Enclosure Design of Electronics Equipment
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Lecture – 46
Common connectors

Why I have been showing you this is, this is a very common thing.

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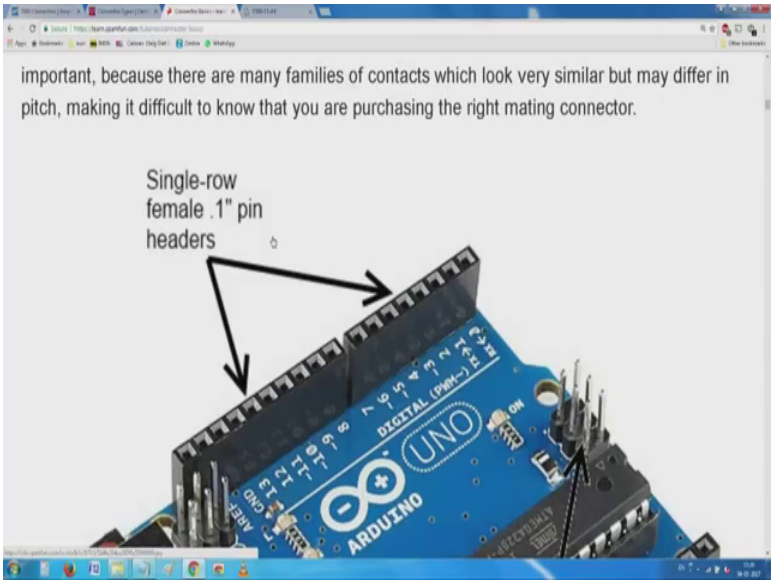

Now, we have a little a little about the rather I do not know it is a (Refer Time: 00:28) bold you have seen this here. So, we see all sorts of things, we see 0.1 inch pin headers 0.1 inch refers to the pitch 2.54 milimeters and double row 0.1 inch header. You have understood this one is a socket this one is a plug type which I have shown you. And then something here we also see which is not very satisfactory. It is paring in terminals if you remember in the beginning we talk about cost often this cost seems to dictate how bad things can be.

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If my colleague can kindly give me this, you see here, I am not very clear probably yes it may be an audio or it may be something. If you spend more money you get a proper connector, if you do not spend enough money you end up with something often which fails.

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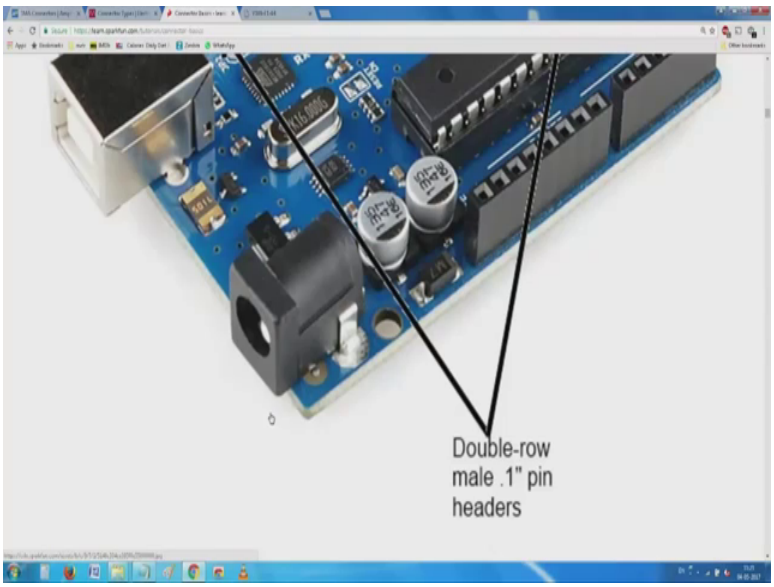

As if this is not sufficient most of they had been have come in the original sockets have been made such that there, is a built in battery or a battery backup inside. If you provide external power that is circuit is interrupted and hence powered from outside, if you

remove it the internal battery works. So, a built in switch contact also maintain. So, it leads a little bit of a problem ah, fantastic here.

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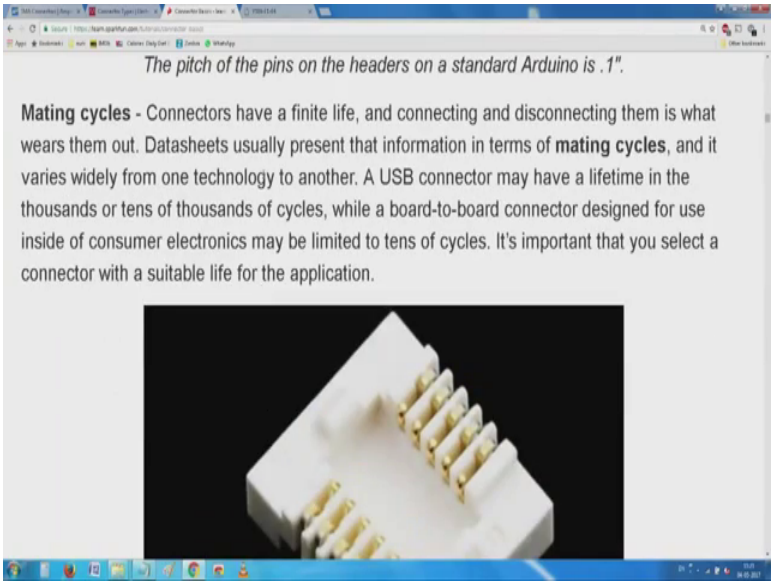

There getting it very organic thing about mating cycles and all that know maybe they will built houses eventually, or going to investing season. Sorry for the small problem, but what you will notice here is that, connectors have a finite life connecting disconnected them is what wears them out. Data sheets usually present that information in terms of mating cycles. So, USB connector may have a lifetime in the thousands or tens of thousands cycles while, a board to board connector designed for use inside the electronics maybe limited to tens of cycles.

You see one very interesting thing here.

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You see this is having flat surface mount contacts. I do not know the designation, and once it sit is on the top of a what you call printed circuit board, something from the top gets inserted here. On the top something is inserted here, and now I think you should read it for it. About the connector datasheet and so on, just read it.

50 insertion cycles, what did go out in the manufacture itself. No, generally they are all I know checked the connectors checked. Then probably the functionalities check directly by a different device. And once when the whole thing is pushed on top of it, it works extremely reliable. Satellites do not fail the connectors would not fail your module would not fail. We just have to stand in the open and wait for the satellite to connect.

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So, about this mounting the connector is mounted in use panel mount free hanging board in mount what the angle of the connectors relative to the attachment. Or how it is mechanically attached solder tabs surface mount through hole. So, added to that there is a very funny thing the professionals and military no use the word bulkhead. Anything which is used on a vertical plate no you have calling it a panel I will call it a bulkhead with they have reasons. And this is you have seen here it is looks a little like a multipurpose thing. It has a small soldering hole and all that plus it is punched out of a flat sheet. So, you can mount it on the PCB or you can connect a cable also it is.

While this know is clearly a cable mounted thing now you just read it.

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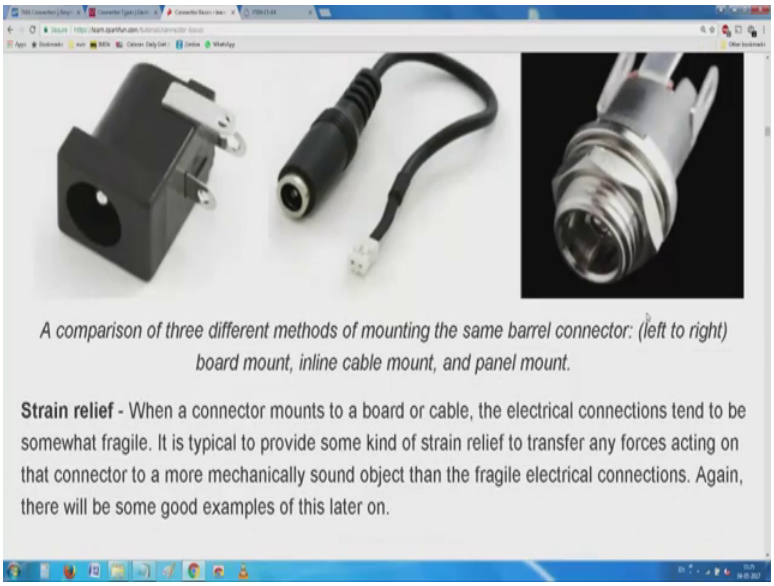

PCB mounted by soldering, because there is no other way of holding onto the panel, inline cable mount understand so one side it is connected to a somewhat you call 2 pin switch come from the printed circuit board. Other side it has a that nice coaxial connector and finally, panel mount we have a nut in the front panel one 12 will be just a hole within it or as I have explained to you earlier they can be a flange they can be a flange with 4 holes you see that BNC occasionally that TNC connectors you have a nice flange with 4 holes.

There is reason for that which is better one of the thing is especially for BNC, it is essential you mount it like that because, by definition we are going to take meeting socket part and going to rotate it. So, that it engages permanently that often causes the other end to completely fail, only other way of getting over it is to make it D side D type things.

Sum of these especially BNC has a D type cut here. So, can you put it inside, that D is supposed to prevent it, but due to small variations in manufacturing tolerances your opening D opening can be little bigger and the connector can be little smaller. You end with an n plus n situation that was damaged arts and eventually it start rotating.

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Most important thing here to when a connector wants to a board or a cable electrical connections tends to be fragile. It is typical to provide some kind of strain relief to transfer any forces acting on that connector to more mechanical sound object than the fragile electrical connections. So, I am sure all of you know about this 3.5 mm cable jack which we use in your headphones.

Very interesting this is taken from an old telephone this thing where you have quarter and 6.35 the terminally you have seen that the tip and ring. And it was carried through in the pots plain old telephone system, that they were tip and ring is even used in the electrical circuits is only plays very clearly they explain what a tip and ring is. People who are in the telecom industry will probably either learn or appreciate it hold like me you will appreciate it. If you are young you have a chance for learning.

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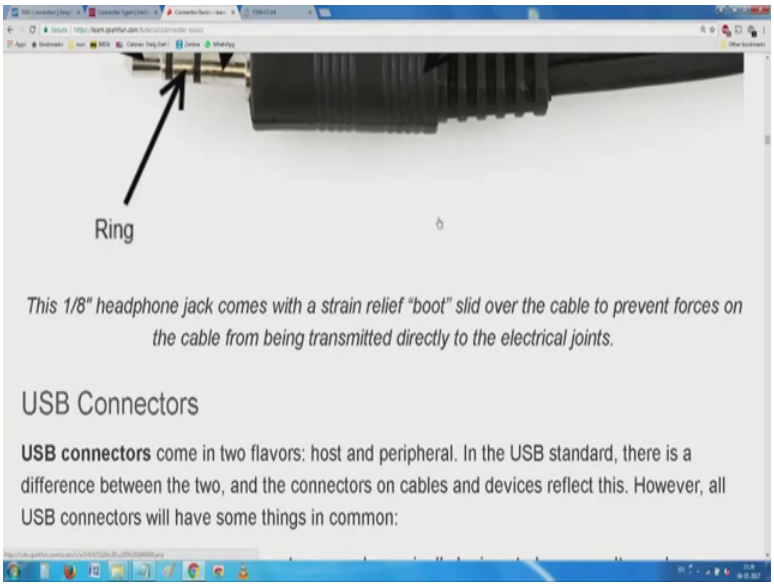

This is a 3.1 mm normal head phone jack comes with a strain relief boot, this is the one which main thing is, if you pull this out here or if you hold and anything the contacts inside no should not get damaged, what often they do.

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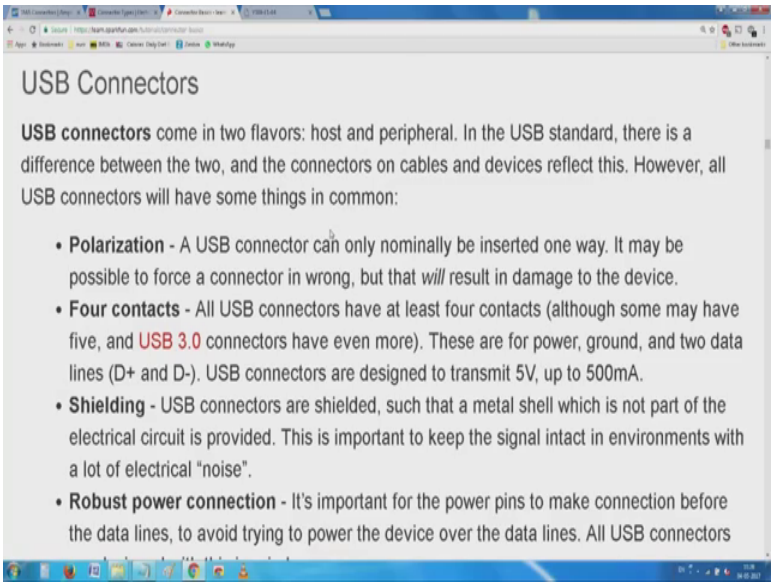

Nice word host and peripheral first is the one which supplys the par and then it has certain features one of them is, that it is 5 volts. And the current is limited very carefully. You have seen this? We have 2 issues there, but there are not electrical thing it is about how much of power you can get. So, as you say if you multiply both of them a little over

2 watts is what I can produce, I am sorry, what can what needs be supplied in all conditions.

So, generally it is restricted to 350 milliamps and that your other side should not draw more than this. So, I live all this first thing is which has explaining to you a USB connector can be inserted only one way nominally, you understood no? If you are a (Refer Time: 10:06) or a hacker nothing prevents you from removing the barrier and push it that is all.

It will result in damage because extiments are per issues is there. Than if you see carefully apple does not use this, if you use that lighting connector it can go both directions (Refer Time: 10:33) go like this and the other way also there is an advantage and disadvantage, some things are duplicated something are, but there is a gain, there make sure that you cannot interchange the other subjects. All USB connectors at least have 4 contacts, these are for par ground data line data high and data low design to transmit So much shielding.

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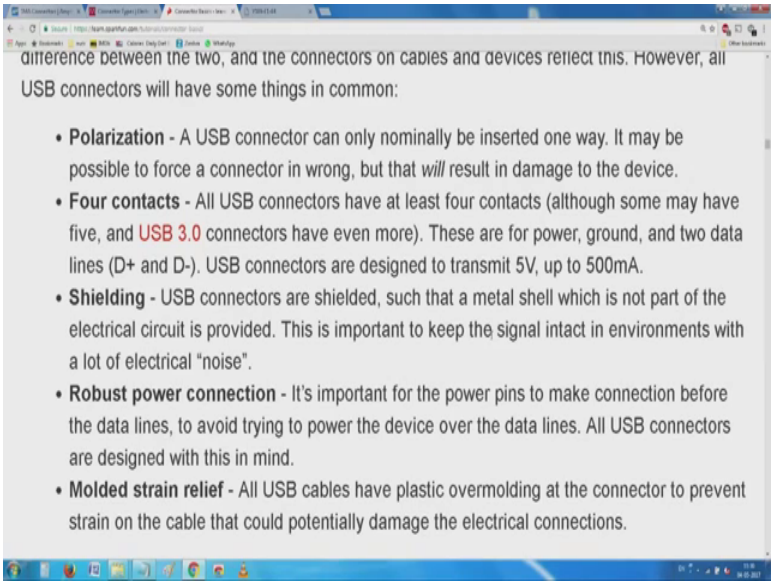

Metal shell just not part of the electrical circuit is provided. Keep signal in tack in the case of environments with lot of electrical noise. So, it is built in that the outside world.

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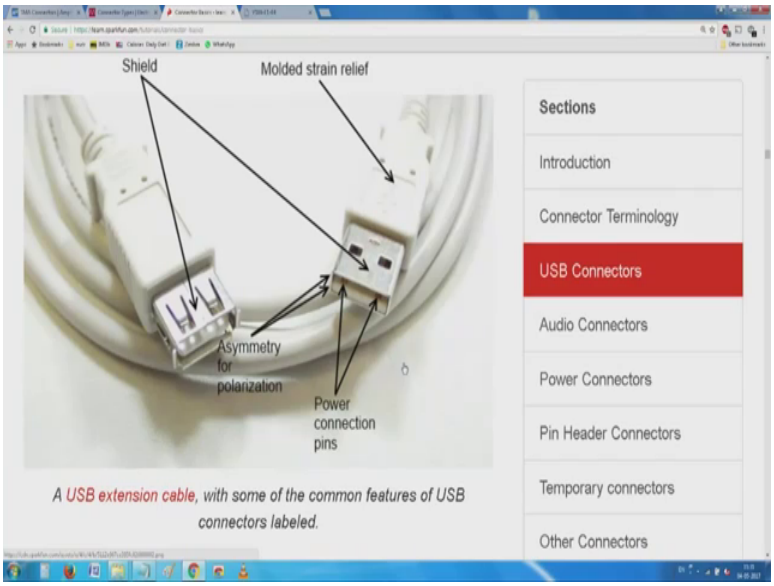

You know so, you only read it a little you see here this word. I will just make it little bit smaller. So, left one comes as (Refer Time: 11:41) So, left one comes as the host right thing and the other thing now you see this small 2 contacts which have trying to show you on the sample I had and then the small opening where, this will go and sit into that. Then we have the power pins some of the features.

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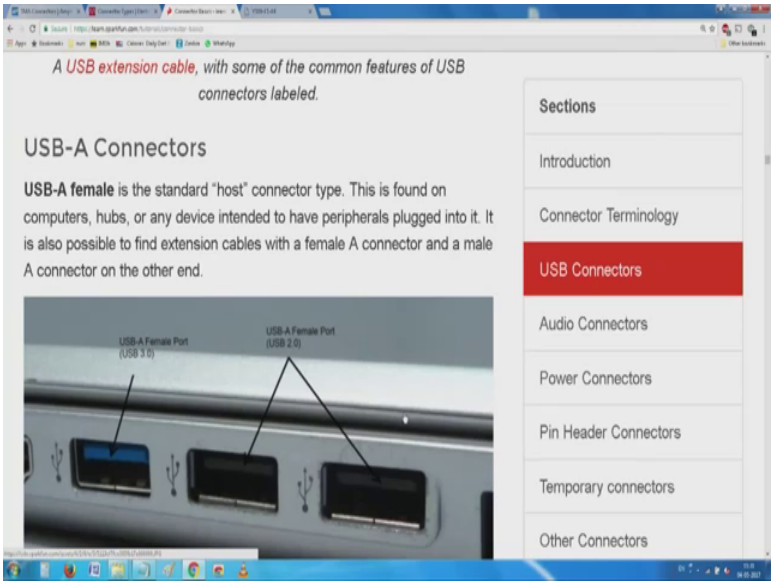

Now, it comes to the huge list on what is USB, a b and you know mini and micro looks like a nonstop thing. USB a female is a standard host connector, on most computers or

any device intended to have any peripheral plugged into it. You have seen this no? And you see a small designation also is there 3 versus the old black.

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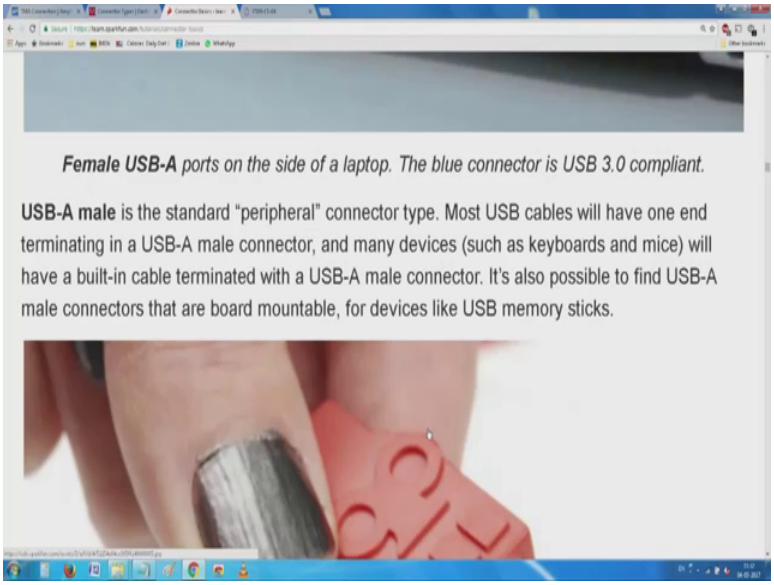

Somebody has removed this outside shell to see how well the contacts are made you see it is a 4 terminal.

So, we have all this, I hope you read it carefully.

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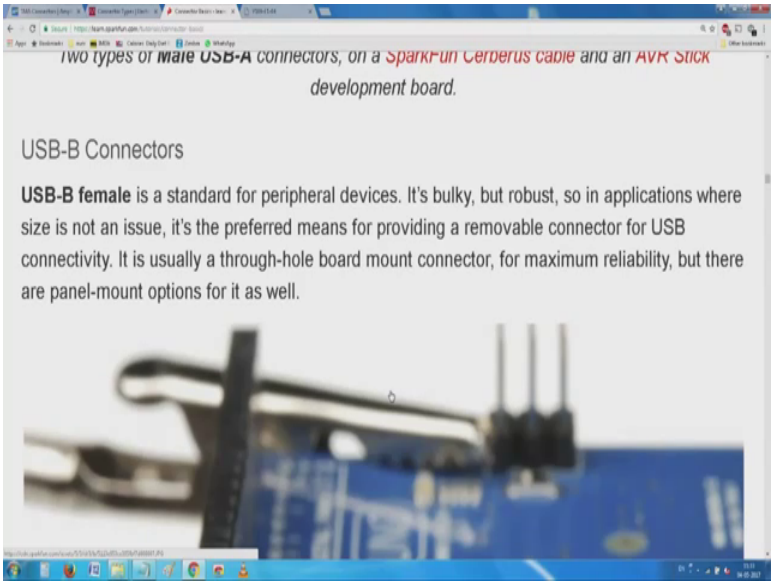

This has come probably of the reason of you needed to stack them, and a little more on the squash side. See the whole mounting little more squares. It is a little stronger compare to the other thing. So, occasionally you find it on printers. Because for some reason they may have problem and some types of hubs and all that you have this USB type b squarish thing.

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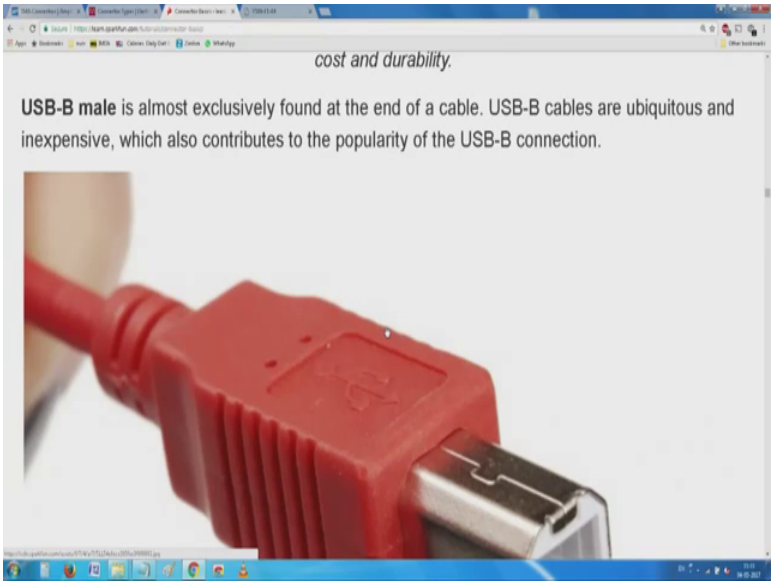

So, not long ago USB was use for more regarded this thing compared to the other one.

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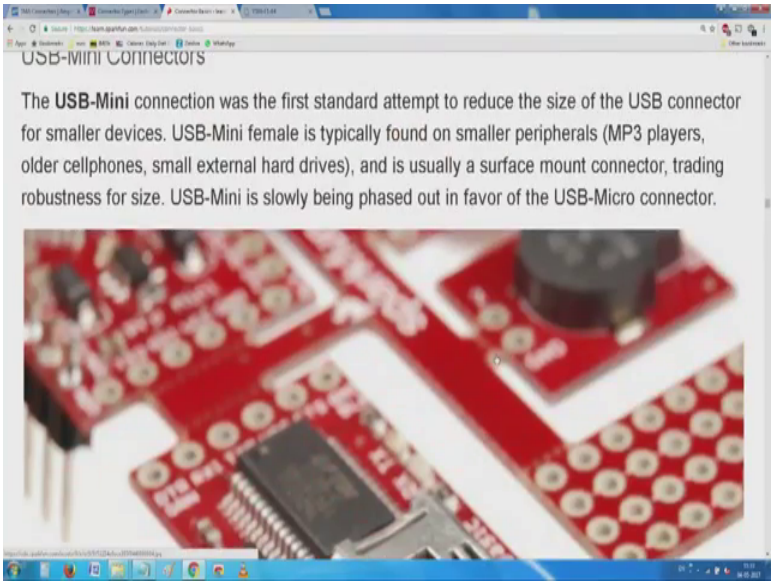

They are coming into nice beautiful area, mini has an attempt first attempt you have seen that no reduce the connector for smaller devices. Found on smallest peripherals mp3, older cell phone, small hard drives, external hard drive, surface mount connector. You will notice that most hard drives the pocket hard drives and all come with it there is a small advantage of it also. Normally you are not likely to use a charging cable for connecting it. Because that USB to this mini has data things also their slightly different, I am I am just you can just check.

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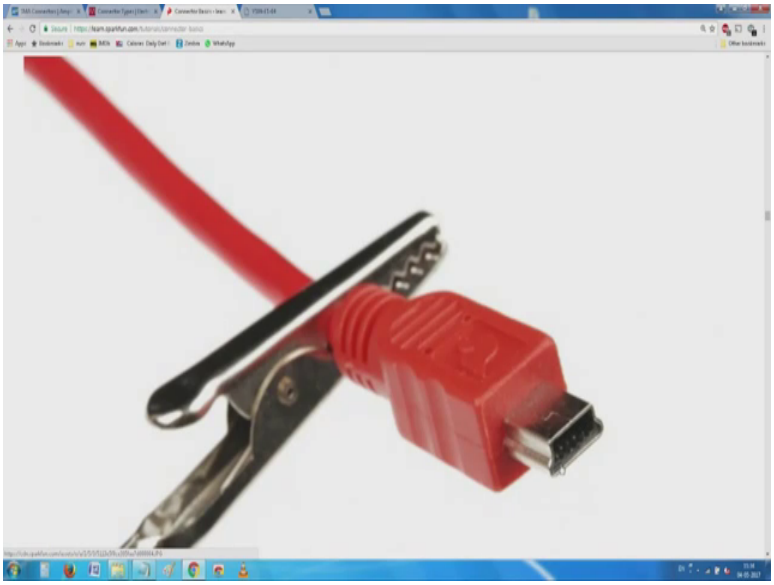

You have seen this? This very beautiful shape is characteristic of it which you do not find with the micro cable, that small step with 45 degree jumper is characteristic of this. Now we finally, come to the micro female.

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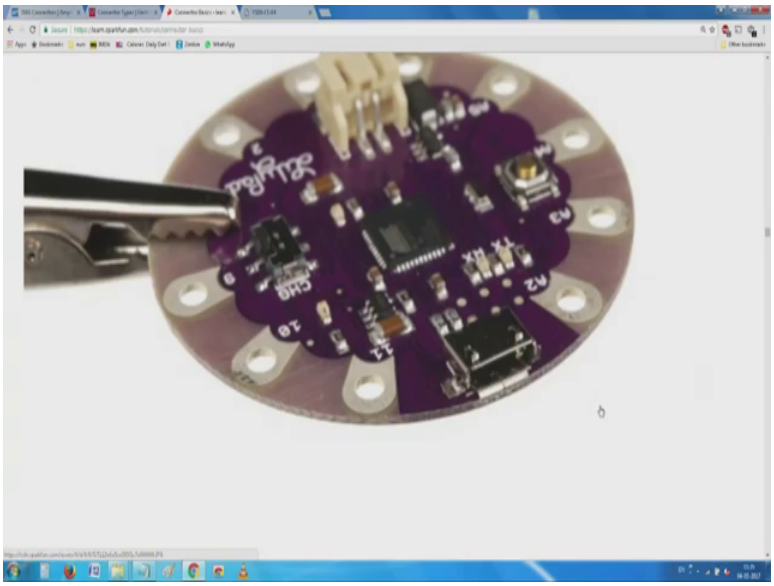

You have seen here there is no step, but instead it is shipped.

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One end for connecting everything USB micro has a peripheral. So, by default most cell phones these days come with a socket which is mounted on this. And then they data cum charging cable it is all of them now practically come with this. This is the typical.

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You have seen this? As a OTG, on the go cable devices. Say if you have a mobile phone like this, sir can you show me this.

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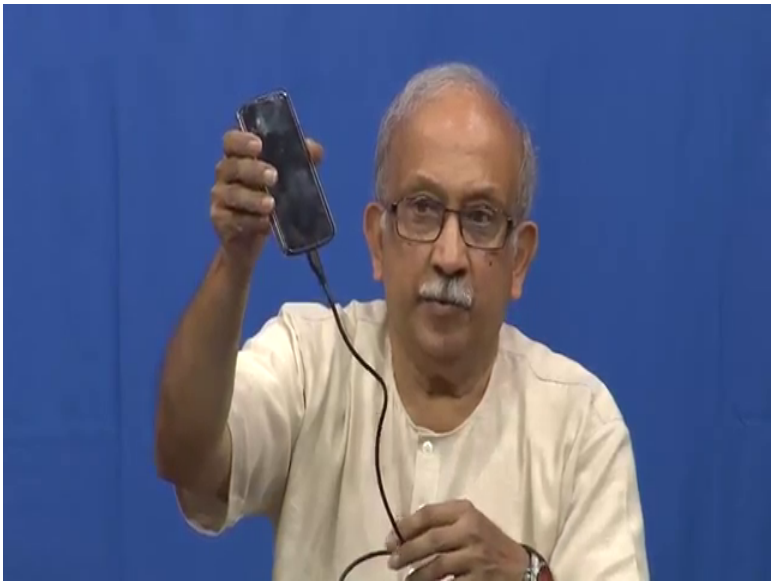

If have a mobile phone like this normally we connect this for connecting it to the what you call peripheral of the other side, but it has a small also called the OTG cable where the other side has a first connector the female part of it. So, if you have this now any of these devices can directly be plugged into the phone.

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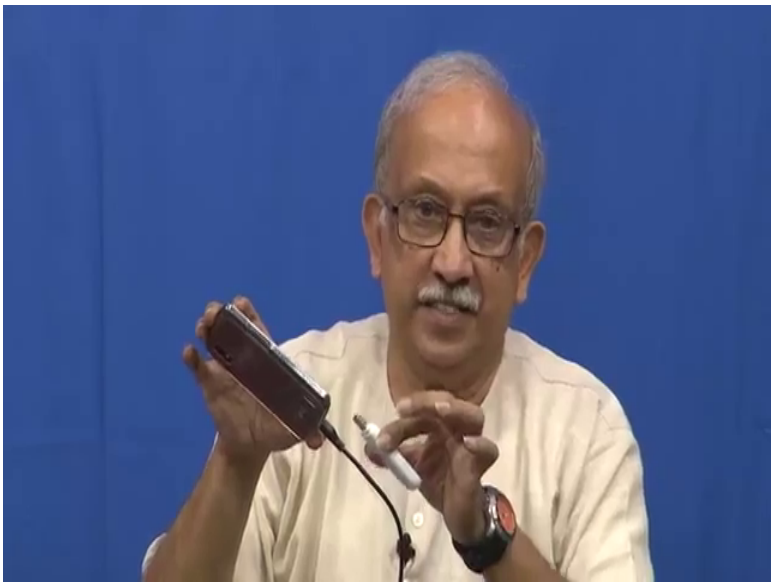

I can plug it just for fun I am just showing you, can also plug in normal pen drives and all into this, there is only about the cable not about the operating system there you there you need a file manager something to read it not part of this.

Thing is as I started and told you earlier, we have to live with them and yes, then audio is a long list of audio connectors.

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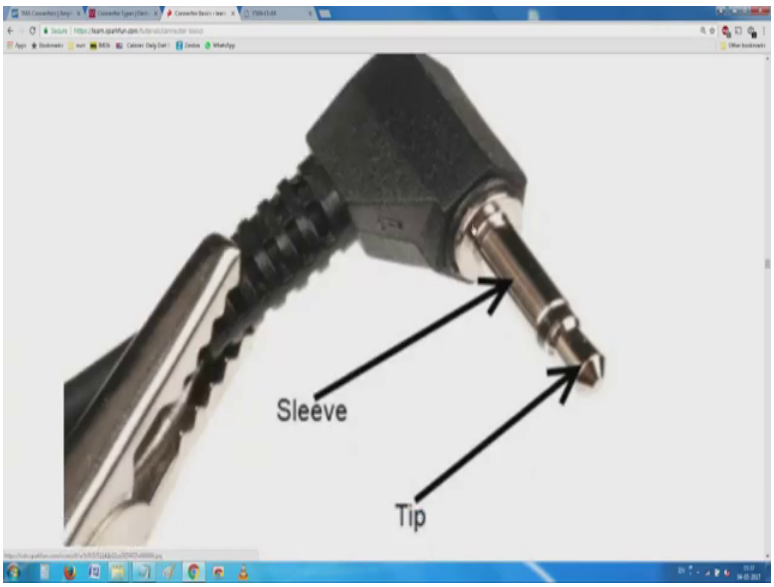

You would have seen this? What was shown their no your tip and thing is there, phone plug with a right angle.

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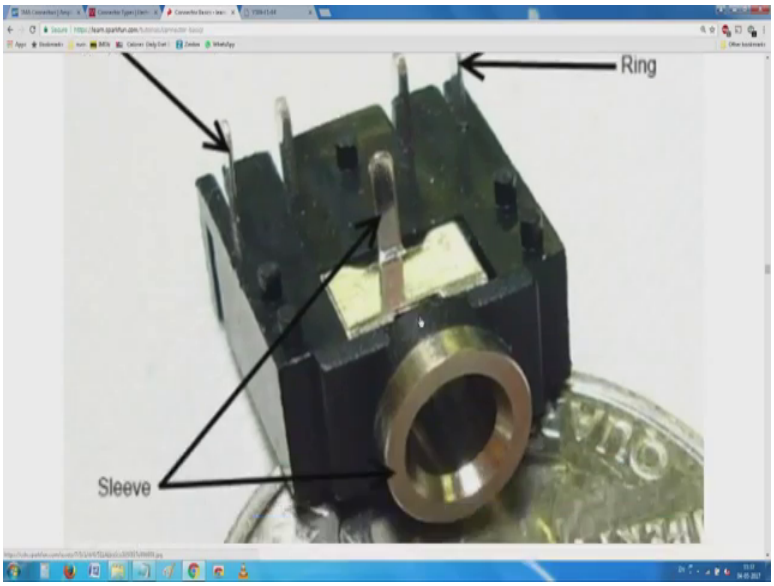

And at the back all the stuff how it is mounted. Now we come to that RCA which I was talking to you about.

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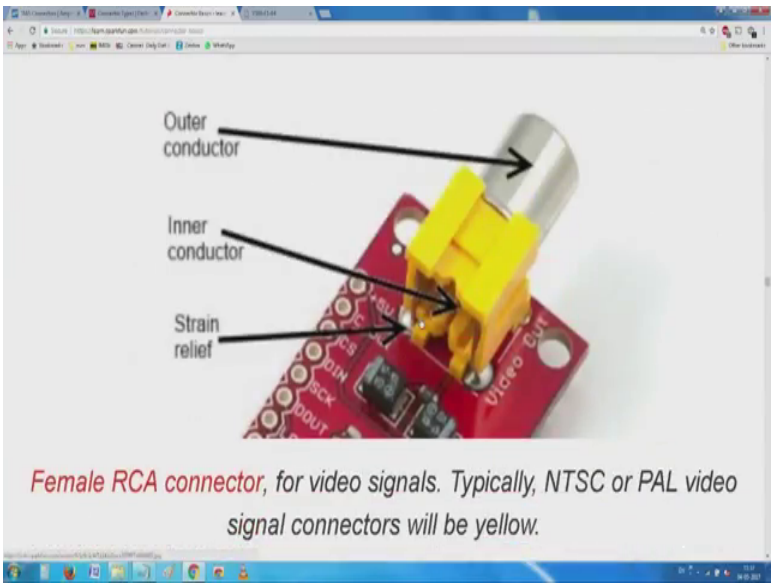

I do not know how the designation is come probably being supplanted by connections like HDMI.

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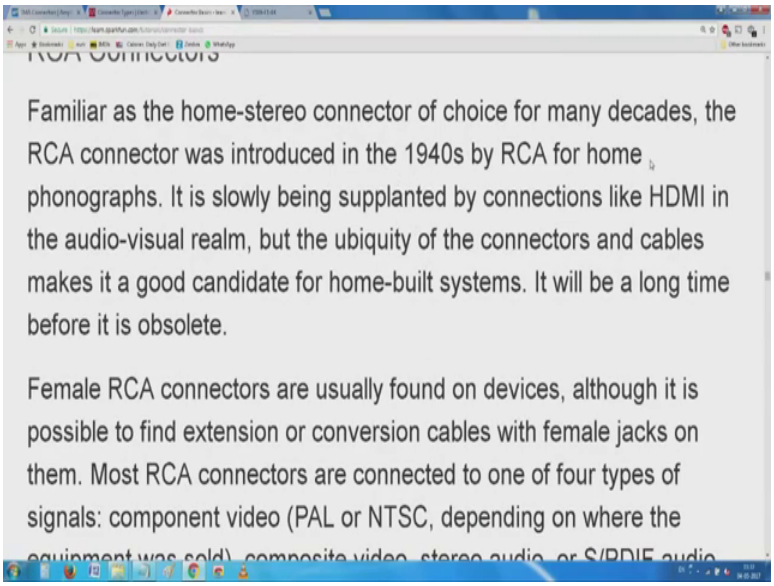

I will burn a little later not time not that old, but even now most of the connections between a setup box and TV or satellite everything's, make use of the 3 pin yellow black and blue, or yellow blue red and other combination a 3 pin flat cable, which has you have a audio then left and right separately and then the video cable.

Advantage being video at I am not very familiar with the frequency is, it works very well audio definitely works video also is reasonable works well. If you have a game nintendo wii and all that now of course, the latest ones have all been changed with HDMI. HDMI has other features also automatic resolution setting, So that you do not complain saying it is not working once you plug it, it just works very well.

So, we have the video and you have seen this? Beautiful.

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Nice way of remembering red is for right. White is the other, but each of them remember has to contact. Some of them the outer is isolated separately. Very rarely their join together that operational is also available.

So, we come to a large number of this type of you know connectors, saying this is something I can probably after this I will try to stop.

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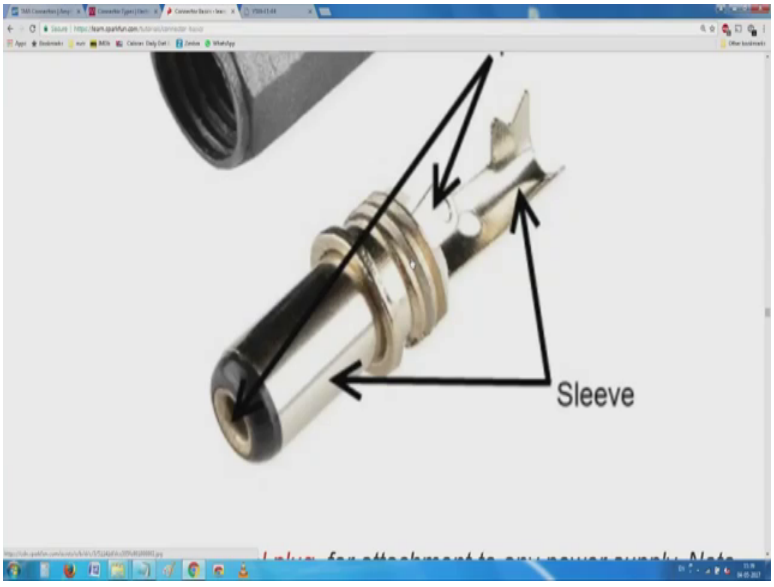

So, we have all you know stuff which goes into this thing here you see here.

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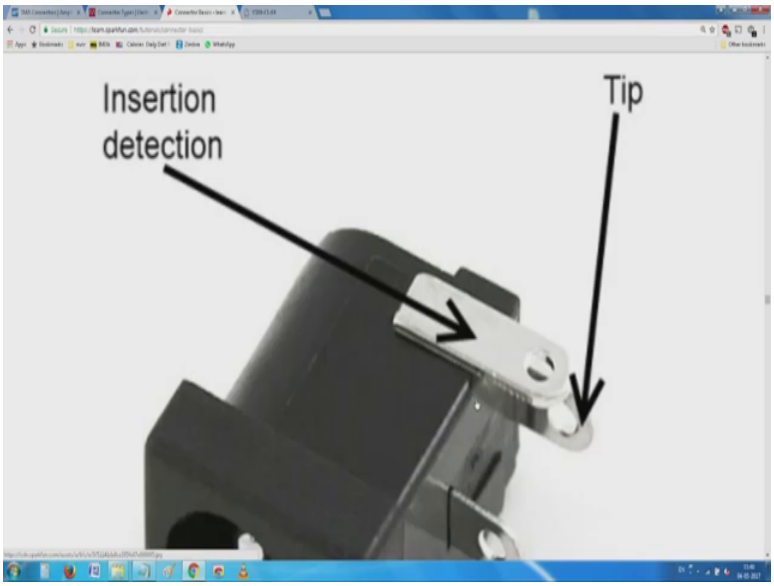

There is a centre pin and outside there is a contact. So, this is the outside sleeve there is something else inside. And then this whole thing you see here. If you see here carefully we have a beautiful thing here something here which directly can be crimped onto this sleeve.

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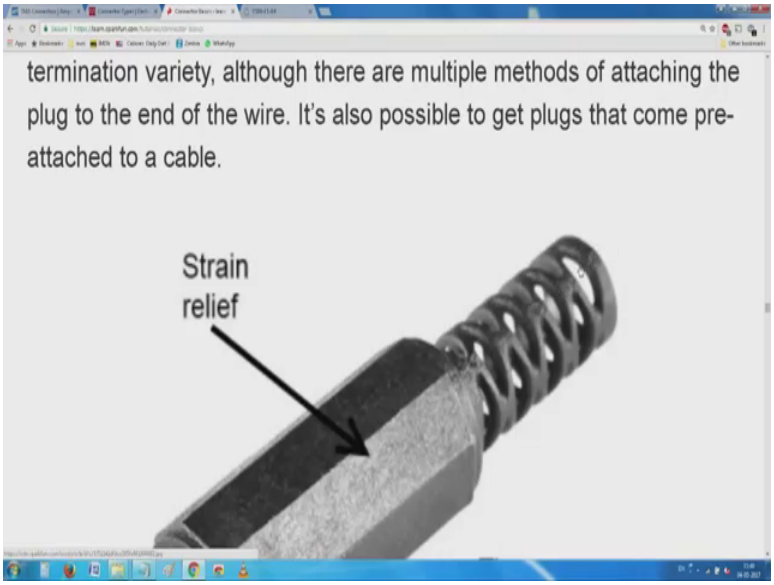

And then afterwards we still have boot or a strained relief mechanism.

So, this is here

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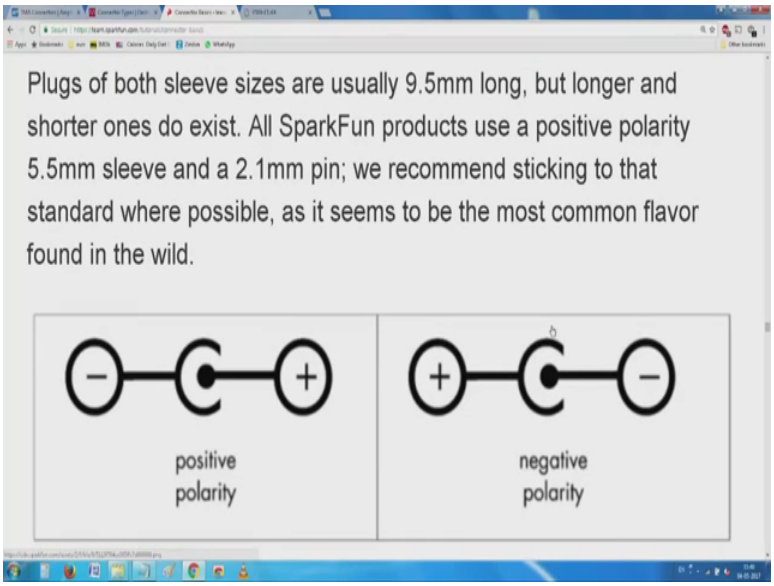

We have this little problem about why Positive can be out and why positive can b in and all that?

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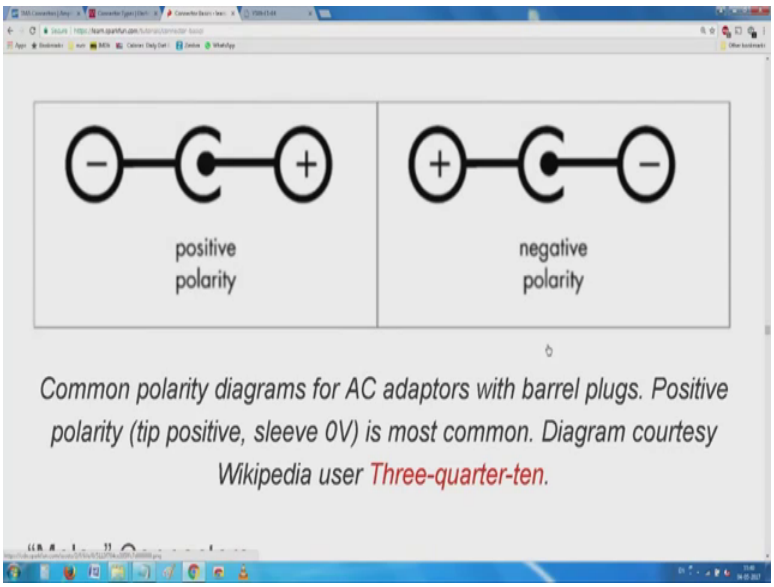

Not yet decided. I do not know any person, but you will notice in the case of your cars and all that, usually have positive grounding or it is construct to the metal body, maybe related to some corrosion maybe related to something. And then negative is what drives it.

So, both side of things are there. Now we have come to a beautiful arrangement.

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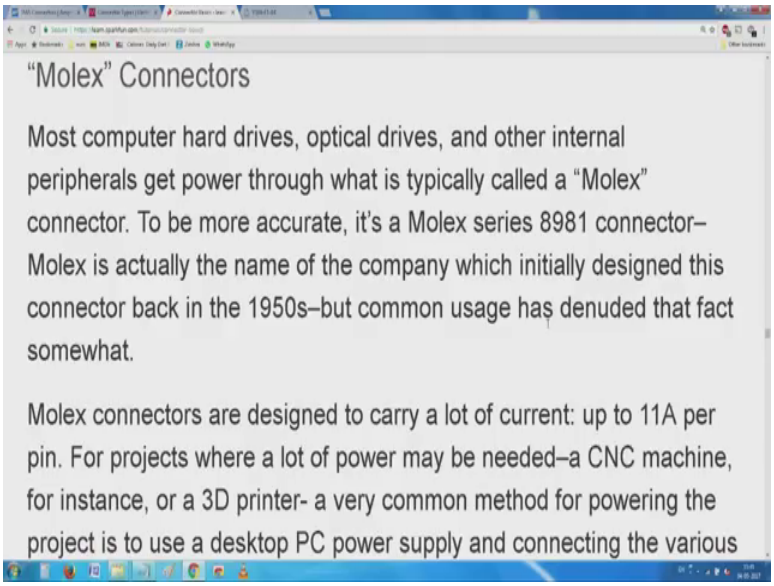

Called the molex, name of the company which has become generic. That is a lot of what you call shows how first time when it was you know, invented how well they have thought about it.

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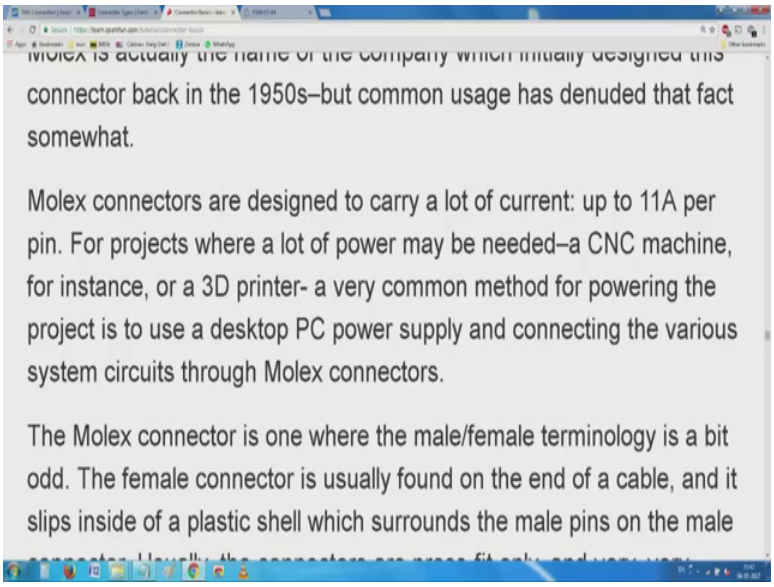

I designed to carry currents up to oh, seen that molex connectors.

This is one part Mating part is the other side.

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You have seen that very important I think in one of the very earlier lectures. I talked to you about this it is not about it is not about how the shell or the header fills into the tub of the pin designation decides on it (Refer Time: 23:22) just lose like calling you know male and female which while there is nothing sexist about it does not clearly indicate what it is, but the pin in some socket seems to be better thing.

A socket is by definition you know you put anything inside. So, we have this molex pins.

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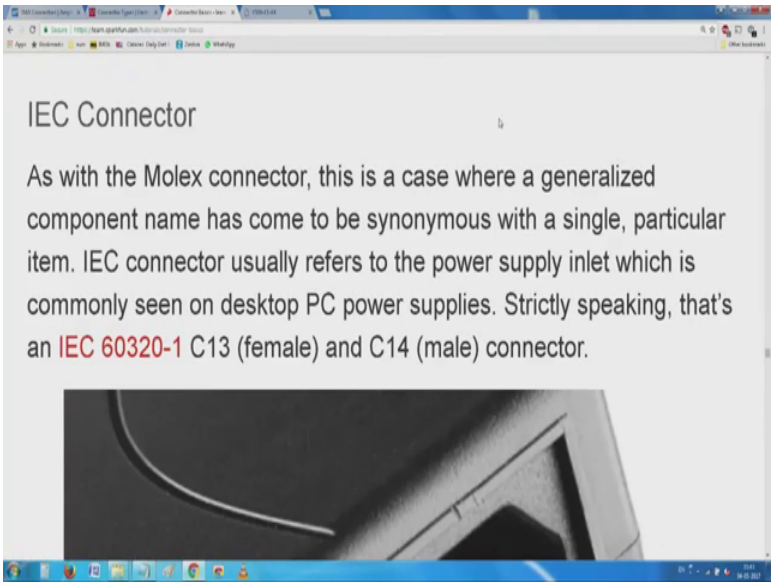

In this thing and now slowly, we come to IEC60320. For supply in late which is suppose to be this I am sure you have seen this, on all of your adaptors for computers. The outlet part of it is usually moulded and from the adaptor the outlet is moulded in given to your computer cause that is very specific. Voltage may be different and termination at the end may be different. The inlate will be in this condition. So, the advantage here is you can have a whether 2 pin if you want you can have 3 pin, the other side can carry a plug which can fit in the local system.

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So, when something ships from manufacturer, it comes with cable which is suitable for the lower end. So, AC connectors we can do. So, I mean this is not very, very common, but then you will notice it that you will find these things are also.

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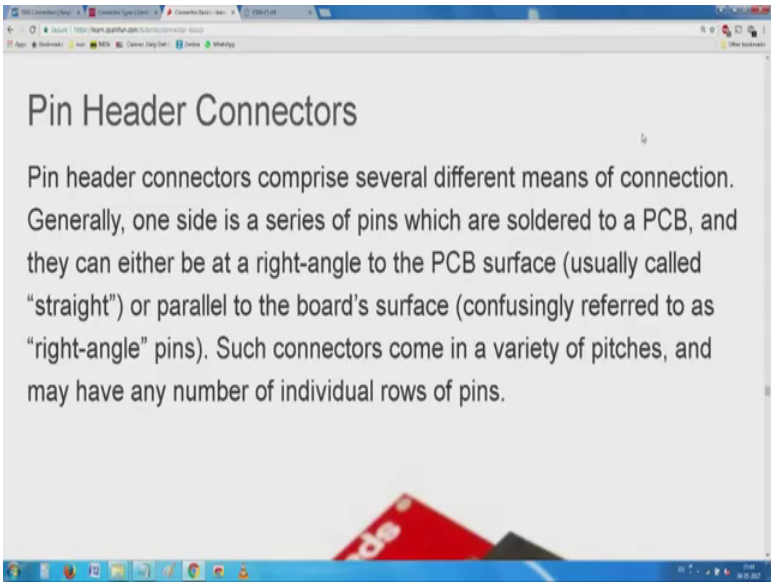

You have seen this? Pin header or several different means of connection. One said there the series of pins, another side there is a series of sockets, this what you have the things which you have seen earlier.

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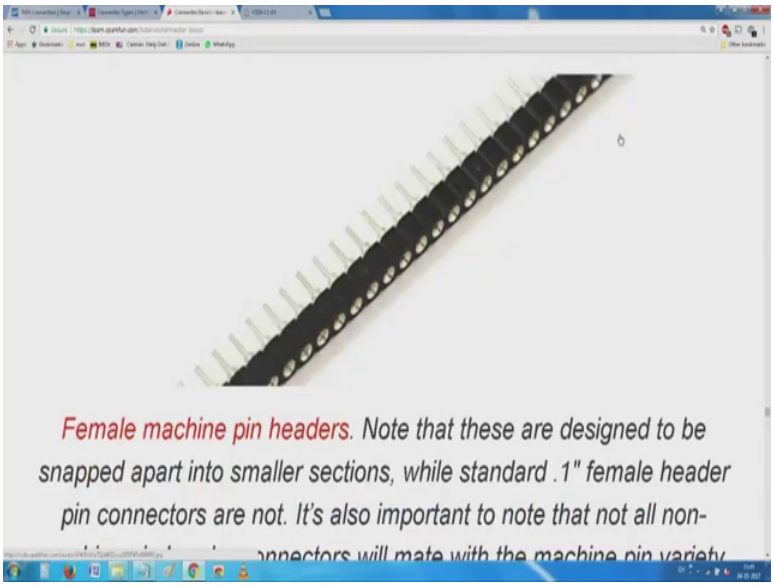

Here also we have very highly reliable to very cheap connectors. So, as a combination this is a socket this is this goes on to the PCB, and then only other side you have all these connectors.

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GE standard connector and push it there.

So, I will continue the lecture next time, because it has been quite as I see. It is a lot of stuff for you to understand unless you have seen them if you have seem them you may feel it is not enough. So, my suggestion is try to look and read any of these things here. I will just surplice put the screen yeah.

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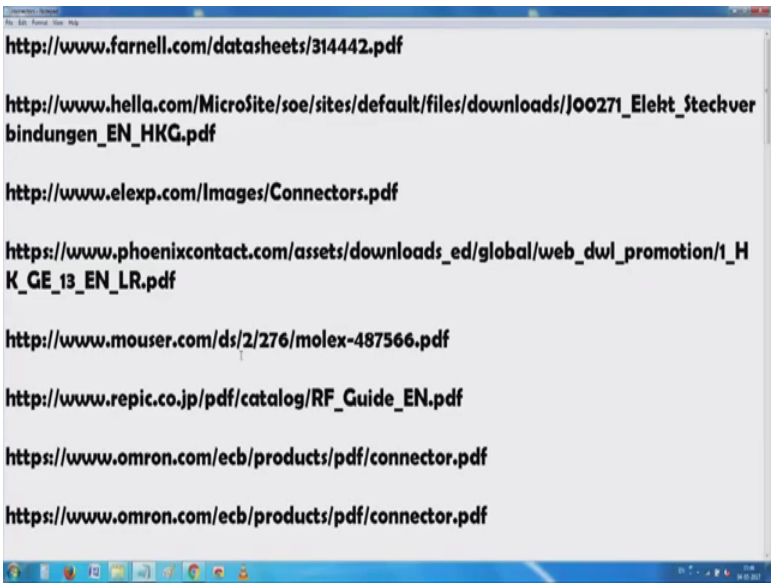

go to any of these sheets are likely to get read up.

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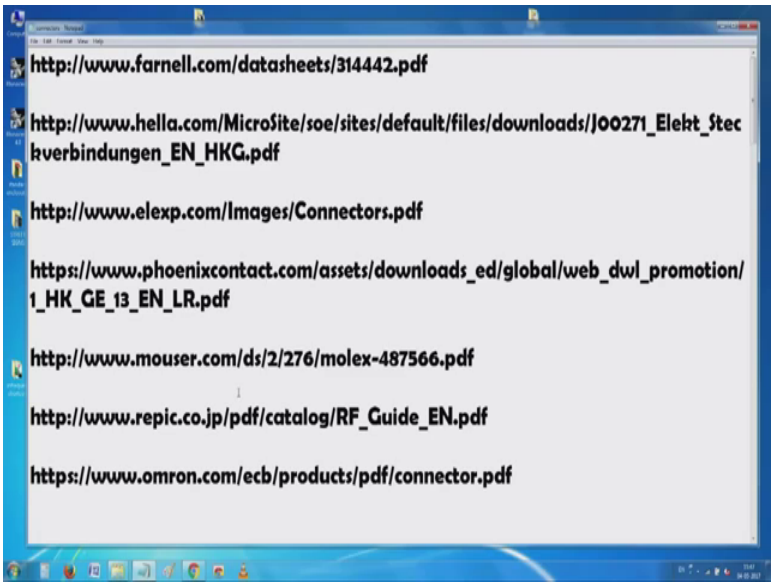

So, quickly I can talk to you we have farnell then we are hella which is a German this thing. Then there some people who supply. And then the panel builders invariably depend on phoenix contact. These are also a German probably German or what you call multinational company. And a lot of us know about mouser. The other thing intentionally I have picked up things from supplier which are able to supply you these thing from alternate thing. So, if you see the Farnell is what you call like the JKE and this thing. Now everything has come down. If you are a small not any other way no not in the level or a somebody who likes to do things at a small scale and all that, you will get them usually in Amazon, and in our Indian conditions. Now we also have other suppliers like this online (Refer Time: 28:24) and so many of these people supply things.

So, about application I will continue later, about the application how to select and all that that I will continue later, they only hint what I can give is you must use something which is already used by others to make them compatible. And people has spent a lot of choice and I mean exercise their choice after spending a lot of time, and hence they are not likely to go wrong. Secondly, your cell be compatible.

Thank you.