A practical approach to Electronics PART 8

How to service cassette decks Pt.2

Replacing the heads in most cassette decks is a relatively simple job. You can also replace the pinch roller and belts, and make motor speed adjustments.

by KINGSLEY HOWE

The heads most commonly used in cassette decks are of three types: mono, stereo and four track.

Monaural heads are found in the smaller, single speaker units. The wiring to these is fairly simple, as there are only two head connections. The head is used for both recording and replay, and differs from stereo heads in that the signals output is a mixture of both the left and right channels (assuming a stereo tape is being replayed).

Stereo Heads

There are three types of stereo heads. Standard stereo heads incorporate both record and replay capabilities in the one head. Some confusion can arise when replacing them. The four pins on the rear of the head may be connected to the internal coils in either a vertical or horizontal configuration. Testing with a multimeter is a must before soldering any leads to them.

Set the meter to the high ohms range to avoid magnetising the head or overheating the fine wire coils inside. The original head may have the coils connected horizontally, and the new head vertically. Check carefully, otherwise you may solder two earth wires to one coil and two signal wires to the other!

The second type of stereo head is called a 'play only' head. This is exactly what they do and no recording is possible. These heads are designed to fit car sound equipment and are cheaper to manufacture than the standard stereo head. They are therefore used where recording is not a requirement.

There is no difference in physical appearance between the two types. A standard record/play head may be used for a car cassette player without problems, but note that play-only heads fitted to a hifi deck will render the recording facility ineffective. If you have unintentionally fitted a head of this type, the erase will still work, but the end result will be a blank tape.

Metal heads are specially made to cater for the high demands of metal tape recording. The coils are more rugged electrically than the standard tape head. Any unit displaying a 'metal' label, should be fitted with a head replacement specified as 'metal tape capable'. These heads are rated at a 16kHz upper limit in reference to metal coated tape, as against the standard head rating of 12.5kHz.

Four Track Heads

Four track heads are really two stereo heads in one housing. They are capable of playing tape in either direction and are found mainly in automatic-reverse car cassette players, although some domestic units offer this facility. They are easily identified by the four pole pieces on the face, and tape guide fingers on both sides of the head. The connecting pins at the rear are usually attached to a small circuit board.

When replacing these heads, make an accurate sketch of the connections before removing the leads.

Head Brackets

The head bracket is the plate on which the head is mounted, and the tape guide fingers are formed from part of this. The bracket is, in most intances, spot welded to the head. It is important that the bracket is not bent or otherwise mistreated, as even the smallest distortion will throw the head out of alignment.

Several patterns of brackets are used. The most common types have a hole at one end and a slot in the other end. Some may have three holes, where two mounting pillars are fitted to the deck.

The size of the head may vary according to the manufacturer. A smaller head does not imply an inferior product, it is just a more compact design.

The most important point to check is the distance between the bracket mounting holes and the head face. If the distance is too short, there will be little or no contact with the tape. To compare the two, place the brackets together (turn one head upside down) so that the holes line up, and view the two head faces. These should be in line. Most are made to standard dimensions, but there are some exceptions.

Changing The Head

You will need a small Phillips head screwdriver to remove the locking screws and release the head. The screws will be found at either end of the mounting bracket, and are often covered with paint or lacquer to prevent movement of the head.

Desolder the wires from the head

first, then place the tip of the hot iron on the head of one screw. Leave it on for a few seconds, so that the lacquer becomes soft, then try to loosen the screw. If it turns easily, heat the other screw next and loosen that. Finally, remove the two screws, undoing each several turns at a time.

When the head is free, lift it out carefully. On the end where the spring is found, a small brass bush will be seen inside it. Lift the spring clear and grasp the bush with a pair of long nosed pliers. Several tiny washers may also be found. To avoid loss of these parts, place them in a plastic lid or the cap from an aerosol can.

The new head can now be mounted, and the wires soldered to the pins. Don't apply too much heat, as the insulation may peel back, leaving bare wires which will short out. If this is the case, use a toothpick to apply a coat of contact adhesive to the exposed wire.

Before going further, give the wires a light pull, to test the soldering.

All being well, anchor the cable(s) in the original position and, to avoid future trouble, place a few drops of contact adhesive where the cables contact each other or the deck. This is to minimise any strain at the joints on the head pins.

As the head moves in and out in use, the cables can flex and twist, causing the wire to break at the rear of the head. This is a common form of failure in cassette decks.

Head Alignment

Tighten the screw on the mounting pillar, then adjust the screw at the spring end, so that the head looks fairly level. Insert a cassette into the deck, and slowly depress the Play button. Watch the head carefully, it should enter the slot in the front of the case, without touching anywhere. Now look from behind the head. The top of the head and the case should be parallel.

Now comes the final adjustment procedure. Leave the cassette in place, set the volume control to a moderate level, and check that the cassette is properly seated. Switch the power on. The cassette should now start to play. If a scraping noise is heard, either the motor pulley, flywheel or the belt is catching somewhere. Give the deck additional support to clear this fault.

Adjust the screw at the spring end of the head bracket, up or down by a small amount. The sound will be loudest when the head is exactly in line with the recorded tracks. On either side of this position, the sound will appear muffled and bassy.

Adjust the screw for the highest volume, then very slowly make fine adjustments for maximum treble. Once this is achieved, switch off and pull the plug from the mains socket.

Coat both screws with contact adhesive. Use a toothpick to run the adhesive over the screw heads and down onto the bracket. This will lock the screws in place and prevent the head shifting.

External Adjustment

On some players, the head may be adjusted via a small hole in the case. Look near the cassette lid, on the side where the head is situated.

The hole will be found directly over the head position and adjustments may be made with a small screwdriver. Don't neglect to lock the head screw afterwards.

Pinch Roller Replacement

When a roller becomes worn or hard, it is best replaced. The roller is secured to a metal frame attached to a steel post on the deck. A spring is linked between the metal frame and the deck, to apply pressure to the pinch roller and spindle when the unit is playing. The position of this spring should be noted before any attempt is made to remove the pinch roller assembly.

A small circlip is employed to hold the frame to the post. This fits into a fine groove at the top of the post and may be eased off using a sharp pointed tool or small screwdriver. Do not try to remove it too quickly, as this may cause the circlip to fly off and be lost. Several small washers may be found on the post also, and these will need to be replaced during re-assembly.

When sliding the new frame onto the post, reset the spring to its original position before pushing the frame home. The frame may have to be manipulated to sit it down tightly, so that the circlip will fit on.

On many frames, a small tab will be found underneath. This extends into the deck linkage(s), and is engaged when the pause button is pressed. Before any other work is carried out, check this for correct operation. First, press the Play button. This should not be stiff or hard to move. If it is, the tab position is incorrect and will have to be relocated.

The play button should now work easily, with the head moving across the deck and the pinch roller contacting the spindle squarely. Now press the Pause button. It should operate with a smooth, easy movement, and give a distinct click on engagement and release. The pinch roller should swing clear of the spindle by several millimetres, and latch in this position.

A few decks have extra holes punched in them for the purpose of altering the spring tension. Unless the spring has become weak, do not increase the pressure. Higher than normal pressure will cause rapid wear on the spindle bearing and, on many decks, these are pressed in and not replaceable.

No Spare Parts

Not all pinch roller assemblies are available as spare parts. There are as many frames as there are deck designs, and some may be obsolete or not imported as spare parts. When faced with this problem, the roller may be purchased as a separate item or removed from a different type of frame. To do this, file the end of the roller pin right down to the frame, then punch it out. Place the new roller in the frame, and burr over the end of the pin to hold it in position.

Check that the frame is not bent out of shape and that the roller turns easily.

If the new roller hub is too high for the frame, it will be tight to turn. These white nylon hubs are of split construction, and the end can be prised off by inserting a thumbnail between the tyre and the flange. Remove the tyres from both rollers and swap them over. Filing the hubs down on the ends is not advised, as this will cause the roller to run up and down as it turns, and thus damage the tape.

"The din you are complaining about, mate, is a tape recording I made of the party you had yesterday!"

Servicing cassette decks

Belts

Belts are used on cassette decks for a multitude of purposes. They drive the flywheel/spindle assembly, tape counter, the fast forward and rewind capstans (depending on the design) and, on units fitted with electronic automatic stop circuits, the magnet or optical system.

Three main types may be found: flat, square or round. Over two hundred sizes are available all told, so choosing the right size can be tricky.

When a belt needs to be replaced, it will almost certainly be in a stretched condition, and the rule of thumb in this case is to use a belt one size down to allow for this.

A loose or worn main drive belt will cause speed variations and failure of the mechanical automatic stop to operate. A loose belt driving the electronic automatic stop will cause the player to stop frequently during play.

The belt should be examined for a shiny surface or oil contamination. A shiny surface indicates slippage and stretch, so turning it over is not likely to improve the grip. Oily belts may be cleaned and put back into service, provided the oil has not made the belt soft. Surface oil and grease may be removed from a belt with a tissue paper and methylated spirits.

Belts several years old can develop cracks in the surface. To test for this condition, stretch the belt slightly so that the cracks become visible.

Do not use a belt that is too small and thus overtight. This would impose a heavy load on the bearings in the deck and may cause the motor to run sluggishly or stall from overload.

Before removing any belts, make a sketch of the belt and pulley arrangement. A drive belt fitted onto the wrong side of a pulley may turn the takeup capstan in the wrong direction and tangle or spill tape.

Fitting Belts

Regardless of how much care is taken when new belts are fitted, some oil or grease will be picked up from the deck. Remove any oil so found from both the belt and pulley groove. When the belt is dry, remove any twists (if the belt is square) to avoid erratic speeds.

The thin circular belts used to drive the tape counter should be fairly slack. Check that the counter does not stick with the new belt — a clacking sound when running, or a jumping motion of the digit reels indicates jamming. Several pushes of the zero button may be needed to free it. No oil should be used, as the plastic is self-lubricating. In fact, lubrication will attract dust and the reels will eventually seize.

Correct tension on the main drive belt can be tested by holding the motor pulley tightly, then turning the flywheel by a small amount. The belt should tighten up on one side and slacken on the other, without much slippage. Next, turn the flywheel only. The motor pulley should rotate freely and without drag. If it feels stiff, the belt is too tight. As a rough guide, the flywheel should be only a little harder to turn than when the belt was off.

Cassette Motors

A wide variety of cassette deck motors is in use. These range from the thumbnail size 3-volt motors in "Walkman-type" portables, through to 240V AC motors in domestic decks.

The majority of cassette player motors are DC-powered, with 6, 9 and 12V types being the most common. All three may be obtained with clockwise (CW) or counterclockwise (CCW) rotation.

Fixed Speed Motors

Fixed speed motors generally rotate at a standard speed of 2400rpm. This speed is maintained by the use of a mechanical governor attached to the motor shaft. If the motor speed rises, contact points open the circuit to the windings, thus cutting off the power. When the speed falls, the points close, and the motor again receives power. The motor is therefore switched on and off very rapidly. Speed is not constant in the strict sense, but averages 2400rpm.

These motors are gradually being displaced by those with an electronic speed control, which is more responsive and reliable. The mechanically-governed motors have one advantage over the electronic type however, in that they may be reverse connected without damage.

Variable Speed Motors

Unlike fixed-speed motors, reversing the polarity on electronically-regulated motors will destroy the control circuit. The circuit is mounted on a small board inside the motor housing. Earlier makes were constructed from discrete components, but these are being displaced by dedicated ICs.

The speed control adjustment will be found on the bottom of the motor housing. It can be altered by means of a small screwdriver inserted through a hole in the housing. This hole may be open, fitted with a dust cover, or sealed with an adhesive label.

The screwdriver should be carefully inserted so that it engages the small trimpot slot inside.

As mentioned before, damage will result if the motors are connected wrongly, or an attempt is made to run them in reverse.

Motor Pulleys

Motor pulleys may be made of brass, aluminium, or plastic. Some are fitted to the shaft by a screw, or may be simply glued on. Plastic pulleys are easily removed by sliding them off the shaft. They are held on only by friction.

Metal pulleys may have screws through the boss, which will be covered with a sealer to prevent them working loose. The easiest way to remove these without chewing out the slot is to heat the pulley with the soldering iron, to soften the sealer. Pulleys that are glued to the shaft may also be loosened by heating. Make sure that you use a rag when handling the hot pulley.

When the motor is installed in the deck, check that the belt is straight and in line with both the motor and flywheel pulleys.

Auto Stop (Mechanical)

Some later model decks do not use a white plastic finger to sense the end-of-tape position. The plastic finger trips out the tape drive due to pressure exerted by the tape itself, whereas the alternate mechanical method involves sensing the lost motion of the takeup reel.

The latter is found on decks where there are nylon gears fitted. At the end of the tape, a cam or gear train is operated to disengage the tape drive. This may take between three and five seconds to operate. Many of these decks generate a rattling noise on fast forward or rewind, due to the clearance between the gear teeth.

Head Cleaning

When cleaning the cassette head, use only methylated spirits or a well known brand of head cleaner. The use of petrol, turps, kerosene, thinners or acetone will damage the epoxy resin surface which surrounds the magnet/gap assembly. The above solvents pit or etch the surface of the resin.