a couple we knew quite well. They wanted to buy a new set but hadn't quite made up their minds. They said a plain 22in. set would do. So I showed them a Pye set fitted with the K30 chassis and they were quite happy with it. I then put my foot in it by suggesting one with remote control, to save them jumping up every time they wanted a different channel or wanted to alter the volume etc.

They said this was a good idea so I unpacked a nice new 1042T and put it up on the bench. The little light came on to say that all was ready, but when I pressed channel one the light went out and the set was stubbornly dead. It remained so even after I'd switched off and on again. Even the little light now remained out.

That's funny I thought, and then noticed that the front panel was loose. Off with the back cover, revealing little bits of plastic on the floor of the cabinet. It had apparently sustained a mortal blow somewhere along the line, and I cursed myself for not having checked it earlier. The couple settled for the one without remote control however, and departed quite happily whilst I repacked the damaged set for return to the wholesalers. During this procedure H.B. came downstairs and stood beside me.

"I think you should go to the bathroom" she said.

I sniffed but found that I was still my usual pleasant self. H.B. sighed. "I don't mean you need a wash you fool. There's an enormous spider in the bath and I can't get it out."

So after I'd packed the set I went up to the bathroom to carry out a rescue operation. The usual process is to drape a towel over the side so that the spider can climb out. Must help them otherwise we'd be knee-deep in other insects. When I saw the size of this one however I was quite amazed: it's body was the size of a peanut, with legs sticking out three inches on either side. When I say a peanut I mean a pair in the shell, not one of your shucked variety. No indeed there was nothing small about this fellow (or girl) and it refused the invitation when I slid a towel down towards it. So I moved the towel round to the other side and tried to drive the ungrateful beast on to it.

It didn't want to know, so I left it too take its time. A while later I found that it was still there. Maybe it was tired out after trying to climb the sides of the bath unaided. I pondered: should I insist on it going up the towel and possibly hurt it, pick it up and risk it hurting me, or feed it some dead flies to give it strength? I decided to pick it up and risk instant death. Up by the legs and out on to the window sill. It would have to take its chance, jumping or climbing down the wall. Shut window and put towel back.

What's this? Three tiny specks scurrying around in the

bath. Looking for mother? Now what had I done? Something had to be done about this and quickly. Fortunately mother spider hadn't made her departure, and with the aid of a piece of toilet paper I was able to get her back into the bath.

I expected the little ones to rush towards their mum, but they didn't. In fact they scooted as far away as they could get. Then another thought hit me. Maybe it was dad. Do the fathers eat their young? Were these the final survivors? There was only one solution, to rescue them all but separately. This was easy enough with the big one, but the others scampered about everywhere. I eventually got them all out, but what subsequently befell them I shall never know.

## **The White GEC**

After this harrowing encounter with the animal world I staggered down to the shop to harrow with humanity again. I didn't have long to wait. In came a young chap carrying a monochrome GEC set in a white cabinet – a Series One type.

"The tube's knackered" he informed me.

"Oh, ah" I said for want of anything better to say whilst removing the back.

"Yes indeed" he babbled on. "When it's going there's a blue light in the back of the tube."

I asked him if it was in the tube's neck and he said it wasn't. It was up the front where the scan coils meet the tube bowl.

I switched on and after the line timebase had warmed up I noticed that a raster appeared. "There it is, just above the coils" he said. It was a reflection from the screen through a section of the bowl with no coating of course. So I turned the brightness down and the glow vanished. "It's gone" he said.

Connect aerial and turn brightness up again. The line hold was way out, but trying to correct this by adjusting the line oscillator coil pulled the picture sideways in fine lines, with the hold still poor. Time to check likely components. The sync separator's 47k $\Omega$  screen grid feed resistor was o.k., as were the flywheel line sync discriminator diodes and the 100k $\Omega$  reference pulse feedback/integrating resistor. The PCF802 perhaps? What's this – a PCF801!

"Who put that in?" I demanded. Said he didn't know. Anyway a new PCF802 and adjustment of the coil set things to right, and the young man departed still wondering where the blue glow had gone.

## **The White Murphy**

The owner of a white Murphy complained that the fuse must have gone because it didn't do anything. Also that the Channel 4 button wouldn't get Channel 4. It was a standard A823 chassis.

The tube heaters glowed and there was h.t. at the top fuse which was intact. The l.t. fuse was also intact, but there seemed precious little l.t. from the bridge rectifier, suggesting either that the bridge was at fault or that the reservoir capacitor wasn't reservoiring. The bridge (a BY164) measured o.k. when checked with the meter, so we removed the top plug and checked the reservoir capacitor via pin 5. It too read right so we decided that the bridge wasn't telling the truth. We fitted a BY225 in preference to four separate diodes – because the BY225 is quite adequate for the job and is easier to fit. The l.t.

was then correct, but as there was a suspicious and leaky bulge in the centre of the double smoother another one went in.

We could tune in three buttons, but the bottom one seemed too free, leading us to believe that it had shed its collar. Removing the tuner revealed that this was so, and that the three spindles that did work didn't have collars that fitted snugly – there were fine hair cracks in them. So we removed the front plate and fitted four nice new blue collars, assembling the spindles so that the springs didn't get caught in the rear holes.

The set was then ready for use, complete with a Channel 4 button. The owner was quite pleased with our efforts, and rounded up the bill by an extra 51p to prove it.

### ***An offer we couldn't refuse***

A well known motoring organisation regularly circulates its members with offers of publications, accompanied by various enticements. Some of the publications are well worth having, and on this occasion the book was one I'd have ordered without the added inducement of a Ford Granada to a lucky person plus thousands of pounds if an early order was received. This suited me down to the ground, because we badly needed a new car and the money would come in handy to buy petrol for it. So I sent off for the book without delay and told Honey Bunch that our days of running around in a rusty old car were over.

Time went by and we received a card saying that there was a slight delay in sending out the book but to be patient. So patient I was and the book finally arrived. Very good it was, picturing and describing most parts of the country worth picturing and describing. There was no mention at all of our locality therefore, and I wondered about that.

I was still agog about the opportunity of that top of the range Granada. As the weeks went by however I was forced to the conclusion that I'd been forgotten, and when my foot went through the bottom of our car I was reluctantly forced to buy another one – with a bit of help from the bank.

A few more weeks went by and I received a letter to remind me that I'd not paid for the book. This was quite true: in the excitement of waiting for them to send me the car and a lot of money I'd quite forgotten to send them a cheque for the book. So I wrote and told them that I'd forgotten but so had they, and that I was quite upset because I had needed the car quite badly. I haven't heard from them yet, but I really will send them a cheque in due course to further increase the overdraft. I wonder if someone else got the car and money? Something else we shall never know.

## **FIELD OUTPUT TRANSISTORS**

In S. Simon's article on the GEC C2110 series solid-state colour receivers (July issue) the BD203 was suggested as a suitable replacement transistor for use in the field output stage. In the original circuit two different types of transistor (generally ON447 and ON448) were used, and it should have been made clear that the BD203 can be used in either position. In fact the BD203 can be used generally as a reliable replacement in this type of two-transistor class A field output stage provided the mounting arrangements are suitable.

# next month in

# TELEVISION

### ● THE PHILIPS CTX CHASSIS

Models fitted with the new Philips CTX colour chassis are now being released. The chassis was developed at the Philips research and development headquarters in Eindhoven to take advantage of the latest TV technology. The single board is about the size of a sheet of A4 paper and the component count is down to 386 – a third less than previous Philips sets. Next month we review the technical features of the chassis.

### ● TV COMPONENT DISTRIBUTION DIRECTORY

Our first tabulated directory of TV component suppliers. Provides a quick reference to sources of the components you need.

### ● VCR SERVICING

So far we've been dealing mainly with the original basic JVC machine. Next month we go on to the JVC/Ferguson HR3660/3V16 to see the changes required to provide extra features – still pictures, slow motion and double-speed playback. Amongst other things, the off-tape reference pulses control the capstan instead of the drum servo.

### ● ROUTINE TV RECEIVER TESTS

S. Simon on the 18in. Pye/Philips colour chassis – the 713/570 series.

### ● THE FINISHING TOUCH

An otherwise sound set can be let down by the condition of its cabinet. Tony Thompson on simple, practical methods of enhancing the appearance of sets.

**PLUS ALL THE REGULAR FEATURES**

**ORDER YOUR COPY ON THE FORM BELOW:**

TO .....  
(Name of Newsagent)

*Please reserve/deliver the January issue of TELEVISION (80p), on sale December 15th, and continue every month until further notice.*

NAME .....

ADDRESS .....

.....

.....