

CASSETTE DECK ROUTINE MAINTENANCE
COURSE # NEB710001 \$26

Object: To show how to clean heads, change belts and do routine maintenance.

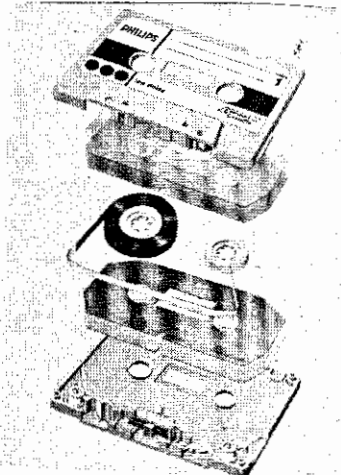
Motivation: To save money and time on routine maintenance doing it yourself instead of paying others.

This course focuses on the cassette format as this is the most widely used tape format in the world. Since the cassette was introduced in 1963, it has come a long way from a system meant for dictating and small portable uses. To the right is the original publicity photo that Philips used to introduce what they call the "Compact Cassette".

What made this format so popular compared to competing tape cartridge and cassette systems being promoted since the early 50's? Simple. The other companies promoting a cartridge or cassette system wanted substantial license fees to allow other firms to use their systems. Philips gave the system away virtually free to anyone who would conform to the standard. They felt it better to have a part of a huge market instead of all of a tiny one. The rest is history.



This is the system as it was introduced in 1963 — Cassettes, exactly as we know them now, and a record/playback machine, Philips model EL3300, which was known in North America as the Carrycorder, or the 'Continental 51'.



The cassette shown on the left consists of an upper and lower shell, lubricated gaskets, magnetic recording tape, two reel hubs, two guide wheels and a pressure pad. The shell halves are the outer parts of the case which we actually touch. The case usually has windows to allow us to see approximately how much tape is remaining. Cheap cassettes may only have holes in the sides, which may allow dust, etc into the case. Better cassettes have a transparent plastic window and some cassettes are moulded from clear plastic.

The cassette has two lubricating gaskets. Better cassettes use graphite coated mylar sheets while cheap ones use waxed paper. This gasket ensures that the tape can move freely within the shell.

The magnetic recording tape in the cassette is permanently attached to the two reel hubs so that no threading is required. The tapes originally came in Ferric Oxide formulation. Since then, in the quest for better performance, Chromium Dioxide and various Metal types have been introduced. It is a point worth noting that the reference cassette of twelve years ago, the TDK SA-C90 is now only an average quality cassette and sells for less now than it did then. In fact, some of the superior SA metal cassettes may now be purchased for no more than the TDK SA-C90 sold for in 1978.

Cassettes come in lengths denoting the playing time of both sides. A C60 cassette is a cassette that will play for 30 minutes on each side. Typical lengths available are C30, C46, C60, C90, C120 and C180. Of course, any length is available from cassette duplicating companies. The instructor once had 100 leaderless C10 cassettes made up for his mobile DJ operation.

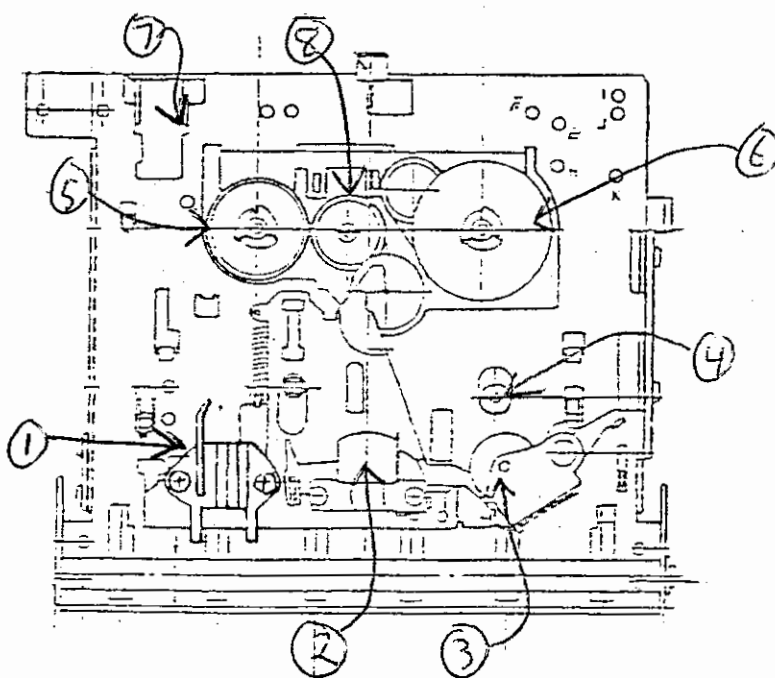
The cassette usually has two guide rollers to ensure the tape moves smoothly past the heads. There is also a pressure pad to keep the tape pressed against the record/playback head. This may be as simple as a piece of foam rubber but in most cases it is a small felt pad glued to a brass spring. Old cassettes where the volume has suddenly dropped are often suffering from the loss of this pad. A new one may be glued on.

In addition to the previous list of parts in a cassette, it usually also includes a paper label attached to each side. Some pre-recorded cassettes now have the list of songs actually printed directly on the shell. The cassette usually comes packaged in a two part break open case.

Cassette TRANSPORT

To the right is a specification drawing of a typical cassette tape transport. The more important parts include:

1. Erase Head
2. Record/Play Head
3. Pinch Roller
4. Capstan
5. Supply Reel
6. Take Up Reel
7. Erase Protection Lever
8. Idler Wheel



FUNCTION OF PARTS

1. Erase head. This part erases the old material prior to recording a cassette. If the old material is not erased, some of it may exist in the background of the new material.

2. Record/Play head. This is that actual part that records onto the tape and recovers the signal from the tape.

3. Pinch Roller. This puts pressure on the tape to ensure that the capstan is able to pull the tape properly.

4. Capstan. This thin, chrome plated, post is the part that actually pulls the tape past the heads. It rotates at a constant speed and has a large flywheel attached to it to even out speed variations. This part, and not the take up reel is what moves the tape.

5. Supply reel. This reel holds the supply of tape that we are listening to. It is driven by the motor only when rewinding the tape. During playback or fast forward, a brake puts some drag on this reel to ensure that the tape stays tight. Loose tape can slip off the head and cause variation in volume.

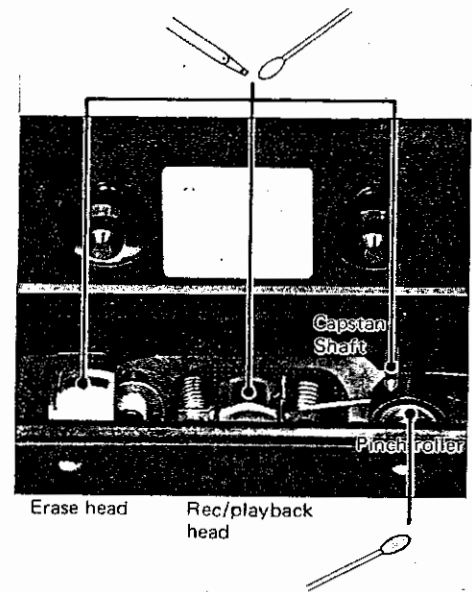
6. Take-up reel. Contrary to first examination, this does not move the tape past the head. This is because the size of the reel varies with the amount of tape on it. Therefore, if it turned at a constant speed, as the diameter of the reel with its tape increased, the speed of the tape would increase. This would give a varying quality of sound along the tape as well as making tape splicing impossible.

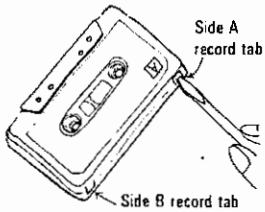
Instead, the capstan and pinch roller pull the tape past the head at a constant speed. The take-up reel, through a slip clutch system merely winds up the tape that exits the capstan-pinchroller. The speed at which the take-up reel turns will get slower as the amount of tape on the reel gets bigger.

The only problem with this system is that if the slip clutch driving the take up reel fails, the take up reel will stop turning. However, the capstan will still be pulling the tape along. The result is that the tape spills out of the cassette, usually wrapping itself around the pinch roller. Everyone has experienced this at some time or other. We have a special technical term for this phenomenon, "eating tape".

The take up reel is directly driven in the fast forward mode.

7. Erase Protection Lever. This lever is pushed back by the cassette when it is inserted to allow the recording of the cassette. If the knockout on the back of the cassette has been removed, this lever will not be pushed back when the cassette is inserted and the record button will be mechanically disabled. This





is why, when there is no cassette in the machine, you cannot press the record button down.

To record on a cassette with the knockout removed, cover the hole with a piece of cellophane or masking tape.

8. Idler wheel. This rubber tired wheel couples the rotating energy from the motor to either the supply or take up reel, depending on what mode the transport is in. Its position depends on what mode the transport is in. It presses against and supplies rotation to the supply reel during rewind mode and against the take-up reel during play, record and fast forward.

Some decks use a gear here instead as it gives a more positive, slip free drive. The instructor considers gear drive systems to be superior.

REAR VIEW

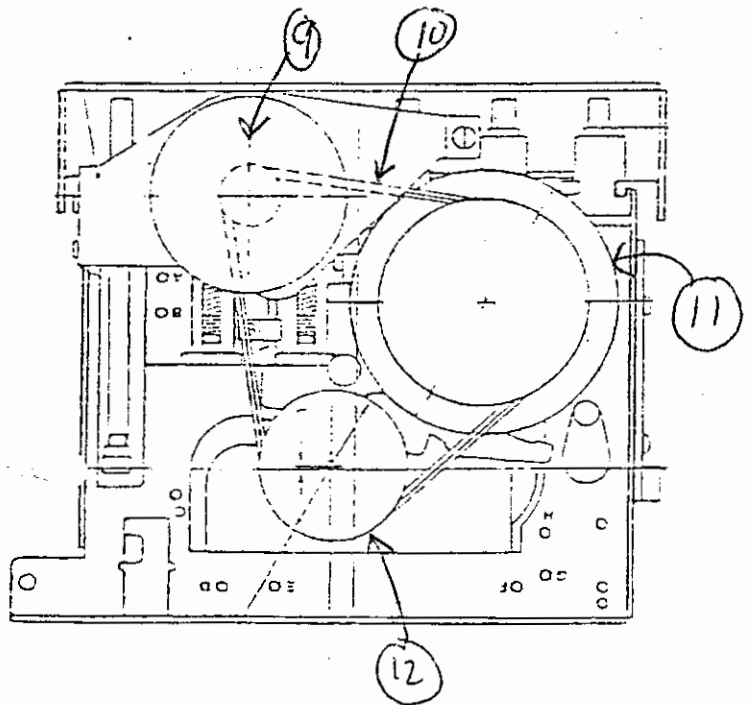
- 9. Motor
- 10. Belt
- 11. Flywheel
- 12. Idler wheel

9. The motor supplies the mechanical energy that actually operates the mechanism. In almost every case, this is a DC motor turning at 2400 RPM.

10. The belt transmits the power from the motor to the rest of the deck. It may be round, square or flat. It is important that any replacement be fairly tight and be the same physical style.

11. The flywheel provides mechanical inertia to even out any speed fluctuations from the motor.

12. The idler wheel couples mechanical energy to the upper idler wheel that, in turn, drives the supply or take up reel, depending on which mode the machine is in.



MAINTENANCE

The main parts that need cleaning are:

- Record/Play Head
- Erase Head
- Pinch Roller
- Capstan
- Idler Wheel

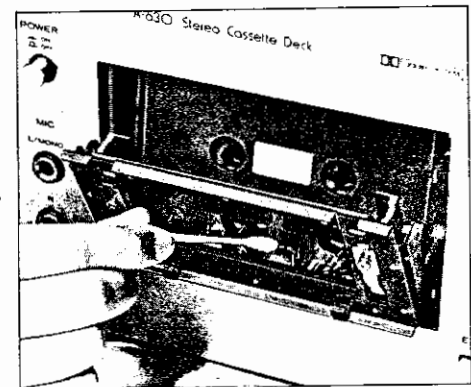
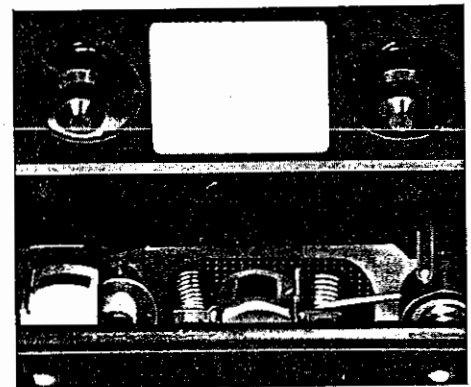
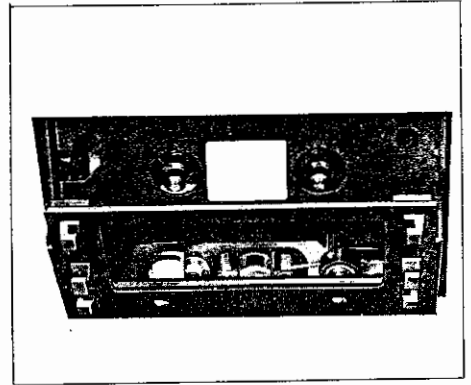
FRONT END

After the deck has been used for a long time, tape oxide and other foreign matter tend to build up on the heads. Dirty heads will drastically reduce the sound quality you will experience. Extremely dirty heads may cause the deck to cease being able to record or play at all. To prevent problems and to ensure longer life for the heads, regular cleaning should be done every 100 playing hours or so.

The cleaning fluid may be any commercially prepared head cleaning solution or you may use 90% or better isopropyl alcohol. Beware of "rubbing alcohol" as this usually has an oil in it that is undesirable for this application.

With the power shut off, the process is:

1. Remove the cassette door cover if possible. It is not possible on all machines. If it is possible for you to do this on your machine, it will make access to the heads much easier.
2. Press the play button to extend the heads. If the machine has a power operated mechanism, you will have to turn on the power, press play and then turn off the power or unplug the machine so the heads stay in the extended position.
3. Take a small, dry paintbrush that has never been used for painting, and brush away any dust, hair, lint or any other loose material out of the mechanism. Compressed air, gently used, may also be employed for this, if available.
4. Using a cotton (Q-Tip) or foam tipped swab dipped in the head cleaning solution, clean both heads until no evidence of tape oxide or other foreign material is left. The heads should be



like new with the exception for wear. Nothing but clean plastic or metal should be visible. See figure J

5. Turn on the power, and with the machine in play mode, using the swab, above, clean the pinch roller and the capstan. While the alcohol will work on the capstan and pinch roller, the instructor finds they are slow to use and prefers to use Ronsonol lighter fluid.

Some machines will keep shutting off. In these cases, use your other hand to slowly rotate the supply reel. The pinch roller normally has a band of colour around it from oxide residue from the tape. This should be cleaned off so that nothing but black rubber is showing.

If the oxide cannot all be cleaned off, operation of the deck may be impaired. If the pinch roller is cracked, it must be replaced. If the swab starts to come apart, discard it and use another.

6. The capstan must be cleaned so that nothing shows on it except bare, chrome plated metal. If it is bent or appears to wobble as it rotates, it must be replaced.

7. Shut off the power without pressing stop. The heads must stay in the extended position. Plug in your demagnetizer. This is also known as a degaussing tool. Make sure that no cassettes are within 6 feet for 2 metres of the demagnetizer anytime it is switched on. Figure M shows a typical demagnetizer. Radio Shack always has a suitable model available.

8. With the demagnetizer away from the machine, turn it on. Move the wand on the demagnetizer over the heads and pinch roller, along the tape path from left to right. Move the demagnetizer well away from the machine, at least 1 foot or 30cm before moving it back to that starting point and doing the operation again 2 or 3 times more.

As long as the plastic coating on the wand is intact, it is okay for it to touch the heads. If, however, bare metal is showing, cover it with black vinyl tape or replace the tool.

Make sure the demagnetizer is at least 12" or 30cm from the machine before you shut it off.

9. If you can get at it easily, use the same tools and fluid that you used to clean the pinch roller to clean the idler wheel.

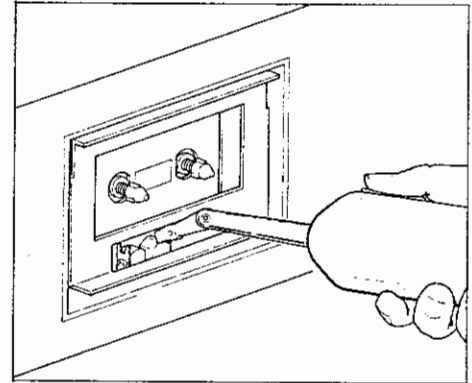
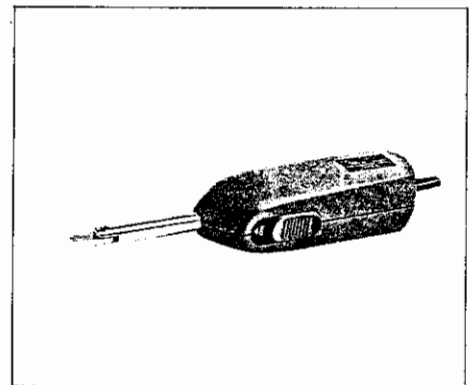


Fig. L



BACK END

1. With the unit unplugged, remove the cover so that the belt(s) are exposed.
2. Push you finger against the main belt. It should only easily deflect about 1cm or 3/8". If it is looser, it must be replaced.
3. Examine the pulley on the motor. It must be clean, with no black particles stuck to it. If there are any, it must be cleaned using the same fluid as used on the pinch roller. The belt may be slipped off of the pulley to make this easier. The lack deposits here may be resistant to cleaning. Use your fingernail to scrape them if necessary. Also, a more powerful solvent may be used such as lacquer thinner if it is a metal pulley and you do not allow any to touch any rubber parts such as the belt. Put the belt back on the pulley after the solvent has dried off.

Repeat this examination and cleaning for all the wheels the belt goes around.

4. If the belt is not too loose, with the same fluid and tools used to clean the pinch roller, clean the belt. Rotate the flywheel by hand to move the belt so that all parts of it may be cleaned.

If the belt is a flat type and has never been turned inside out before, instead of cleaning it, just turn it inside out so that the clean unused side now contacts the pulleys, etc. This trick will not work if done before, or if the belt, during is travels has pulleys against pressing both sides. You can tell if this is feasible by examining the belt. An unused side of a flat belt will have a flat finish while a used side will be shiny.

This flip over trick is not possible with a square or round belt. In an emergency, the instructor has gotten away with replacing the belt with an elastic band but the operating life of an elastic band is only about 3 hours.

Removing the belt may require removing a cover plate that retains the flywheel in place. Do not remove any more screws than absolutely necessary. Make sure the belt does not get any grease on it during the replacement process.

HEAD ALIGNMENT

This is to ensure the highest quality of playback sound quality. To do this, you need a tiny screwdriver, usually a Philips head and a pre-recorded tape with good treble. Music with a lot of cymbals is good. Do not use a home recorded tape.

1. Find the record/play head azimuth alignment screw. Looking at the deck, in play mode, it is usually the record/play head mounting screw located between the record/play and the erase head. There is often an access hole or slot to allow you to get to it.
2. Plugging in a pair of headphones or listening to the deck through an amplifier and speakers, play your pre-recorded tape. The reason for using the pre-recorded tape is that the recorder to make the tape will, in most likelihood, be adjusted to industry standard. There is no guarantee that a home recorded tape will be made on an accurately aligned machine.
3. Playing the tape, turn the adjustment screw to the right and left until you get the best high frequency sound quality. If when

rotating the screw in one direction, the sound gets worse, usually sounding muffled, you are turning the screw the wrong way. The screw may be rotated for several turns. Be aware that a half turn is usually enough and more than 2 or three turns counter-clockwise will make the screw fall out and it is quite difficult to get the screw, spring and head back into place.

Some auto-reverse decks have a separate adjustment for each direction. Therefore, on an auto reverse deck, do this adjustment while playing the tape each way.

4. After the adjustment, remove the cassette and put the machine back in the play mode without a tape and shut off the power. Put a tiny dab of nail polish on the screw head to prevent it from vibrating out of place.

PARTS

If parts are needed, the best parts are original parts. For more popular brands such as Sony, Hitachi, Toshiba, Technics (Matsushita), JVC, MTC, etc., original parts may be bought directly from the manufacturer's warehouse, often in Richmond or Annacis Island. The addresses of these places are in the white pages. Parts for other brands may be purchased from the warranty service centre. The name of this place is listed with the warranty card that came with the machine. If you cannot find this information, common parts such as belts, cleaners, etc. are stocked by Main Electronics at 4554 Main St. in Vancouver. Main is open on Saturday as well. If Main does not have the part you need, they are usually able to order it for you.

MATERIALS NEEDED

Q-tips

Head cleaning solution (90% or better Isopropyl Alcohol)

Rubber Cleaner (Ronseal Lighter fluid)

Nail Polish