

## “Tech Talk” TV Show

### TVs/Video Cameras Episode

View of scattered pixels on a TV screen. The voices of a woman and man are heard.

**Woman:** Now what did you do to it?

**Man:** I didn't touch it.

**Woman:** Check the rabbit ears. Are the rabbit ears connected?

**Man:** They're connected.

**Woman:** Fiddle with the focus or something.

**Man:** I'm working on it.

**Woman:** Let's get a new TV.

**Man:** Give me a break, Madeline, have you seen the newspaper ads lately? A TV ain't a TV anymore, it's an SDTV or an EDTV or an HDTV or a projection or...

**Woman:** Hit it Herb; that works sometimes.

**Man:** Alright!

The sound of someone hitting the side of TV is heard and the screen goes black.

Tech Talk intro plays.

**J.B.:** Hello and welcome to Tech Talk from the University of Minnesota, your source of information about technology that surrounds us everyday. I'm J.B. Eckert sitting in for Susan McKinnell. If you're in the market for a new television set but the descriptions in the Sunday advertising section seem like just a lot of letters and numbers, stay tuned. Today we're going to demystify those letters and numbers and focus not only on the television of today but the TV that's in your future. And that's just for starters, in the second half of Tech Talk; we're going to look at the new digital video cameras. Some of the terms you'll hear today include: SDTV, EDTV, HDTV, plasma and digital zoom. If you're going to talk about television, who better to discuss it with than the chief technical engineer of a television station? Bruce Jacobs is just that, he oversees television engineering and information technology for KTCA TV in St. Paul and Minneapolis. Moreover, he helped develop the model for public television's conversion to digital broadcasting. Bruce, it is nice to have you here.

**Bruce:** It's good to be here, Jim.

**J.B.:** Now we're going to start at the basics.

**Bruce:** Okay, great.

**J.B.:** We're going to start at the basics. When I was a little kid there was television, but the television that we had lasted for a long time.

**Bruce:** Well, television stayed the same for a long time, since they were invented back in the thirties, they changed somewhat in color, but fundamentally the technology stayed very much the same for like fifty years.

**J.B.:** What was it, the technology?

**Bruce:** Well, for many years it based on that big, heavy, glass cathode ray tube that had an electron gun at the back that made phosphors glow on the front of it and the bigger you got it the deeper it was and the heavier it got. Everything was based on the cathode ray tube.

**J.B.:** But it still continued about fifteen years ago those great, huge televisions.

**Bruce:** Well, even the first, you know the people who bought, especially sports fans, love these big displays in their basement living room and you'd have this giant display, it's kind of a big box, usually about this deep and it went all the way to the floor and it actually had three cathode ray tubes in the back shining red, blue and green up onto that rear screen.

**J.B.:** Now, but that all changed in what, about the last ten-fifteen years?

**Bruce:** Well, just recently at the same time we're developing digital television broadcasting technology, there have been new digital display technologies developed using a variety of technologies and the most popular that came out first, was the plasma display. We have one right here in the studio that has Tech Talk emblazoned on it and these plasma displays actually also have a little, tiny electron gun but there are hundreds of thousands of them shining red and blue and green light to the front of the screen. Now, the other displays that we see a lot these days are LCD and DLP and these use little mirrors..."

**J.B.:** Go back, go back a little. LCD is...?

**Bruce:** Liquid Crystal Display has...

**J.B.:** Like your watch?

**Bruce:** Just like the watch. The same kind of technology that makes my watch flash 2:22 or whatever time it is, is letting light through this little valve and in an LCD television, they have hundreds of thousands of these little electronic valves that let the light—a fluorescent light—through the display or a projector lamp through if you have a projector like everybody has seen in board rooms and conference rooms.

**J.B.:** LCD and then you mentioned...

**Bruce:** DLP, actually and this is the most amazing thing because...

**J.B.:** DLP stands for...

**Bruce:** Digital Light Projector and it's hard to believe, this sounds like magic, I know, but on this little tiny chip there are hundreds and thousands of little mirrors on hinges and they can make these mirrors tip one way or the other and they send the light that's coming in either back to a screen or off to a little piece of black that absorbs it up. But, there's actually hundreds of thousands of little hinged mirrors that are tilting at hundred and thousands of times each second.

**J.B.:** Huh! That's nanotechnology, isn't it?

**Bruce:** I think I'd call it nanotechnology.

**J.B.:** Okay, that's technology that's so small that you can't even see it.

**Bruce:** Right. The main, the important thing is these are technologies that make displays look better. They're sharper, they're smaller, they're cheaper, they're brighter and so now we can have, instead of having a big display that goes to the floor and it's two and a half feet deep, now they're like maybe six inches deep and they don't go to the floor, they're just as tall as the display and you can carry them, one person, instead of needing four people to carry them so they're much more practical for the home consumer.

**J.B.:** Now, when I was growing up, the television had that gun that you were talking about, the cathode ray gun, scanned 525 lines.

**Bruce:** Right, it was 480 visible lines and now our new technologies, when people hear about HDTV, that's a standard that has 700 or more lines vertically instead of 400 and some lines.

**J.B.:** So HDTV doesn't necessarily have to be, I always thought it was a thousand or twelve hundred lines.

**Bruce:** Well, there are two options, but it is 700 or more is that standard for HDTV.

**J.B.:** Okay, so that would make sense when you look at ads and they say there is HDTV...

**Bruce:** Right. And there are always those options in ads, yes.

**J.B.:** Definitely.

**Bruce:** (laughs.)

**J.B.:** Now this last one that you talked about, the D...

**Bruce:** The DLP?

**J.B.:** DLP, is that on the market?

**Bruce:** Yes, Samsung has one that's available and very common in stores. These digital displays, they have some work to do yet, sometimes when you look in the black areas of the screen and when the picture move you see something kind of fuzzy crawling around and that is the limitation of these displays but they get better by the day.

**J.B.:** Man, my, this is just...the TV is changing isn't it?

**Bruce:** It is exciting, I mean it's the consumer; all of us and whenever we go shopping we want *the* answer because it makes our life easier and that's not the case in televisions today, we go and there are many options: plasmas tend to be not as deep, more expensive; the DLP's are nice and shallow, they're maybe only a foot deep and they're less expensive, and CRT's are least expensive but you can't get them very big. So there are these trade-offs and the consumer really has to make their own choice.

**J.B.** Okay. Let me go back. I've got some ads here.

**Bruce:** Uh. Huh.

**J.B.:** These are kind of nice. Now, this one says, this is a television set that is 42 inches, that's the diameter, right?

**Bruce:** The diagonal.

**J.B.:** The diagonal, right, 42 inches and it has, I don't understand, 853 x 480 resolution.

**Bruce:** Well, the resolution is important at some level. I brought my glasses as a very high-tech demonstration here. Let's say all our lives that all of the paintings that we saw in museums were impressionist paintings. But it didn't matter because our eyesight wasn't very good and our glasses weren't very good and everything was sort of fuzzy anyhow so we were happy. So it was Monet and everything was great. What sense would it make for somebody to make highly detailed Andrew Wyeth-style paintings if we still had fuzzy glasses? So, the great thing about HDTV is it's like getting better glasses and the more resolution you have, the more of those dots, instead of 480; 700 and instead of 700 horizontally; 800, that's like getting better glasses as long as the programming is there with the higher resolution as well, because, otherwise, the better glasses doesn't do any good.

**J.B.:** Oh! So, it has to be shot in a higher resolution format.

**Bruce:** And it has to be delivered to the home in a high definition format.

**J.B.:** Now, you were saying 480 or 480 x 853, so those are the little dots, the little pixels?

**Bruce:** Right. Now, it's confusing. I have trouble, myself; I'm a professional television engineer and trying to remember, now, "How many dots? And how many dots?" The nice thing the consumer industry has done and we see it right in this ad, this display says, EDTV, instead of HDTV, that's Enhanced Definition Television and the consumer industry agreed that they would say well, we won't call it HDTV unless it's got enough dots to really qualify. And if it's less than that but better than an old-style television we'll call that Enhanced Definition Television; EDTV.

**J.B.:** Okay, so what...start out, here we are at the bottom, you walk in, you get the old-style television it would be called...

**Bruce:** SDTV

**J.B.:** "S" being?

**Bruce:** Standard Definition Television

**J.B.:** Standard Definition Television, then there is

**Bruce:** Enhanced

**J.B.** and then it's

**Bruce:** EDTV and then the best is HDTV.

**J.B.:** Ah! Good for you. Okay. Alright, this is great.

**Bruce:** But even in HDTV the displays vary and that's why consumers really need to ask is "Am I seeing HDTV content?" to be able to compare the displays to make sure the HDTV display that they are seeing is being shown at its best.

**J.B.:** So it has to be shot in High Definition.

**Bruce:** And delivered and viewed.

**J.B.:** Okay. While we're doing this I want to go through a couple of other things here. Here's one that says it's a 20 inch flat panel. Is that plasma?

**Bruce:** Well, everybody likes flat so they'll always tout that, but you know, nowadays most televisions are flat so it's not too big of a surprise.

**J.B.:** Okay, this one says it has 400:1 contrast ratio.

**Bruce:** Well, these early digital displays had difficulty making very dark images very carefully and so they're touting the fact that they've gotten better; they used to be 200:1 or 150:1 and so the higher the number, the better.

**J.B.:** Okay, so, now look I'm going to go out and I'm going to buy a high definition television.

**Bruce:** Right.

**J.B.:** But I've got a couple...you know the little television in my bedroom, little television in the den, whatever, whatever...

**Bruce:** Uh. Huh.

**J.B.:** And these are the old-style ones because they're about 12-15 years old.

**Bruce:** Uh. Huh.

**J.B.:** I can't see high definition television on my old ones can I?

**Bruce:** So far we've all been talking about the glasses and what we can see in our displays, but the whole other aspect of this transition that consumers are certainly interested in is the fact that the way we're delivering the content to the home is changing. Cable is going digital that's an easy transition because when consumers decide to get digital cable, they just call up the cable company and get this new set-top box like the ones similar to what we see here and they get just a different box and they don't need to care whether it's digital or not, they just get more channels, more video on demand, more offerings.

**J.B.:** Okay.

**Bruce:** But the congress has been pushing broadcasters to switch from analog to digital transmission and all the local broadcasters are now transmitting digital signals and in some case that's now available to consumers through their cable system and eventually consumers will find that when they go to buy a television, it will include a digital tuner that will allow them to receive digital transmissions over the air and eventually the analog transmissions over the air will go away.

**J.B.:** So the next set of television sets will have both the analog and the high definition tuner?

**Bruce:** Congress has mandated that starting this July the large sets with any tuner at all have to include a new digital tuner capable of receiving a digital broadcast.

**J.B.:** So, my stuff, ultimately, those 10-15 year old TV sets are going to be of no use?

**Bruce:** Not necessarily. If you have cable, the cable company will always make sure that those sets work. If you have a dish network and you have a box for that, well then that box will feed those old televisions for years to come. The other side of it is that you'll probably want to get some new displays because it looks much nicer and as new ways of getting programs to your home come around, you'll want to take advantage of them.

**J.B.:** You know what I heard...I couldn't believe this when I heard this, when you buy a high definition television set, you don't necessarily get the tuner. You have to buy a tuner, is that right?

**Bruce:** That's correct.

**J.B.:** Really?!

**Bruce:** That's a surprise to lots of people because we all grew up, you bought a television well it had a tuner, right?

**J.B.:** Right.

**Bruce:** Yeah, you couldn't buy a television without a tuner and most televisions have a tuner for analog, but it's only this summer that you'll see televisions that include the digital tuner in them.

**J.B.:** So, here are a couple of tuners, now these are to be fore high definition televisions.

**Bruce:** These work for off-air reception of digital television and very soon we'll see boxes, fortunately, that work both with digital cable and digital broadcasts.

**J.B.:** These guys are not inexpensive.

**Bruce:** They're around \$400.00.

**J.B.:** Yeah.

**Bruce:** Now those prices will continue to drop so people shouldn't be too scared away by that.

**J.B.:** Well as soon as the ones with in the summer come in with the whole thing in one...

**Bruce:** Right.

**J.B.:** Then it'll be great.

**Bruce:** Right.

**J.B.:** Okay, so this is good, so if I'm going to go out looking for...give me an idea, just a brief idea, I'm going to go out I'm going to look for a television set, it's going to go in the living room, so I don't need a great big, huge projection one, but I want to have a big nice one, what should I...

**Bruce:** Well, your choices are, if you have a big basement room that you can have totally dark and you want a huge screen, look at getting a projector that you hang from the ceiling with a regular projection screen. A lot of people are doing that and those look wonderful, then you can get really big and those prices are going down and the quality is going up. If that's not appropriate, if you have windows, you can't keep the room dark, you really need to have a more traditional display. Then, you need to think about how much room you have in size this way, but also in depth, how much would you like to spend and then you look at your choices of options and the plasmas are nice because they're only three inches deep, but they're pretty expensive, those prices are dropping, so you know as the months go by it's a better and better proposition. Then if you want to spend less money but you still want big and little more space, look at the LCD and the DLP rear screens where it's a piece of plastic screen with a projector behind it and these days, I would recommend people to look at those technologies as their first choice.

**J.B.:** Bruce, thank you very much.

**Bruce:** Thank you, Jim.

**J.B.:** It's been a pleasure and eye opening too. This is great, thank you for being here.

Well, since we've looked at TVs we thought it only appropriate that we should take a look at all the new cameras that are out now. Here to show us, is Justin Proulx, Justin is a strategic technologist for the Best Buy Corporation, that means that among his other duties, he's looking to incorporate developing technologies into a multimedia home network. Justin, it's good to have you on Tech Talk.

**Justin:** Thank you, J.B.

**J.B.:** Alright. Now, we're going to talk about television cameras.

**Justin:** Actually, people like to call these camcorders now because of the fact that camera is a term now that's used for digital cameras now.

**J.B.** Oh! Still cameras.

**Justin:** Still cameras. This is a camcorders.

**J.B.:** So these are camcorders. Is there another technology, I keep thinking of the analog way of doing it, right, it's where you kind of made a kind of a picture on the tape. But what goes on the tape now isn't actually pictures.

**Justin:** Actually, by using the word digital, your actually not going to be recording a picture or a frame on the tape, you're actually going to be recording ones and zeros.

**J.B.:** Ones and zeros.

**Justin:** Correct.

**J.B.:** And it makes a picture?

**Justin:** At the end of the day, it makes a picture.

J.B: Oh Man! Now, this is the newest kind of technology, isn't it?

**Justin:** Digital camcorders have been around, actually pervasive, in the market since about 1998.

**J.B.:** The camcorders that you've got here, you've got a nice selection of camcorders, I'm going to go buy one, what am I going to look for in a camera—camcorder.

**Justin:** Well, there are a couple of key things that you want to look for in a camcorder, one of them happens to be a zoom. Usually, today on one of these camcorders you'll see blasted on the side of them, "120x" to "200x" digital zoom.

**J.B.:** Which means?

**Justin:** ...Which means that inside the camera it will zoom for you digitally, not optically.

**J.B.:** Oh yes!

**Justin:** Does that make sense? Optical zoom is done with the lens; digital zoom is done within the camera.

**J.B.:** Okay, so the "120" means? When you say 120, it says 120x, that's...

**Justin:** Digital zoom; something that analog cameras never had.

**J.B.:** Now the higher the number, if it's 120, if it's 240 that means that if you stand six feet away from something, you can get closer to it.

**Justin:** So, what it means is with the optical zoom it'll go as far as it can, they work together, optical zoom will go as far as it can optically, but then when it reaches its maximum optical zoom, it will then go out even further into the digital zoom. The important thing between digital and optical zoom is you don't want to worry as much about the digital zoom, although it's important and adds benefits; you want to worry

about the optical zoom. So, the higher the optical zoomed camera, the better the resolution you will have on your footage.

**J.B.:** Okay, optical zoom. Television cameras, when I was working, they were three-quarter-inch or half-inch and I understand there was a camcorder a few years ago that had Super 8, the actual thing that you recorded on...

**Justin:** Right; the tape.

**J.B.:** The tape! And what is it now?

**Justin:** Well, today for digital format, tape is still the preferred format before we had High 8 tape which was a thinner tape, the thinner of the analog tapes.

**J.B.:** Okay, okay.

**Justin:** Then we had the VHS-C, and then of course, years ago, we had the big, you'd put a big VCR tape in your camcorder and you had to hire three people to drag the camera along with you.

**J.B.:** Carry it around, that's right.

**Justin:** So, today we still use tape and you can actually get the highest resolution out of digital tape. There are many digital formats, today, there is MiniDV which is the most pervasive in the market today, it's the best quality, from a digital stand point. There is Digital 8 which is mostly a Sony format. That actually allows you to take your old High 8 tapes and use them in your digital camera. So for those who had a High 8 analog camcorder, you can reuse those tapes again and you can view that analog footage on a Digital 8 camera as well.

**J.B.:** Wow. So, I'm going to buy one of these cameras so I'm looking for an optical zoom, I'm looking for...the format should be...

**Justin:** MiniDV.

**J.B.:** MiniDV, then what else am I going to need on the camcorder?

**Justin:** Depends on what you're going to end up using it for. If you don't want to edit your movies, if you don't want to edit your footage at the end of the day, you can do things like burn it directly onto a DVD. There are camcorders like this that actually allow you to burn directly onto a DVD. So, when you're done with it you can take it out of the camera and put it in your DVD player and watch it.

**J.B.:** Oh, Wow!

**Justin:** Which eliminates hooking it up to a television with wires, it eliminate...well, most people don't do anything with their analog tapes, they leave them either in the bag or they mark them well and put them on a shelf.

**J.B.:** Yep. That's right. Okay, this is a bigger camera; this guy.

**Justin:** Right so you guys just talked about high definition television, for professionals or those who have a large wallet, you can get something like this that actually will help you take advantage of your HDTV because this records in true high definition quality. This will give you 720p.

**J.B.:** Woo. So this is good.

**Justin:** Yes. That's good.

**J.B.:** Okay, but is this also expensive?

**Justin:** This is very expensive.

**J.B.:** Oh it is! How expensive is this one?

**Justin:** This camera retails for \$3500.

**J.B.:** \$3500?

**Justin:** Verses some of the \$500 and \$900 price point devices we have over here.

**J.B.:** Okay. Is there a basic camera? Just a basic camcorder?

**Justin:** Right. So the basic camcorder is...actually the nice thing about it is there getting smaller so they're easier to tote around, but they're MiniDV formats. They allow you to actually transfer your digital content from your camera to your computer very easily.

**J.B.:** Okay. Do you need a cord?

**Justin:** You do need a cord and that's what we have sitting right here. This cord here is actually a firewire cord or for those techies, an IEEE1394.

**J.B.:** Woo! Okay, okay. This goes from the camera...

**Justin:** This allows you to transfer to your computer from your camera.

**J.B.:** Okay, now would that cord be applicable for any other except for this guy, for these other cameras.

**Justin:** Absolutely. So the firewire has basically been a standard for digital video since digital video camcorders have been around.

**J.B.:** Okay, now a basic camcorder, just a basic one, how much would that run?

**Justin:** You can get camcorders starting anywhere from 399 to 599 for a basic decent quality camcorder.

**J.B.:** Okay, Now are they doing the same thing that televisions are; coming down in price the more they're produced?

**Justin:** Absolutely. So what they're doing is they're enhancing camcorders with features, now.

**J.B.:** But you brought something a little more special than just a camcorder, right?

**Justin:** Right. So, everyone of these camcorders here, has the ability to take a still picture, however, the quality is not the quality of a digital camera, per se. Except for some of the newer camcorders that like the Samsung duel cam. Actually, when it's in this position it will take high quality video. All you do is you flip it around like this and you can now take 4.1 megapixel photos, which 4.1 megapixels in a camcorder has not been heard of in the past. It is usually right around 1.8 megapixel pictures to 2.0 megapixel pictures.

**J.B.:** The higher that number, the more pixels, the better definition of the picture itself, right?

**Justin:** Absolutely.

**J.B.:** So if you're talking 4 point....

**Justin:** 4.13, I believe is the megapixels in this camcorder.

**J.B.:** Wow! So you could take not only moving pictures with that, but you could do a portrait, a nice sized 18x18 inch portrait and have a wonderful quality. Now what else does that do?

**Justin:** So, one thing that actually all these camcorders offer that are in front of us today is the ability to take that still photo on a piece of memory. So, if you've heard of Sony memory sticks or Secure Digital...

**J.B.:** Okay. Okay.

**Justin:** These are memory formats that are not the tape, if that makes any sense, if I'm not going to confuse you.

**J.B.:** Yes, yes, yes.

**Justin:** So, it allows you to take that photo so you don't have to rewind through your footage and find where you took that still picture. You can switch the lever and take a picture right on that solid state memory.

**J.B.:** Okay, all of these cameras have that ability.

**Justin:** All these cameras but not all digital camcorders.

**J.B.:** Okay.

**Justin:** When we talk about that 3-349 price point camcorders they're not going to have that.

**J.B.:** Tell me what you would suggest? What would you suggest that I buy; what features, what format, what whatever?

**Justin:** So, I would suggest a MiniDV camcorder because you can get a good quality camcorder for the price you pay for it. Some of the things you get in a camcorder that's right around \$300-\$500 is an LCD screen. An LCD screen allows you to view without looking through the hole. You can set this and just angle it the way you want to and see what you're capturing. Another nice feature of it is, a lot of them are coming with remote controls, today, so you can actually be part of the video and still record.

**J.B.:** This is pretty neat stuff. What kind of format does that have?

**Justin:** This is a MiniDV camcorder.

**J.B.:** Now, there were a number of formats over the years; is this going to be around for a while, for a few years?

**Justin:** This is going to be around for a while. The one downfall of the MiniDV is it's still a tape. And tapes, they degrade, just like in the analog world.

**J.B.:** So to dub it off you put it on a CD?

**Justin:** You put it on your computer, turn it into a file and create a DVD.

**J.B.:** And keep it forever?

**Justin:** And keep it forever.

**J.B.:** This is really neat. Thank you very much for being, Justin, here.

**Justin:** Great! It was great to be here.

**J.B.:** This is super, thank you very much. Well, that's our show for today. We got some pretty important pointers about selecting a TV and selecting a video camera, some of those points we've included For Your Files.

**Bruce Jacobs**, KTCA's chief engineer describes the differences in today's TVs.

**Bruce:** ...plasmas tend to be not as deep, more expensive; the DLP's are nice and shallow, they're maybe only a foot deep and they're less expensive, and CRT's are least expensive but you can't get them very big. So there are these trade-offs and the consumer really has to make their own choice.

J.B: Jacobs also said HDTV has a better picture than normal cathode ray tubes because it has almost twice as many horizontal display lines,

**Bruce:** ...it's like getting better glasses and the more resolution you have, the more of those dots, instead of 480; 700 and instead of 700 horizontally; 800, that's like getting better glasses as long as the programming is there with the higher resolution as well, because, otherwise, the better glasses doesn't do any good.

**Justin Proulx**, a technologist from Best Buy, talked about the various formats for video cameras.

**Justin:** ...there is MiniDV which is the most pervasive in the market today, it's the best quality, from a digital stand point. There is digital eight which is mostly a Sony format. That actually allows you to take your old high eight tapes and use them in your digital camera.

**J.B.:** If you missed any portion of our program on TVs and video cameras, or you just want to review it all again, stop by our website. All of the programs we've done so far including this one are right there for your viewing. Our address is [techtalk.umn.edu](http://techtalk.umn.edu). And if you have a question about TVs or video cameras just post it on our website. We'll have one of our specialists answer it. Next week, now that we've got a new video camera, we're going to show you how to put that video into your computer and we'll even show you how to show other people, far away, the video that you've taken. Next week it's all about digital video. We promise it'll make for good viewing. Thanks for watching. See you next week.

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**Executive Producer**  
Robert H. Bruininks

**Special Thanks to:**

Steve Cawley  
Sandra Gardebring  
Shih-Pau Yen

**Guest Host**  
J.B. Eckert

**Producer / Director**  
Susan J. Tade

**Assistant Director**  
Richard Reardon

**Associate Producer**  
J.B. Eckert

**Technical Director**  
Steve Barbo

**Audio**  
Laura Cervin

**Floor Director**  
Dan Sagisser

**Cameras**  
Pete Gorton  
Jonathan Kranzler  
David Lindeman

**Lighting**  
Laura Cervin  
Jonathan Kranzler

**Set Design**  
Richard Stachow

**Graphic Design**  
Nicky Torkzadeh

**Effects Design**  
Paul Pecilunas

**Make-Up / Prompter**  
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