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I'd like to go over a few features before we get started just for the benefit of those of you who have never used this platform before.
You will note in the lower left of the screen or occupying the left of your screen is a chat window.
And at the bottom of that window is a field where you can type in a question or comment.
Please do so at any point in time.
We will be addressing them at the appropriate time so you don't need to wait until you're called upon.
There is also a closed captioning pod along the bottom of the screen and the transcript from the closed captioning pod will also be made available with the session recording.
We will be doing first is a quick little introduction and then going on to today's presentation.
I'm going to begin recording at this time.
I'd like to ask your host Jenny Arena to begin.
>> Thank you so much, Mike.
Welcome back everyone.
So many familiar names logged in today.
People logged in to the meeting room.
Please free to type in your questions I will hold on to them ask during a break.
As you notice just one of many

courses in our series "Caring for audio visual material" if you missed any of those and for this particular course we owe a great debt to the conservation center for organizing all of our speakers and materials and again today we have Laura Stanton from CCAHA on board to field your questions.
Do you want to say a quick hello?
>> Sure.
Thank you, Jenny.
Again my name is Laura Stanton I work at CCHA where I'm the director of preservation services.
Focusing on education and outreach, at CCHA we're a nonprofit paper conservation lab so it's been a great opportunity to be able to work with heritage preservation on this program.
Thank you, Jenny.
>> Thank you.
Before we move on to the topic let me run through quickly some logistics of our course.
Today is the fourth webinar.
We'll meet one final last time if you can believe it on Wednesday October 30th at 2:00 same place.
Like our other courses you may earn that certificate of completion, we just ask a few things that you're registered so you have your e-mail that you have watched all five webinars whether it's live or through our recordings.
That that you also complete all five homework assignments which are due no later than Wednesday November 6.
If you are interested in earning

that certificate.
Again everything that you need for this course including links to the homework assignments, PDFs, handouts, resources, everything can be found on the course webpage.
Once the course has concluded we will also post recordings of these webinars there.
As always if you have questions feel free to mail us or call us we're here to help you.
Without further delay let's move on to our topic I am so pleased to introduce today's instructor Jeff Martin.
Jeff is an archivist and conservator with caring for archival collections and time-based art A. five graduate of the New York moving image archiving and preservation M.A. program in 2007 postgraduate research fellow at the Smithsonian museum and sculpture garden.
Give currently serves as executive director of the independent media arts preservation, a nonprofit organization dedicated to providing resources for the care of independently produced electronic media.
His other recent projects have included ongoing work as time-based art conserve for as well as collections assessment for the Seattle art museum, Carnegie museum of art in Pittsburgh, science museum of Minnesota and cooperation for public broadcasting.
He has served for two years as program chair for electronic media group, the Americans

institute for conservation also organized the MG sponsored workshop "Tech focus: Caring for film and slide art" in 2012.
Jeff, thank you so much for joining us I am going to move my power point out of the way.
And pull yours up.
>> Great.
I really need to cut that introduction down, don't I.
It's great to be here and I really appreciate the opportunity to speak to everybody.
We are looking specifically at film today.
And what we're going to go over today is first of all, historical background of mows motion picture film, we'll talk briefly about.
That we'll look at the physical properties that motion picture Tim and deterioration factors if you were on the first webinar she reviewed this but we'll go in to more depth today.
We'll also talk about production processes, how films are actually made because first of all that helps understands how films are preserved.
Also helps understand the materials that you might find in the collection because lot of times you'll find materials not only related to the completed film but to the production of the film, out takes and things like that.
We'll talk about production processes.
Talk about film handling and basic things to understand when you are actually handling film.
We'll talk about preservation

actions and some of the sort of standard procedures for handling those.
The thing that I think is important to think about before we really get started is real benefit of working with film is, it's human readable.
I'm sure Sarah and Linda talked about some of the things you really can't learn about audio tape or videotape just by looking at them.
Happily with film, this goes for slides, too, the physical properties are the same with film.
You can look at the film, on very simple quick and learn a great deal about it.
About how it was made, when it was made, its condition, what your next steps might be.
If you have film you're actually lucky in that sense.
To get things started, this is the Edison Kinetoscope, you get the point.
What we're talking about here is the photographing of multiple frames projected in rapid succession on a flexible piece of film that creates illusion of movement which is -- what you can really see here.
The process was dependent on the development of flexible film by Kodak in 1889.
The Edison Kinetoscope was the first such device to actually prove practical all low as you can see here you kind of peep in the top of it.
The next development is the Lumiere Cinematographe, what you are looking at here is the projector part of it.

The film is winding through down in to that box.
Causing archivist headaches by getting dirty and scratched up.
This was the device that allowed for the projection of motion picture film.
Since 1895.
Here you see the contemporary equivalent, 35 millimeter platter projector of the kind that were Ip multiplexes until last few years.
These are the kinds of machines that are being taken out of multiplexes all across the countries these days.
The technology has been the same since about 1893.
So what is motion picture film physically.
It's a photographic emulsion on a flexible base.
This is a cross section of motion picture film.
As you can see base constitutes the vast majority of the thickness, sort of looking across it here.
The emulsion is a gelatin that is photo sensitive, the base simply there as a carrier.
It makes up the majority of the thickness.
90 to 97% of the thickness of motion picture film is the base.
We'll talk in a little with the about things that depend on understanding which side of the emulsion side and which side is the base side.
the way to tell emulsion versus base if you have black and white film, the base side is very shiny, the emulsion side is very dull, sort of matte.
Color film mostly the same.

It can be difficult with a color negative to tell one side from the other as they both look a little bit shiny.
Looking at raking light can be helpful if you look at color film in raking light you can see almost like a relief of the image.
People who work in film labs are work Ink total darkness will tell you their technique to lick their lips put the film in their mouth the sticky side is the emulsion side.
Side that doesn't get sticky is the base.
I cannot recommend that as an archivist.
nitrate, acetate and polyester.
Nitrate is between that was introduced in the 1880s by Kodak, originally for still photo negatives then used for motion picture negatives and prints until 1951.
It had excellent visual quality, it was scratch resistant and very durable.
It also had some serious problems.
First of all it's extremely flammable.
When nitrate is on fire it generates it's own oxygen.
If you go on youtube, which I wreck, you can find nitrate film that is burning when it's submersed in water and subject to decomposition which we'll learn success or is subject to that as well.
The image on the right is the one of extremely decompressioned nitrate material.
At that stage it does become

quite hazardous.
Excuse me that's the image on the left.
The image on the right is what nitrate film looks like when it is actually in the process of decomposing that's what the image looks like.
A thing to understand about my freight is, although it is -- nitrate it is extremely flammable when exposed to open flame unlegs it gets to the stage that you see -- unless it gets to the stage that you see on the left the extremely powdery brown stage it's not inherently unstable in the sense that it's not going to spontaneously combust.
An open flame will definitely ignite but I hope there are no open flames enyour archives.
It does require special handling which we'll touch on when we gets to things like storage.
But again this is 35 millimeter from -- up to about 1951.
Cellulose acetate which is also known as safety film was introduced in 1910 roughly.
Became more common with the introduction of 16 millimeter film, which we'll talk about.
It was originally a cellulose diacetate which is not incredibly important to learn except that the earlier format was a bit less stable.
It's not flammable or inflammable depending how you like to use the words.
If you try to set it on fire it will simply melt.
And it became the standard for nontheatrical exhibition up until earlier this year, it

wasn't until June that Kodak
finally ended production of
acetate motion picture film.
There in the picture you see
exactly what it was designed
for.
Home use, exclusive -- without
the need for the types of fire
protection that nitrate film
might have had.
Acetate of course is subject to
decomposition as well.
It is subject to specifically to
what is known as vinegar
syndrome.
Because it is based, has acetate
based it gives off as it
decomposes acidic as it which
gives it that specifically
pungent vinegary smell.
I think if you saw Karen's graph
that demonstrated as the film
decomposes gives off acidic as
it it becomes auto catalytic,
release of the gas accelerates
the process.
And it is fundamentally
irreversible.
One of the problems that happen
when the film begins to
decompose you can see here
buckling and cracking.
This is looking down at a reel
of 16 millimeter film, acetate
film that severely buckled and
cracked.
But even before the film gets to
this point the decomposition
causes warping and cupping and
that sort of dimensional
changes.
The dimensional changes lead to
problems in projection,
instability and focus issues on
the left you can see some 35
millimeter safety film sort of
laid out in ways that you can

see the sort of warping and
buckling.
On the right you see the type of
film handling that I'll
recommend again.
It's a little more subtle.
You can't quite see.
This is an example of a
relatively heavily warped reel
of acetate film I think warping
is very obvious, it's
nevertheless it is still
recoverable and it is still
viewable on a light box as you
see.
You can still look at this and
understand what is on it find
out what it is, understand its
condition.
This is a reel of relatively
short lived format when it's 28
millimeter.
This reel dates to about 1923.
You can see it's decomposed it
could be saved through
digitization or duplication
despite some of these problems.
If it goes further duplication,
migration will be extremely
difficult.
The next base is polyester.
It's marketed under the brand
name Estar.
It was introduced in 1955, the
for like micro film and x-rays
and non-motion picture,
nonconsumer applications.
Polliester is extremely stable
over time.
It's not flammable is extremely
strong.
In fact the reason that it
wasn't adopt by motion picture
industry until the late '80s and
early '90s of the fact that it
is so strong that in projection
if the projector jams, the

polyester film will damage the equipment before it hairs, so rather than tear it will yank things out of alignment.
For exhibition there was a lot of resistance, but it is at this point sort of the de facto motion picture stock for creating new motion pictures.
If you want to tell the difference between a reel of polyester film and reel of acetate film you can hold them up to the light.
Now the reel on the left is polyester, it transmits light.
If you were on say video's webinar about audio tape you know that learning the difference between polyester audio tape and as state audio tape it's the opposite.
Determining whether a reel of tape is polyester or acetate is as simple as holding it up to the light.
Now I want to talk about gauges and format.
It's important to understand that gauge refers to the width of the film.
And the format refers to things like the position of the image and how it's project.
Although they are really used interchangeably it's a useful distinction to think about.
For example, if you look here you see a diagram of a theater which used three projectors, 35 millimeter and yet -- 35 millimeter gauge.
The projected them all in to a single screenment the gauge was 35 millimeter but the format is is in ram ma.
The most common format again as

Karen brought up.
The dozens have happened since 1893.
Here is a closer look at the four formats.
I'm going to try using the arrow here see if it works properly for me.
What you are going to see first of all is here is the sound track.
I'll point out a few things we'll be Taubing about.
This is 35 millimeter, this is the sound track.
This is 16 millimeter.
You'll see here some numbers and information, here you can note that this film, regular 8 is the same width as super 8.
It's a bit of optical illusion.
They are the same width.
But the projector sprockets here are smaller as opposed to these ones.
The other thing to note about this is that the image on all four is the same basic shape.
The same aspect ratio.
Which we'll stalk about again in a minute.
So 35 millimeter.
It was the initial film format, one used in the Gwinnett scope and one used for theatrical exhibition that's what this is here.
Things to note about it are, number one, you see here a sound track.
We'll get in to that more in a moment.
You also see here the useful information nitrate.
We talk about nitrate film being flammable and dangerous.
The people at Eastman Kodak were

kind enough to put nitrate in to the edge of the film.
If you have reel of 35 millimeter film and are concerned that it is nitrate and it might have been made before 1951, easiest way to roll off a few feet and see if it says nitrate on the edge.
If it does, you should assume that it's nitrate.
It's possible that it would have been duplicated on to safety film and nitrate information was simply transmitted.
But it's likely that it is nitrate.
It's worth handling it as if it were.
Here 16 millimeter.
Now 16 millimeter as opposed to 35 was a nontheatrical gauge.
It was used from the '20s up until the mid '80s really.
For just about any application that film could be used forment it was used for home movies, for educational applications and schools.
If you are my age or older you grew up with the 16 millimeter films being shown in class.
Educational training, corporate, government films, television commercials, Kinescope, TV news was shot on 16 millimeter up to the early '50s.
Even the syndication of television shows, shows that were syndicated were shipping 16 millimeter prints out.
There is 16 millimeter everywhere.
But let's look at a few things about this.
First of all you see three different reels of 16 millimeter

film.
Here if you look here you see first of all perforations on both sides of the film on the right.
That is silent film.
There's no place for the sound track.
Over here in the middle you see on the left side you see the sound track.
So that's how you know.
Same thing is true over here on the left hand film you see the sound track running down one side.
The perforations down the other side.
You should also note that there is printed in information on the edges of all three films.
Now, this is valuable also a mitt of a pain.
6 millimeter film if you've ever seen it is about 5/8ths inch wide so if you think about that you can imagine how tiny these pieces of information are.
But again it's there, it's really helpful.
The other thing to notice is on left side of the film on the right.
This dot which will become important a little bit litter on.
Keep that dot in mind.
That's what 16 millimeter looks like.
Again if you have collection that has film in it you are likely to have at least some.
And probably a lot.
8 mil meeter is amateur format introduced in 1932.
The same perforation but the size is really small.

You can see here and here on top and bottom you can see the perforations more or less the same size.
8 millimeter film if you have it is almost certainly home or amateur film, it never had very much wide adoption outside of home or amateur use.
And it was always safety, always acetate or polyester.
Super 8 was introduced in 1965 by Kodak as amateur format.
This diagram shows why it was developed.
You see here on the left side of the left hand film, sound track, you also see the image is quite a bit larger which means that the resolution is better and the quality is going to be better.
The two are not compatible.
Super 8 projector will not play regular 8 and vice versa.
Super 8 did have a wider adoption outside of amateur cinema used in certain types of film cartridges for educational use, experimental film makers used it a lot, pornographers used it a lot.
Other types of nontheatrical very low budget film making used it.
It's still available. Can still get super 8 film.
But again never nitrate, always safety acetate or polyester.
Now this is one specific bit of arcane information about film that can be very useful when you're doing inspection of the film and trying to figure out what a film is.
It's A-wind or B-wind.
It's possible for the image when it's going through the camera

for emulsion to be on the side
closest to the learns or the
side further from the lens.
What that means is, when you
look at the film sometimes if
you hold it up to the light or
looking on a viewer when you
look at the emulsion side it's
properly oriented.
Sometimes you look at the base
side it's properly orient.
That tells you some specific
things about it.
For example, 16 millimeter
camera original the film that's
in the camera is B-wind always.
If you have something that is
A-wind it is not a camera
original.
The shorthand for this what it
says right there.
If you want to know -- if a reel
of film is A-wind or B-wind you
look through the base side of
the film, the shiny side.
If the image is properly
oriented and hopefully there's
an imagine there that is either
a sign or title or a card are
can car driving down the road
that you can tell left hand from
the right, if it's properly
oriented you look through the
base it's B-wind.
This is useful piece of
information certain types of
film inspection.
We'll touch on in a bit.
Now at this point I've been
going on for quite awhile and it
seemed like really good idea to
stop for questions.
>> All right, well, we do have
a few questions, Jeff.
And you did touch on this a bit
in your discussion specifically
of the 8 millimeter film.

But can you maybe just clarify that some folks are curious to know if all date of the film can be found on any of the bases. Is nitrate more common on 35 millimeter or nitrate-based films that are on other gauges as well?
>> That's very simple. Nitrate is only 35 millimeter. 35 hill -- nitrate film was only ever used for 35 millimeter for the reasons that I touched on. 5 millimeter exhibition going to be in theater with experience projectionist in fire proof booth.
People like Kodak didn't want to sell potentially flammable nitrate stock to the home March Chet which is the other reason that 16 millimeter is actually not.
In other words, they didn't take the wide format make it smaller they made it completely different.
So that nobody would actually be ail to use nitrate.
Nitrate is only 35 millimeter. 16 millimeter, 8 millimeter and super 8 can each be on either of the safety, quote, unquote, bases, acetate or polyester.
>> Okay, great.
In a similar vein I know people always have this terror that there might be nitrate film in their collection.
>> Sure.
>> So if they do happen to have it can you give a few more tips how they might want to store it?
>> The first thing is to give -- take a look at it, if it is at that extremely decomposed stage first thing to know that

the film is completely lost so
your concern is not storage or
care but disposal.
Working backwardsf it look like
that it's gone.
There's nothing you can do about
it.
You need to be concerned with
disposal.
It is a haz-mat issue.
Hazardous material.
Frankly you need to go through
whatever your institution's
protocol for dealing with
hazardous materials.
If it's in better shape, the key
thing is in the short to medium
term have it in the coolest and
most stable storage environment
possible in a closed metal can.
If you have cold storage it
should be in there.
If you have nitrate sheet film
in your institution you may have
storage protocol already set up.
If you have frozen storage even
better.
If you don't have good storage
one of the best solutions is to
either partner with a larger
institution that may have
nitrate storage and be willing
to put it up for you or find a
donor organization that might be
willing to take it.
Like the library of congress,
for example.
The other sort of general
guideline if you have some film
that is nitrate is valuable to
your institution, first of all
you know it was shot on 35
millimeter is probably well
shot, sect you should prioritize
its transfer or digitization.
>> Okay.
Absolutely.

>> We'll get more questions.
Another relate question you
briefly had mentioned vinegar
syndrome.
And is there a way to detect
that before you have that
wonderful salad dressing smell
in your collection?
>> I don't have a slide on?
But there is something by image
permanence institute called A-D
which are simply the auto can I
have whether or not of litmus
paper.
Small slips of paper that you
can slip in to a film can, leave
for a couple of days then take
out and it will have changed
color to indicate the level of
decomposition.
If you Google it, it will turn
up, it's economical and very
easy to do.
It will give you a sense of the
decomposition before you
actually have to smell it.
>> Great.
One more question we'll let you
get back to your talk.
With the last slide that you
have up now about A-wind and
B-wind, Selena from California
has a question of not sure why
it's quite so important to know
if it's a camera original.
Why would we need to know that
from archival standpoint.
>> That's very good question.
The answer is, I think this
might become a little clearer we
talk about production processes,
that in a nutshell film is in
analog process.
Whenever you duplicate film from
one copy to another there's a
loss of resolution and sharpness
and image quality.

The camera original is the film that actually went through the camera when the film was made. So it's going to be the highest quality film material you have. So if you're doing preservation you want to digitize the material, if you can get to the camera original the very original film that's one you want to work with.
It's useful to try to find that original for preservation purposes.
>> I lied.
I think we have one more question if you feel it's okay with time.
>> Yeah.
>> Amy from Jefferson city, Missouri, asked if nitrate was only used for commercial film production is there a simple way to find out if other copies exist in institutions, is there some sort of central database that's useful for these things?
>> Unfortunately it isn't. It's leg work and research. There isn't a simple way to find that out.
It's important but there's not a simple way to do that.
>> Shucks.
>> It is a matter of posting to list serves, contacting other archivists thinking who the likely holders of this might be if it's corporate, where's the corporation.
Type of research that archivists know all too well.
>> Great.
I will mute myself and turn things back to you then.
>> I'm going to talk very quickly about aspect ratio

because it's useful to know but it's not the most essential.
In a nutshell I think this is something we all know due to the recent change of tell vehicles aspect ratios.
Basically aspect ratio is ratio of the film's width to height.
Here you see standard aspect ratio, I mention this in part.
All film gauges have same.
Roughly 1.37 wide to one high.
This is aspect ratio used for pretty much everything with a few exceptions up until about 1953.
Aspect ratios got wide in the '50s due to the competition of television.
And became the de facto standard, films are almost in theatrical renovations wide screen.
There are two types of wide screens, nonanmorphic or cropped or masked.
Or anmorphic.
Nonanmorphic means that you shoot the film at the full aspect ratio.
This is the image that goes through the camera, this sort of square 1.37C1 image.
In printing or projection they crop off the top and bottom.
"Dr. Strangelive" is supposed to be seen at wider, 1.66 wide to one high.
Aspect ratios that are anmorphic means that there's a wide angle of view that is squeezed by specific types of lenses on to standard 35 millimeter film.
Although it could be 16 or 8.
What happens is it squishes the image to a narrow aspect ratio then lenses on the projector

unsqueeze it.
Most common of those is cinemascope which as aspect ratio of 2.35 to one.
To get a sense it's almost the exact proportion of a dollar bill.
Here you see frame enlargement from the film that is anmorphic wide screen.
It's smashed down in the middle and will be unsmashed in projection or in digitization.
Note also on the left the sound track.
There's the sound track.
Color is the next thing to talk about.
Although briefly talking about other formats this is the 70 millimeter format used almost exclusively forepeaks and major motion pictures in the '50s up until still in use now.
You can also see that this color has faded almost completely.
Certain types of color film stock and image are very susceptible to color fade.
Colors that are resistant to fade are Kodachrome the Kodak stock, after 1938.
The dye-transfer technicolor process was process from early '30s through the mid '50s involved transferring dyes physical low on to the film stock.
Then the most recent polyester/Estar stocks known at LPP.
Color stocks that are not resistant are color negatives pretty much everything else.
Over time color film will fade as the blue and yellow components of the film

eventually for all in tents and purposes disappear and you end up with the magenta prints.
This is again is important to think about because if you have a Kodachrome copy of the film and non-Kodachrome color copy you'll know that the Kodachrome is probably the more valuable one in the collection.
One more thing to think about in terms of the physical film is negative film and reversal film. This is something you'll hear about when you talk about film preservation.
Negative film means that you put film in the camera, it comes out as negative refuse to make prints.
Reversal film means you put the film in the camera it comes out as a positive.
Home movies are always reversal. This is something that those of us who grew up taking film to the drugstore you understand. You get back a print and little envelope of negatives.
Reversal film is a positive.
A quick way to tell reversal film is that the edges around the image are completely black. This is reversal film.
Again, this is about understanding what you have in a collection and what some of the notations and things might be.
Sound is most commonly a track along one side of the film frame and if you think of the film image being inter mitt tent the sound is continuous.
the image is series of discrete images, sound just rolls along continuously.
The two types of sound track are

optical or magnetic.
What does that mean?
Here you see the optical sound track.
Especially in 16 millimeter.
Magnetic sound is essentially a strip of magnetic media similar to an audio tape that is base bely painted down one side of the film and has the sound recorded on it.
It's like extremely skinny strip of audio tape.
Some other sorts it was largely TV news film you do see a lot of it in that type of production and other productions from say the mid '60s through early '80s.
Now we have video clip that we'll show you what I mean by optical sound track.
>> Look left-hand side of the
--
>> Sounds that we wish to record were picked up with you means upon and concentrated on a diaphragm.
The diaphragm had attached to it a styleus which would cut a variable group in a record either what is called a lateral groove or a hill and Dale groove.
>> Okay.
What you are seeing that the sound levels are reflected by the varying level of light and dark on the side of the frame photographed in which is again what is known as optical sound track.
Again, if you look here you'll see the jagged black and white pair of lines are optical stereo sound track.
On the far right you have series of dots that control a separate

sound track.
I should take step back explain
what we're looking at here.
I apologize.
What we're looking at is extreme
close up of a contemporary
21st century 35 millimeter
print on which a recorded bunch
of different types of sound
tracks.
It's quite amazing how much they
managed to cram in to these
things.
Again on the far right is a
little control track.
Controls separate sound track
recorded on CDs.
Next in black and white you see
standard optical sound track
with two channels of sound,
stereo sound track.
Each of those contains sound.
Here in grey in the middle is
the Dolby sound track which is a
series of images that looks like
a QC code in between the
sprockets then over here is a
different type of digital sound
track.
This is theatrical high end
exhibition.
It's useful to think about in
terms of the complexity of
information that can be on the
film and the nonintuitive ways
in which it can be recorded.
Speed.
Very quickly, speed varied in
the silent Era between 16 and 24
frames per second.
The sound era, it was fixed at
24 frames.
The speed is fixed which means
that if you know the footage of
the film, the film frames are
all the same size, if you know
how long the film is and if its

sound or silent you'll know the duration.
There are calculators I believe there's a chart in the NFPF guide that will explain to you how to convert either the duration of the film in to a length or the length -- footage of the film in to its duration.
For example, 16 millimeter film those two acetate and polyester reels, those are both 400 foot, 16 millimeter films.
Those are always going to be, because they're sound about ten minutes in length.
You can work backwards and forwards on this.
Let's take another pause for a few questions, although time is running.
Just a few perhaps.
>> Okay.
Keep just to couple of questions for you.
There have been a few questions about, say we're not lucky enough to have that safety film stamp on our film S. there another good way to I.D. our base?
>> If it's not 35 millimeter it's either polyester and acetate.
Holding it up to the light is best way to do it.
It's really very rare for it not to be printed in the edge of the film, though.
Either safety or nitrate.
The other ways that you can do it start to become destructive testing.
For example, if you have as state film you can tear it.
You can't tear polyester.
Just as obviously if you have

nitrate film you snip off an inch of the edge.
You'll know whether it's nitrate.
Again, it's almost always printed in.
>> From an archive standpoint there's a question about, is it important to note and identify variable area sound versus variable density sounds?
>> It's use to have identify, yes.
They are projectable and recordable.
We'll look at inspection sheet in a little bit and it's useful to note.
Just for -- clarify those are two different types of optical sound tracks that although they look very different actually are compatible.
The NFPF guide has a good illustration of this.
>> One last question related to sound.
Jan from Ontario has a question.
Will the presence of magnetic sound increase the rate of decomposition of film strips?
>> It can.
There's a type of sound track that I'll mention in a second about that consists, is used in the editing process, 16 millimeter in particular.
That is -- 16 millimeter completely coated with magnetic media known as full coat sound.
That type of sound track which if you see is the Mo susceptible to vinegar syndromes to haven't been well understood.
Presence of the magnetic does have tendency based on experience and anecdotal to

accelerate decomposition.
Things with magnetic sound track require additional attention.
The other challenge is that they are basically pasted or painted on.
They are basically painted on.
And it's possible as you're unwinding them for the track to start sticking and coming off.
In F that happens as you're winding through a film then you definitely want to stop and try to get it to a vendor because -- who will be able to care for it more carefully because that is completely destructive of the track.
And it is a serious problem with audio, magnetic audio.
>> Great, thanks, Jeff.
I'll keep collecting questions until we're at the end.
>> Good.
I'll take you quickly through the work flows and elements of the film it's important because it's used for film duplication.
For film preservation.
Copying from film to film.
The thing is, again, if you come from analog world you recognize that copying something always introduces change and copying photos, et cetera, introduces lower resolution and introduces problems with loss of image quality.
The goal, making a film, in preserving a film is understanding how the process can cause change in the image and managing really caring for that type of change.
Traditional film workflow, you would shoot a negative or a positive, you'd shoot all of

your film that you needed to use
then create a work print.
Which was a cheap sort of down
and dirty rough copy of the
film.
You have camera, original
negative which you protect you
make a work print.
This may be word you see on cans
in a collection.
Work print or really commonly
W/P.
Then film edited together on
editing machine like this this
is a flatbed you see here, over
on the left side the different
pieces of film that you want to
put together.
You can view them here, the
cutting takes place here in the
middle then over on the right
you are compiling the film in to
its complete edited form.
This here is something that you
don't see any more outside of
people who are editing film,
this is a trim bin.
Actually literally be silting at
the side of the film editing
machine while you're editing to
take in out D takes, material
that is not included in the film
because it was literally taken
out.
And then trims, which are the
small bits of pieces of film
that are taken out of the
included material.
If you imagine how that film
process goes you put together
some shots then decide one shot
is about three seconds too long,
you take out the three seconds
then you stick it over here in
the trim bin.
Then if you decide maybe you
want to put the three seconds

back in you take this piece back
and you stick it back in.
So when you see this outtakes
are included, trims are the
teeny little pieces that were
snipped out of the included
material.
Now sound track when edited was
edited splitly may be that sort
of fullkote, sound track covered
with magnetic media.
For some reason it's thing you
might likely see on a film can.
Once you shot the negative, made
a work print, edit work print
then you go back and edit the
original negative.
How would you do that?
You would match these numbers
alongside of the work print back
to the original negative.
You cut the workprint this shot
is supposed to Z60.
Someone goes back cuts the
negative that's how you make the
film.
This is a duplication sort of
standard duplication process.
We were talking about getting
back to the original camera
negative why that is important
it's because creating film
prints to use or creating
materials to digitize or
transfer to a video format
involves copying from one
generation to another.
So you would have started with
that cut camera negative, from
that you made interpositive
there on the left.
Then you would have made from
that an internegative -- process
physician negative to
positive -- to a positive print
over on the left.
So it's duplication process that

typically is negative to
positive, et cetera.
So as you can imagine making
these duplications introduces
loss of resolution, potential
shifting in color that sort of
thing.
It has to be carefully managed.
And again because this process
goes like this, it's really
important to be working with the
most original elements possible,
over on the left side so to
speak of this equation.
At the bottom you'll see the
names of these types of elements
that you will commonly see again
as you're going through a film
collection that has more than
prints.
The IP is the interpositive
which is intermediate step in
the process that is a positive,
as you can see.
Then comes the internegative,
which is another intermediate
step so the IN you see the sound
track negative there next in
black and white.
Which is also very commonly
called the track negative or
track Neg then here you see the
final product positive print.
You may also at some point
rather than going to a print be
digitizing.
Perhaps internegative and sound
negative.
Why is all this copying going
on?
Because you have this original
camera negative over on
left-hand side of the frame out
there.
You want to protect it you don't
want to use it any more than is
absolutely necessary.

You make these subsidiary copies in case something happens to them.
So if you make an internegative, make all your prints, if anything happens gets damaged or scratched or torn you still have all the way over on the left your original negative.
Then you can start the process again.
This is about protection.
That sort of the film making process.
It's important again to keep in mind that the you're doing film preservation in the traditional sense you're copying film to film.
This is the exact same process that you're doing.
There are different steps along the way for restoration of things like scratches and other damage, but you are doing this same basic process.
If you are doing something digitally I think actually we'll come back to that towards the end.
But traditional film workflow these are the film things that you find in a big pile of film cans.
This is the same basic process that you do when you're doing a film preservation project.
Let's talk about film handling and inspection.
This is what cans of films look like in so many archives, very common.
You see labels that are falling off but you see here you see, for example, this can down here that says B-wind that is -- now you know what that is.

It's the negative track.
Now you know what that is.
That is the sound track.
I think -- I don't think you can
see on the bottom can is over
there it says original outs.
The camera original and the
outtakes.
Your job is to make sense of
this stuff and decide what to
did use for preservation and
what to use for duplication and
how to pry other size.
This is a whole bunch of stuff
that went in to the making of a
single film, again, your job is
to try to figure out what is
most important to preserve.
Best practice for film handling
inspection.
Shipping cans, boxes, big metal
lab cans and off reels and
rehouse it in archival
polypropylene cans on film
cores.
This is a film core.
The goals are first of all
rehousing in the types of cans
that will cause the least damage
but also about using this
opportunity to inspect the film
if you want to.
Find out what the film is,
actual film, what is on it.
Find the best possible elements
to use for preservation.
So the types of equipment that
you need are really quite
simple.
You need pair of film rewinds,
we'll look at these things in a
second to wind through the film.
You can use film viewer or use
simple light box and a loop.
One foot square light box and
eight mag any fiving loop.
You want some gloves, cotton or

Latex, that's your basic equipment to actually look at a film.
Try to figure out what it is.
If you want -- going further you'll need a slicer, some clean leader which is blank film that goes through the head and tail.
The aforementioned core, split reels, at the end of the day the cans.
The NFPF film guide is the sort of essential guide to making sets of -- making sense.
They take you through it in great detail spanned video links that I provided but I think will be very useful follow a lot of this.
I do highly recommend those.
This is sort of basic film inspection set up looking down at it.
You see on the left side you see -- the split reels are here, you can see the film is 16 millimeter.
That means it's silent this is a little film viewer called a movie scope although it's spelled Movescop.
It's not essential.
A light table will do just as well.
Your loop there obviously then over on the left is the slicer.
But what you really need rewinds and a board.
My quibble with this is that the board first of all the rewind should be further apart.
Second the board should be painted white which makes it easier to keep clean and reflective light makes it easier to see the film.
This is very basic set up.

You really don't need much more
than that.
Another view of the film
rewinds, again, I don't think
these should be so close
together.
Here you see the split film
reels.
This is basic film inspection.
This on the left is much better
sort of set up.
You can see here, you don't even
need the fancy split reels you
can wind through one and get
sense of what is on the film.
Over here on the right you do
see a pair of nice rewinds on a
nice white board and split reel.
Again, what you are imagining
you have the reels, the core in
the middle, wind the film on the
core, open up the reel you have
this nice flat sort of hockey
puck of carefully wound film on
inert core that goes directly in
to the can.
That's the best practice way to
store the film.
Film handling and inspection.
Couple of basic rules of thumb
are pretty straight forward and
probably relatively obvious.
You want to handle it with
gloves.
And you want to only handle the
film by the edges.
Some people prefer to use cotton
gloves but some people prefer to
use Latex or knee tremendous
gloves.
It's a personal preference.
I find Nitrer or Latex to be a
little bit easier because
they're just a little bit
thinner and you can feel things
a little bit more quickly.
You are looking for scratches

and things.
This is a blow up of a frame
from "Star wars" which I chose
because I think Mo people are
familiar with it.
What when you see this, this is
what would you see if you were
just looking at this frame over
a light box with a loop.
You see here vertical scratches,
few very heavy ones.
You see thinner, lighter
scratches a lot of them
especially obvious over the
bottom.
See this big horizontal scratch
up towards the top right above
the engine.
Then you see kind of all over
the place, another Schmootz.
This is the kind of thing when
you're looking at a film print
trying to determine its
condition.
Also see again since most of
those famine the base of --
whatever it is is -- how pink it
is.
How faded it is.
That tells you something as
well.
what
its condition without -- just
basic equipment.
What do you do with that?
You can utilize something like
this.
This is a print condition report
that is inment NFPF guide on
film preservation.
I strongly recommend using this
as a starting point.
I think it's good but as you see
its print condition report only.
You may well be looking at stuff
that's not a print, that's a
negative or something like that.

In addition to this basic information which again you can find by winding through the film, silent sound, what type of sound.
Magnetic or optical.
Material, it might be nitrate.
Generation, positive reversal, is it -- might go a negative.
Is it sound track only, is it image only, et cetera.
You're also going through the film and making notations on all this sort of potential damage, deterioration on a scale that you can determine.
It can be one to five, one to four.
A to F.
But you would say, for example, on that previous film that we were looking at depending on what side of the film the scratches are.
They might be emulsion scratches.
They might be base scratches.
There might be damage to the perforations.
Might have been some repair to the perforations, this is all pretty straight forward.
Again you can do very detailed film print or film element, relatively easily.
You might remember way back at the beginning I suggested that you note the dot on the edge of the net film frame.
In case you didn't, here is quick reminder.
A dot over the upper left, just to the left of the M.
That is Eastman Kodak date code.
Now they're very tiny, very annoying, but a very useful.
They can tell you when the print

was actually made.
Kodak started using then in 1922 started recycling them on 20-year basis if you look at the edge of the film with the loop you can see that there is a circle and a square.
Tells us the film was made in one of those three dates.
You'll have to use what other information you have of what is in the image to determine which one of those three it is.
It's quite useful.
If I hadn't cropped this color off at the wrong place you can see that the square -- the circle means 1937, '57 or '77 based on the content we know that this film was made roughly in the late '30s we know made in 1937.
Extremely useful thing to try to find.
Again they are tiny but they are there.
You can find them with a loop.
Talking about film preservation costs.
How much does it cost to preserve a film?
When I say preservation, I mean copying it on to new stock, restoring color, scratches, et cetera.
This is a preservation cost from a recent project I worked on.
For 16 millimeter film with sound, it was about 490 feet which meant about 12 minutes long.
There was an internegative that was the negative we were working with.
The lab charged $90 an hour for evaluation which was just to make any repairs.

There was nearly nothing they needed to be done it was only an hour.
Cleaning it, charged by the foot.
Again when you're talking about necessity of knowing duration versus length when making film duplication it's charged by the foot.
If you know again 12 minute film about 490 to 500 feet then you can estimate charges.
To make a new interpositive, again, positive-negative 1.73 a foot.
Dubbing, a hard return.
Another hour, audio stock was 510 feet.
90 cents a foot.
The answer print which is the first completed print at the end of the restoration, the answer print was 1.30 a foot.
To do full preservation on 16 millimeter film sound about if 1/2 minutes long there it was in very good condition was $2,417.70.
Not including shipping.
It's not cheap.
But again it can be done.
Sort of the most important thing to think about when you're talking about film preservation is that film is of all of the -- of all of the media is the most stable over the long term.
Even though nitrate and acetate have decomposition -- they decompose, there is still far more stable than audio tape or videotape and they are still much more known quantities than digital media.
The types of issues that those media face aren't necessarily

faced by film.
This is the recommended storage conditions which is pretty straight forward.
You basically want to for the longest term possible freeze it.
Also be in some of the NFPF guide.
Relatively straight forward.
I think we all know that a lot of people don't have the capability because of the institutional pressures and budgetary issues to have really good frozen storage and protocols for things like that.
But rule of thumb is cooler and dryer the better.
If you do have things that are nitrate or extremely important that are not in good storage it might make a lot of sense to try to partner with other institutions that do have better storage if you can.
That's the end of my talk right now.
I guess we should see what kinds of questions we have and whether I've missed anything that people want to hear about.
>> Great, thanks, Jeff.
We do have a few questions for you.
A lot about just best way to store the films that you might have.
Mary is asking should your containers, or cans be vented or unvented, what do you suggest?
>> Standard archival cans that you will get, there's couple of makers, two names escape me they are slightly vented, yes.
>> Cody from rock hill, South Carolina, has a particular thing that might also be affecting

others.
Several films under 400 feet.
The smallest cans found are made nor 400 film.
How do you start the smaller films, worried that perhaps they're going to slide around in the can.
>> That's possible.
There are two practical considerations, number one it's not likely that they will be retrieved incredibly often.
But number two that's the reason that it's important for the film to be wound tightly on to the core and taped down tightly so that it stays in that sort of hockey puck configuration.
And also that it has a lot of clean leader on the outside so that it's protected.
If it does move around in the can you'll be handling it carefully.
When it's retrieved it may bounce around a little bit.
If you take those steps there's not a lot that can happen to it if it's in a clean can, wound very proper low and leaderred on the outside.
That possible -- possibility of film bouncing around better than putting something in the can whose longevity you may not be able to track.
>> As archivists and librarians so many of us are always trying to save space, would you ever put two films in one can together?
>> That's a good question.
Standard practice is not to.
But I respect the question and I understand the problem I'm trying to envision ways in which

that would be possible.
For example, there are quite large archival cans and if you had number of small reels that were wound properly in theory it would be possible to store them.
In practice it may or may not be worth the trouble because, for example, the labeling of the can is going to be more challenging the tracking of its content adds another layer of complexity to that.
The one thing I could say -- I could understand how that would happen if there were storage issues a number of small reels in small can that would be less than ideal.
One thing that I could say absolutely is that you should never stack film.
For example, if you saw those metal cans in that earlier shot those are big heavy lab cans.
Inside them this is totally common, were two rolls of 16 millimeter stacked on top.
That's something you should never do.
It's not good to stack film.
That's one thing you should definitely not do.
>> Okay.
That leads perfectly to the next question.
Say we get our collections alienationly housed in these cans can once we get them do we store them up right or flat on shelves?
>> Flat.
Always flat.
>> That is an easy one.
Films stored alit.
There we go.
Do you know of any cooperative

storage programs that might be out there, Connie from Arkansas, if we have motion picture film no cold storage capabilities is it maybe that we transfer it to another institution that does is there a good cooperative way to find places that are accepting these sorts of things?
>> In terms of seeking one out, really the association of moving image archivists, Amia is at Amianet.org is the most important group.
They have very active listserv, that is the way that they share information and seeking potential homes or -- someone else was asking also about trying to find out if there were other copies of the films.
That's one good way to start the Amia listserv, majority of moving image archives in the state seem to have connection there.
That is really good place to start.
In terms of cooperatives there are places, one that I know off the top of my head is northeast historic film in bucksport, maine, provides storage for outside clients as not for profit their rates are relatively reasonable.
Certainly someone I would contact.
Library of congress -- I think the national preservation foundation might be good resource to contact.
They have lot of good relationships with other institutions and library of congress as part of mandate really is largely accepting of

donations and material, created in the states.
Those are some places to look at.
>> Great.
Do you have any tips for folks that might want to do some cold storage at their own institutions?
Do they get a refrigerator or freezer, how might they go about that if they have a significant number of films to deal with.
>> It's a lot more complicated than that.
There are some protocols, I keep referring to the NFPF guide it is very helpful I believe that there is a good chapter on it.
But in a nutshell for climatizing film that's being taken in and out of a freezer the first of all conventional freezers cycle on and off they don't have a continuously stable environment.
There are also some pretty rigorous protocols for how to house and pack up film that's being put in to freezing storage.
There are protocols for housing properly film going in to cold storage then for freezing storage then for coming out.
Because it has to climatize and basically Thaw in ways that won't, for example, cause condensation.
There are protocols on that if it's not in the NFPF guide I can send you a link or someone there I could.
I could send to distribute that might be more helpful.
>> Great, thank you.
One last question that we have

here.
Sarah has a question that says she has a lot of films in her collections that are secured at the end just using regular old pressure sensitive tape.
Should she try to remove those
--
>> Nope.
In a nutshell especially if it's got a leader the blank film it's quite the opposite.
Film should be taped down nice and tightly wound.
Talking about film handling something I didn't really talk about.
You want it to be tightly wound but you never want to pull on it to tighten it up.
That causes horizontal scratches known as cinch marks.
You want the film to be tightly wound but never want want to yank it.
If it is taped down and is in storage, that's fine.
Usually people just use paper artist's tape for that sort of thing.
Should be taped down because if it's not it gets loose dirt and dust can get in to the reel and cause damage or scratching.
>> Great.
That's all the questions we have.
I know that Jenny normally likes to step in here, too.
>> Let me go ahead, I'm going to pull over the homework assignment for today's webinar so here is the link to that.
Then as you always do if you have logged in as a group, one person is logged in but multiple people are watching we love to

get an accurate attendance of what is watching if your group leader could go ahead enter in everyone's name for their group.
I will pull over our link to the course webpage.
You also find that homework assignment there.
In addition to some of those resources that Jeff include in his Power Point.
We'll include any new links there as well.
Jeff, thank you so much.
Laura, thank you so much.
I almost forgot we'll see you one last time on Wednesday at 2:00.
It will be our last webinar so this Wednesday at 2:00.
So with that, we can go ahead and close out today.
Jeff and lawyer remark thank you so much.
>> Thank you everyone it's been a pleasure.