

# REPAIRING CASSETTE TAPE DECKS - 1

When cassette tape decks give trouble, generally no-one wants to know them. They often get thrown out in the council clean-up, given away for spare parts — or simply left to gather dust in a cupboard. But cassette decks *can* be repaired and made to work like new, often without spending too much money. Here's the first of two articles explaining how to bring them in from the cold...

by **BRYCE TEMPLETON**

If you are an amateur enthusiast, or even a professional technician, you probably have an old audio cassette deck that has been given to you with the words "You might as well have this, it's not worth repairing, the heads have gone. You can use it for spares". What spares? What can you get out of a 10 year old cassette deck? And even if you *could* find something of value, who would want their deck repaired with second-hand 10 year old parts?

But I rave uncontrollably. There are some parts that can now only come from old machines — knobs, buttons and cabinet parts to name a few, so we should not look a gift cassette in the mouth.

Maybe you found one in those council clean-ups that are much beloved of all true technicians; in this case you have only yourself to blame. Anyway, why not try to repair it and restore it to its former glory? This also has the advantage of stopping your wife/mother nagging at you to throw out "all that old junk". Some women have no heart — but if it works, she'll probably use it.

## Likely faults

OK, here's the drum. Most faults with audio cassette decks are mechanical. In order of most likely appearance, they are:

1. Belts
2. Operating controls, pushbuttons, switches etc.
3. Input and output connectors
4. Motors
5. Heads
6. Then come electronic faults such as transistors, IC's, capacitors, etc.

Have I talked you into it?

Well, what you will need is a set of hand tools with a soldering iron (make them small enough for the job — not harbour bridge size), a multimeter, cleaning materials (methylated spirit is fine for head and belt cleaning), a prerecorded tape (preferably a commercial



*Clare Robbins, a technician at the University of Western Sydney in Kingswood, adjusts the azimuth of a cassette deck. Azimuth adjustment is discussed in the second of these articles.*

one — music is fine, tones are ideal), a blank tape and a source of an input signal. An audio oscillator is best, but a radio will be perfectly adequate.

You will also need some method of monitoring the output. Headphones will do, as will a speaker and amplifier. Optional equipment could include an oscilloscope and an output level meter/noise and distortion meter. An old tape that you won't cry about if it is damaged is also a good idea, as there is a possibility of the deck eating your good Stones tape...

## Know your deck

Before we get going, let's examine the parts of a typical deck.

Fig.1 shows a general view inside a deck. The amplifiers and other electronics are on the left, and the small board

attached to the cabinet front with the ribbon cable running to it is the LED VU meter. The deck is on the right. The lever and spring arrangement operates the record/play switch, while the cylindrical object near the top is the motor.

In this recorder the deck mechanism is fairly easy to remove from the cabinet, and Fig.2 shows the front of the deck after removal. The spool carriers are the black 'gear wheels' towards the top, the capstan and pressure roller are at lower right, the record/play head is in the lower centre, and the erase head is black coloured and at the lower left. The back view (Fig.3) shows the motor at upper right, the black circular flywheel, and the belts.

Fig.4 shows at the right the capstan and pressure roller, also called the pinch wheel. In operation the tape is squeezed



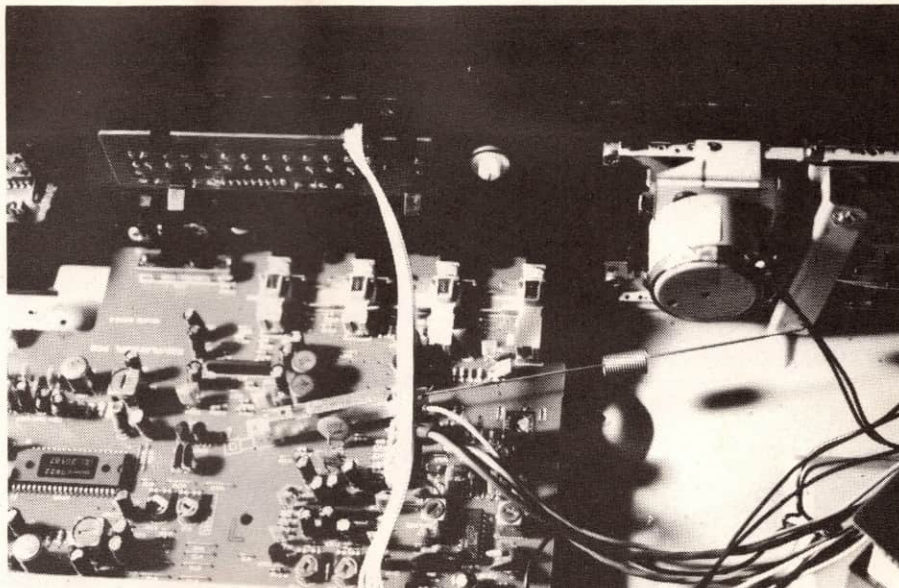
between the capstan and pressure roller, and moved at a constant speed across the heads. Worn pinch wheels can cause tape damage by forcing the tape against the guides, or even completely out of the correct path. Note that when playing or recording, the tape direction is always such that it contacts the heads before it gets to the capstan; in other words the capstan is the last thing in the tape path.

The two heads, also shown in Fig.4, are mounted on a plate that slides them forward into the cassette when activated by the play button. The black head, on the left in the photo, is the erase head.

There are three types of erase heads. The most common is called an AC erase head, which is — surprise, surprise — supplied with a high frequency AC voltage, around 3-5 volts peak to peak at 50 - 100kHz. Less common and usually only used in 'el cheapo' machines are DC erase heads and permanent magnet erase heads. The latter are distinguishable as they are mechanically moved into contact with the tape when erasure is required.

AC erase heads are always used in any machine that has the slightest pretensions to 'hifi'. These are usually made from a ferrite material, and are extremely long wearing. As the gap is relatively non critical, it is most unusual for one to 'wear out'. If your deck is not erasing, check carefully elsewhere before replacing the erase head. There are not usually any adjustments on the erase head.

The silver head in the centre of Fig.4 is the record/play head. This is made of a hard wearing steel alloy, but will still wear out after prolonged use. The tape



**Fig.1: A general view of the interior of a typical cassette deck. Note the lever and spring connecting the transport to the Record/Play slider switch on the PCB.**

eventually wears through the pole pieces and the gap, which is normally so small as to be invisible, opens up. This will not greatly affect the record function, but the 'top end' play response will be greatly reduced.

### Starting repairs

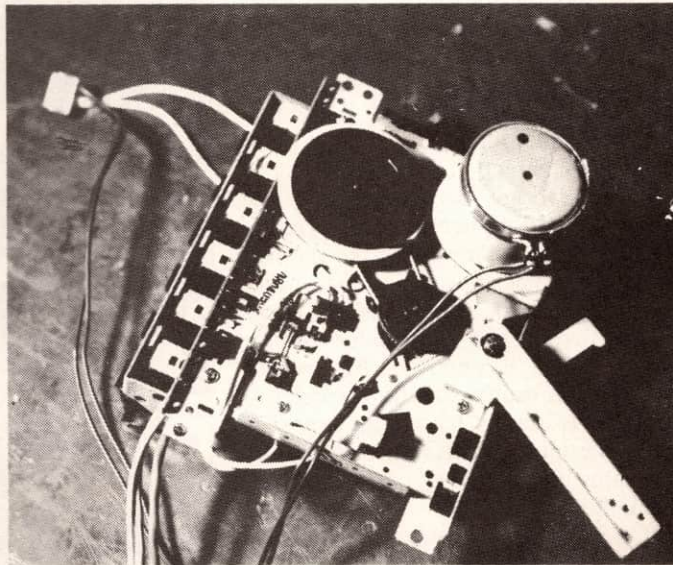
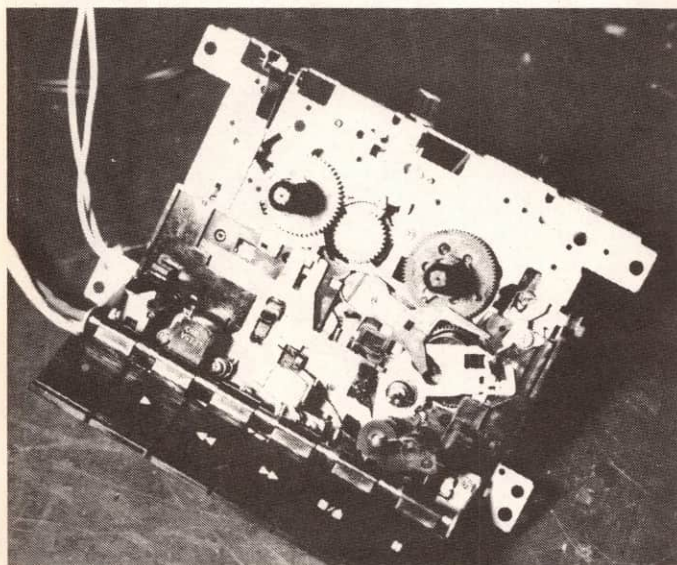
Now we are more familiar with the main parts of our recorder, let's make it go!

The first step is inspection. It is not a good idea to clean too vigorously before checking the operation, in case the cleaning dislodges a belt or otherwise creates problems that weren't there

before. One of the golden rules of servicing is never take something to bits before trying it out. There is a terrible sinking feeling that accompanies the realisation that you don't know if a fault was there before you cleaned it, or not!

Before plugging it in, carefully check the mains cord and plug. Operate the mains switch a few times to ensure that it is mechanically OK, then plug in and switch on. Hopefully we should get a few signs of life. A few lights or a slight movement of the VU meters is encouraging.

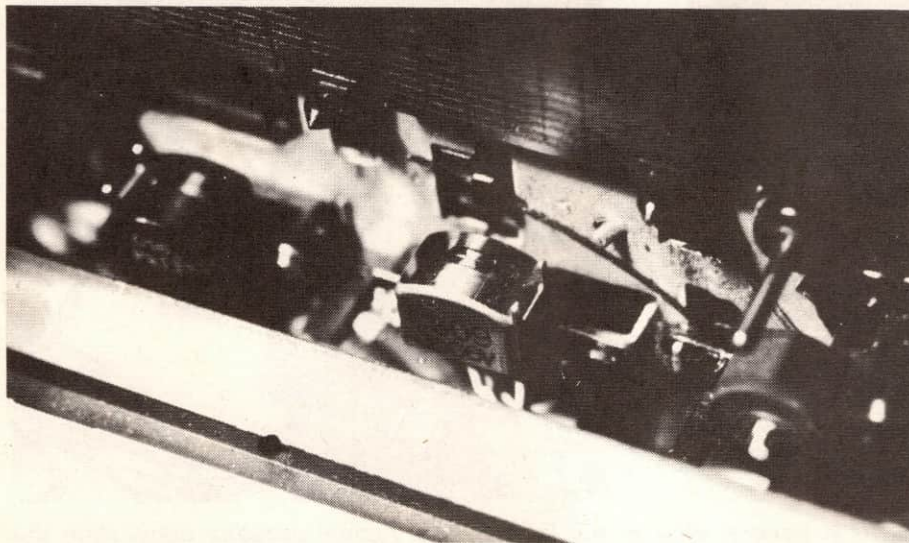
Push the Play button and see if the heads and pressure roller move to the



**Fig.2 (left): A front view of the deck when removed from the case. The actuator buttons are along the bottom edge. Fig.3 (right): The rear of the deck when removed from the case. The drive motor is at upper right, with the capstan fly-wheel to its left.**



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**Fig.4: A close-up view of the heads (centre and left) and the capstan and rubber pressure roller (right).**

replay position, and the capstan and take up spool carriers rotate. Usually you can operate the play button with the cassette door open, but some decks do require it to be closed — some even know if there is a tape inside.

Try the rewind and fast forward buttons, to see if the appropriate action happens. Note that many decks with auto stop will run in fast forward only for a few seconds without tape, as the 'auto stop' circuitry senses that the take-up spool is not rotating. Go back to the play function and stop the take-up spool carrier rotating with your fingers; there should be reasonable tension.

If the spool is able to be stopped with only slight finger pressure, there is a good possibility that the tension will be insufficient to take up the tape as it is fed from the capstan. This will cause the tape to wind around the capstan and pressure roller, and you will curse...

If you have got this far, then we are well away. But if there were no signs of life, then delete all my words about most faults being mechanical, disconnect the power and check the mains and low voltage fuses. This will usually require that the cover is removed. **Be aware, though, that many cassette recorders/decks have mains terminals exposed when the cover is off.** Be certain that the mains plug is out of the socket and check the fuses.

It is often not necessary to remove the fuses from 'open' type PCB-mount fuseholders to check them, using a multimeter on the low ohms range. They should, of course read less than one ohm. If you find a dud, replace it

ONLY with one of the same rating, size, and delay.

Fast acting fuses have the rating indicated as, for instance 1A/250V. Delay fuses show it as T1A/250V, the T indicating thermal. These fuses also often, but not always, have a 'blob' or a small spring visible on the wire inside the glass.

Having replaced any blown fuses, plug in and switch on. If it now works, cheer softly. But if it blows again, power supply fault finding is in order. If the mains fuse keeps blowing, seek the advice of an experienced technician, as

repairs in this area can be hazardous. If it is the low voltage DC fuse, you may be able to isolate the problem by removing plugs connecting the deck with the PC board, and trying again. This approach can become a bit expensive though, as each fuse costs about 50 cents. This sort of difficulty can be caused by stalled motors, shorted electrolytic capacitors, the record/play switch broken or stuck in a 'half-way' position, or shorted IC's, diodes or transistors.

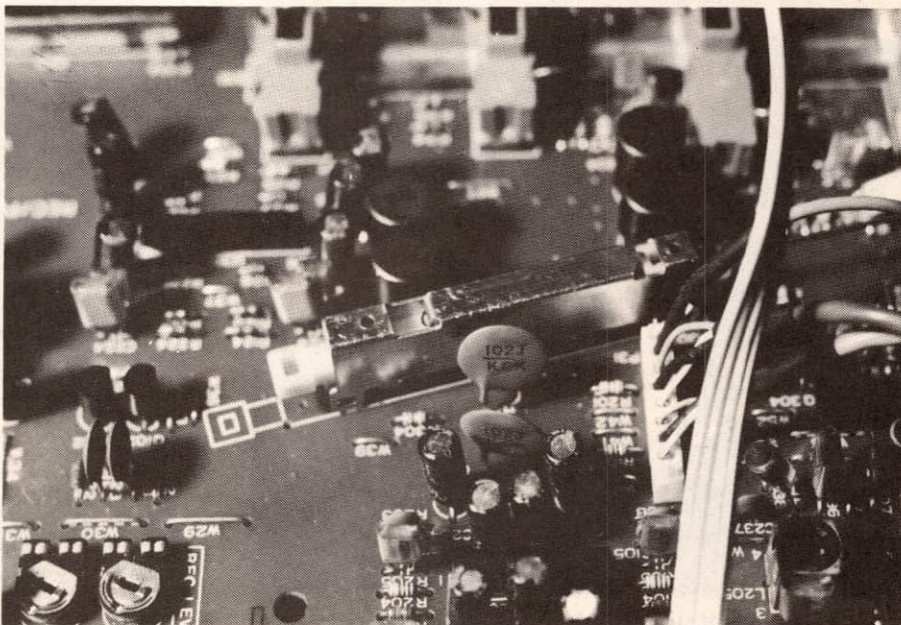
### Vital life signs

Taking the happier view, if we now have a deck that lights up, and on which the wheels turn, we should check out the electronics. Do this by connecting your signal source (the oscillator or the radio) to the cassette deck inputs and monitor the outputs with your amplifier and speakers or headphones.

Now some cassette recorders will immediately burst forth with glorious music, but some you will have to set into the record mode.

Place your 'don't care' cassette into the deck and press the Record button only. If the tape starts moving, press the Pause button. This should result in music (or tone) emerging from the output, and an indication on the recording level indicators, whether they be VU meters, LED indicators or flashing lights.

Some up-market recorders have a



**Fig.5: A closer view of the Record/Play switch, on the main PCB. The actuator spring from the transport hooks into the rectangular hole in the white plastic slider, visible at the left hand end.**



switch to allow you to choose between 'Input' (what is going into the recorder) or 'Tape' (what is being played back off the tape). For our test, set it to Input. With these decks it is not necessary to select record or even have a tape in the deck.

Note that it is desirable to feed both inputs of the recorder simultaneously with your test signal, and that may require a 'Y' cord or adaptor. Do not however, Y cord the outputs; these should be monitored individually.

This test will check that almost all the electronics is operating. The only parts left untested are the head pre-amps and the bias oscillator.

If there is no joy, a common fault with decks that have not been used for some time, or that are never used to actually record cassettes, only to play them back, is the record/play switch. This is generally a long slide switch, normally near the middle of the board, and usually operated by a lever or spring from the deck (see Fig.5). A good clean-out with a quality contact cleaner (do NOT use an oily cleaner such as WD40) and a vigorous workout will most often restore normal operation, but if the problem returns, the only lasting solution is to replace the switch.

A good tip when working with the R/P switch, or with the deck disconnected from the switch, is to make sure that the switch is in the 'play' position before putting your favourite Stones tape into the deck. If the linkage is disconnected, the electronics can be in the 'record' mode even though the button is not pressed. This of course will result in the erasure for all time of Mick and his mates...

If we are happy so far, it is time to check out the transport. Place your 'don't care' cassette into the deck and select play. Keep a careful eye on the two spool carriers, especially the take-up one — they should rotate smoothly and continuously, and should not hesitate or stop.

If erratic performance is noted, the problem is frequently the belt that transfers the drive to the spool carrier. To test, remove the cassette, place the deck into play mode and observe the wheel at the rear of the deck that the spooling belt drives, normally in the vicinity of the spools.

Even with the spool carrier stopped 'by finger', the belt must continue to turn the lower side of the spooling clutch. If it stalls, replace the belt. Actually I would replace ALL the belts and the pressure roller as a matter of course, as they cost only a few dollars, and cannot be rejuvenated successfully.

Replacement of the main drive belt, and sometimes others, often requires that the capstan assembly be partially dismantled. Carefully note the order of removal of the parts, and do not lose the small washers and circlips. Do a sketch if you are in any doubt. Nothing is worse than seeing a washer on the bench that should have gone on first, as you tighten up the last bolt! Take the opportunity to place a very small amount of fine oil on the capstan bearing — but try not to get any on the capstan spindle where it contacts the tape.

How do you determine the correct size belt? Simply fold it in half and measure the length, double this and you have the total length.

The parts dealers are able to cross reference this into the diameter. Choose the next smallest size, as the old belt will have stretched. They are available in square section sizes of 0.8x0.8mm, 1.0x1.0mm, 1.2x1.2mm and 1.4x1.4mm. Flat section belts are also available.

The dimensions required to order a pressure roller are shaft diameter x wheel diameter x by overall height.

In the second of these articles, we'll move on to explain how to check and adjust the deck's performance.

(To be continued.) ♦

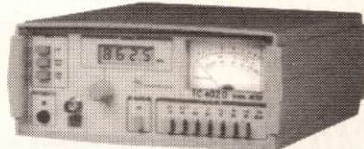
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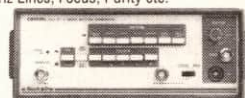
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