

# IN YOUR WORKSHOP



Once more, in response to readers' requests, Smithy the Serviceman takes over "In Your Workshop"

SMITHY, THE SERVICEMAN, WAS IN A BRISK and business-like mood when, one summer morning, Dick entered his workshop.

"Hallo," he said, looking up from the bench, "you're just the chap I need to help me out of trouble! I've got a whole pile of work to get through and there are only a few days left before I go off on my holiday. Do you think you could give me a hand?"

"Certainly," replied Dick, "I'm only too happy to get the chance of some experience."

"Good show," said Smithy. "Well, if you like, you can start right away on those two sound receivers in the corner of the bench over there. So far as I know they've both got routine faults. The electrolytics have dried out the one, and the dial cord has broken on the other. If you run into any snags just let me know."

## Knob Removing

Smithy returned to his own work and Dick enthusiastically set about the two receivers Smithy had pointed out. They were both small sets, and had both seen quite a few years of service. The tuning cursor of the first set Dick examined was reclining at a drunken angle, and could not be shifted along the dial by what, due to its unrestricted movement, was obviously the tuning control. This receiver was obviously that with the broken dial cord Smithy had referred to, and Dick commenced to remove the knobs.

After some moments Dick turned round to Smithy.

"I'm sorry to trouble you so soon," he said, in a rather crestfallen voice, "but I can't get one of these dratted knobs off. I daren't start levering at it with a screwdriver or anything like that, in case I scratch the cabinet."

"Not to worry," said Smithy. "I'll come and have a look at it."

He walked over to the set. The knob was of the type which was held to its spindle by a spring, and its shape was such that it was extremely difficult to obtain any purchase on its surface with the fingers. Smithy made several experimental tugs without success.

"Why do they make knobs these weird shapes?" asked Dick, disgruntledly. "You just can't get a grip on them anywhere!"

"I don't know," said Smithy, shortly; "too many budding Picassos in the factory design department, probably. Anyway, I've never had a knob beat me yet! I'll show you a little dodge I use for obstinate cases like this."

He pulled a handkerchief out of his pocket. "All you need for these awkward knobs is a handkerchief, or a clean rag with a strong hem. First of all you bring the hem of the handkerchief up under the knob like this (Fig. 1(a)). Then, keeping the ends of the handkerchief close to the panel of the set, you bring them round until they overlap each other by 90 degrees or so. Next, you bring the two ends away from the set, grip the whole handkerchief so that you have even

tension round the knob and pull gently. (Fig. 1(b)). And there you are!"

Triumphantly, Smithy pulled the knob off its spindle and retrieved it from the folds of the handkerchief.

"Well, I live and learn!" remarked Dick, impressed. "Why did you say that you should pull gently? Surely a sharp tug will do the trick just as well."

"It doesn't always, I'm afraid," replied Smithy. "You see, although in most cases a knob which is difficult to remove is the result

#### Crackles

Smithy returned to his own job and Dick continued with his removal of the chassis from the cabinet. He replaced the broken dial cord, having first made a careful check, as far as he could, of its route through the chassis, and having noted the number of times it was looped around the tuning drive spindle. These precautions were the result of previous advice from Smithy.

"I've got it all fixed up now," he remarked to Smithy, "but I'm not quite certain how I

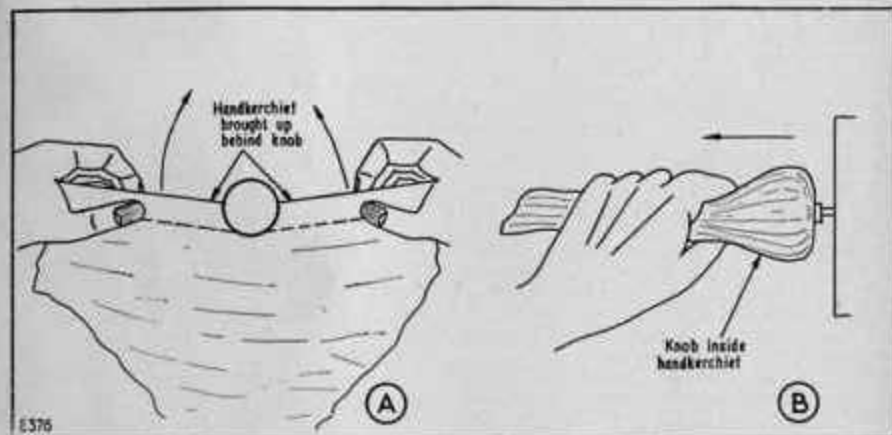


Fig. 1. Two successive steps in removing a difficult knob. The handkerchief is wrapped around the knob, after which it is carefully pulled from the spindle. (See text)

of a tight spring, it occasionally happens that the spring and the spindle may have rusted. Steel spindles are usually cadmium plated, but this plating may be quite thin in some instances. Also, the plating may have been partly scraped away by the original process of putting the knob on, plus that of taking it off and on during later servicing. The same applies to the spring as well, which should also have been given a protective coating when it was made. If the surfaces of the spring and the spindle are rusty it becomes extremely difficult to slide the knob off smoothly. A sharp tug would most probably break the moulding of the knob."

"I see," commented Dick, "I shall remember that in future."  
Smithy was examining the guilty knob and spindle.

"These look a little rusty, themselves," he remarked, "I should put a little grease on that spindle before you fit the knob back on again. It'll make it easier next time and may possible slow down any future rusting."

should align the cursor with the tuning condenser."

Smithy walked over once more. The set had a rectangular scale and the cursor moved horizontally along a slide at its top. The cursor carriage had slots which enabled it to be located anywhere along the dial cord.

"Locating the cursor is a fiddling job sometimes," remarked Smithy, "and I've had a little difficulty with it myself when the ends of the pointer travel are not clearly marked. However, most manufacturers put a calibration marker somewhere on the scale and it can usually be found after a little hunting. For instance, some scales have a spot, or row of dots, at the maximum tuning capacity end of the cursor travel. Others have an extra division mark, similar to those used for wavelength divisions, and also at the maximum capacity end. Ah, there's a mark of that type here! It's on the long-wave section of the dial, and it's the same sort of mark that is used in that section for subdivisions. It obviously isn't a wavelength subdivision

because it is very close to the '2,000 metres' point. We'll put the tuning condenser to maximum capacity, set the cursor to this mark, and the job is done.

"Practically all reputable sets have some means of cursor calibration on the scale or scale backing, but these are not always very obvious. If you haven't a service manual, or if it doesn't give the required information and there is no end-marker on a particular set, then you have to make a guess at it. In such cases I usually assume that the set is correctly aligned on medium waves, tune in a low-frequency signal, and set the cursor to that frequency. It's guesswork, I know, but it works in most cases."

Whilst Smithy was talking, Dick had switched on the chassis and was checking its performance. He had not refitted the knobs, and as he turned the tuning control spindle, the set gave forth a continual loud crackling.

"This must be my unlucky day," he moaned. "I thought I had taken on an easy job, and now there's something else wrong with the set. Just listen to those crackles! Either there's a poor connection to the tuning condenser, or its vanes are shorting."

"Well, that's possible," chuckled Smithy, "but I doubt it. I think you've fallen into a little trap that happens with quite a few sets. Just say to yourself that there's a difference between the way you're operating the set now and the way it will be operated by the customer."

With which remark he left Dick to his task.

Dick scratched his head and looked at the offending set. Absentmindedly he picked up a pair of pliers and scratched the metal-work of the chassis with it. A loud crackle came from the speaker as the pliers rubbed along the metal. Suddenly a light dawned in his eyes and he quickly fitted the knob to the tuning control spindle. As he turned the knob the set worked exactly as before, but the crackling had now ceased completely.

"I see that the penny has dropped," laughed Smithy, who had been quietly watching him.

"Why, of course," replied Dick, "in fact, I can't think why I didn't see it before. The crackles are caused because the chassis isn't earthed, and when I touch it with a piece of metal my body is acting as a counterpoise to the aerial. The tuning control spindle is making intermittent contact to its bush, and so there is a crackle whenever I turn it without the knob. If I put the knob back on I'm insulated from the spindle and the crackle clears."

"Exactly!" said Smithy. "And you've beaten just another of those little puzzlers that happen every now and again. Incidentally, I'm a great believer in putting the knobs on any chassis I'm working on, because I think it saves time in the long run. There is

nothing that annoys me more than to see someone scratching away at, say, a wave-change spindle with a pair of pliers, when the appropriate knob is sitting on the bench right by the side of the chassis."

"Well, that is sensible enough," said Dick; "I didn't expect, though, that my first service job for the day would consist of clearing troubles caused by such simple things as knobs."

#### An Intermittent

The workshop became quiet once more as Smithy and Dick worked on. Dick returned the first set to its cabinet and replaced the electrolytic condensers in the second without mishap. This done he wandered over to Smithy, who was looking unhappily at the television chassis in front of him.

"Why so glum?" he asked.

"I've got an intermittent," remarked Smithy, "and, although I think I know where the trouble is, I'm not certain. The set has flywheel sync and has a habit of going out of horizontal lock every now and again. I've replaced several components which *might* have caused the trouble, but they didn't clear it. Now I have a hunch that it might be the electrolytic condenser decoupling the oscillator h.t. feed."

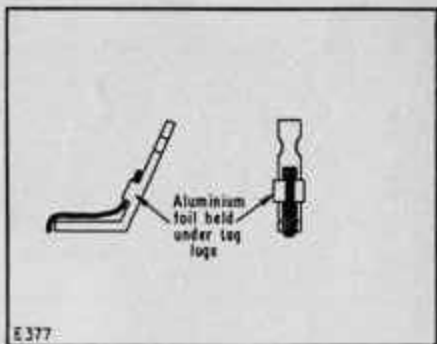


Fig. 2. The type of condenser connection referred to by Smithy when discussing intermittent faults

Dick noticed that Smithy had two test leads clipped to an electrolytic condenser lying on the bench.

Suddenly the picture given by the chassis fell out of sync. Quickly Smithy applied his test prods, one to chassis, and one to the terminal of the condenser he suspected. The picture immediately returned to normal.

"Do you think that the electrolytic in the set is intermittently open-circuit?" asked Dick.

"Well, it might be," replied Smithy, "the only trouble is that applying the second

condenser momentarily causes a sudden change in the circuit potentials. That change could result in an intermittent connection somewhere else becoming good again for a short while."

"There was hardly any spark when you connected the second electrolytic. Why was that?"

"I was keeping it charged up to h.t. potential every now and again," replied Smithy, "in order to keep the circuit disturbance as small as possible when it was applied across the condenser in the set. Fortunately, the set is going faulty fairly frequently, so I could use a technique like that. Dash it, it's gone again!"

Once more the picture had gone out of lock and again, by applying his test prods, Smithy brought it back to normal again.

"Well, the best thing I can do," he decided, "is to replace the suspect condenser temporarily with another and just wait and see if the fault re-appears. Luckily I won't have to keep an actual eye on the chassis all the time; I have developed a trained ear for 10 kc/s line transformer whistle. I'll be able to hear it if it goes off sync again!"

"Do electrolytics become intermittent very often?" asked Dick, as Smithy hooked in the temporary replacement.

"In my experience modern electrolytic

condensers very rarely give trouble," replied Smithy. "In fact, over the last year I've only had two, so far as intermittents go. In one of these the trouble was caused at the tag itself. The condenser had a strip of aluminium foil coming out of the body which was then held under pressure by two folded lugs on the tag (Fig. 2). So far as I could tell, the joint between the foil and the lugs was intermittent. At any rate, I squeezed the lugs down tightly on the foil with a pair of pliers, and the intermittent cleared. The set hasn't given any trouble since, so I must have cured the fault."

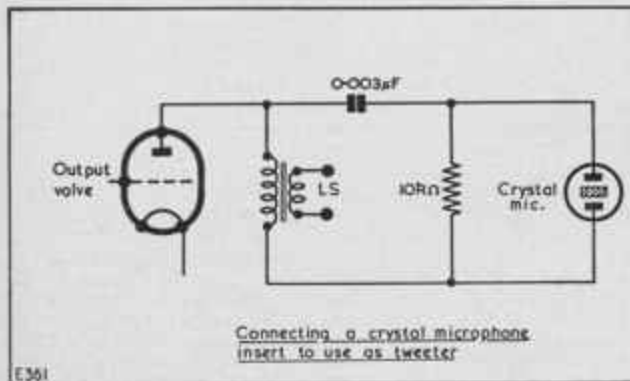
"You sound rather doubtful about it," commented Dick.

"Well, I am always doubtful about intermittent faults, because one has to rely so much on guesswork," said Smithy. "As a matter of fact, intermittents are the bane of the serviceman's life. In this case I'm going to leave the set on for a couple of days with the temporary condenser, and keep my fingers crossed."

"Which reminds me that, by then, I'll be ready to go off to the sea on my holiday. I could do with a little ozone in advance, so in the meantime let's have a look at that television set on the shelf. When I checked it in the customer's house it was giving the best corona display I've seen for years!"

## A Cheap Tweeter

by W. SCHROEDER



The performance of a high-fidelity receiver is often marred by the shortcomings of the loudspeaker, which does not reproduce the high notes at sufficient volume. A tweeter will remedy this, but it is rather a costly item. A cheap, yet efficient, substitute is a crystal microphone insert if it is connected as shown in the circuit diagram. The inserts can stand up to about 30 volts a.f. only; the condenser, therefore, must possess a high-voltage insulation, as a breakdown would destroy the crystal cell.