9-track Mag Tape NRZI

firebirdta84, Chuck(G) · Thursday at 12:07 PM

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firebirdta84 — Experienced Member — Joined: Jun 26, 2013 — Messages: 242 — Location: Central Iowa

Thursday at 12:07 PM

Hi, Chuck! Not sure if I should DM you on this, or start an open forum thread, but I'll start here. We're deep into reading some 9-track tapes using a new method where we read the tapes on a dumb transport, with no host system or formatter board connected. This is important because at this time, we don't have any fully functioning host system operational for any of these tapes yet, and still we need to know what is on them.

So, using a method that has been successful for me years ago with QIC format tapes, I'm using a logic "analyzer" capture device (Saleae) to record all of the logical high and low signals on each track as follows:

Data 0-7
Parity
Read Data Pulse

10 signals in total.

The concept of decoding NRZI is well documented online in Wiki articles, and even in various vintage tape transport manuals found on Bitsavers.

That said, a real-world example of how these signals really look at the output of a dumb tape transport has never been published...I don't think...so I anticipate I'll be the first to do so. But in order to do so, I have to "crack the code", so to speak.

When I think of who I know who really, fundamentally understands multi-track Mag Tape formats from the 60s and the 70s, you rise to the very top of this list.

Would you be interested in helping us interpret what we're seeing on these tapes?

We're currently reading 800bpi tapes on a Pertec T-7840 transport: https://entrex480.blogspot.com/2019/06/pertec-t7840.html Thankfully, Al/Bitsavers has the manual scanned, and it is linked on that page.

I really wish that we could start this project with a tape that has already been read/archived and is available in some .9trk file format or something, because then we could know if we're interpreting the signals coming out of the tape transport correctly if we eventually decode them to match what's in the .9trk file. But alas, we have no such sample. The few tapes we have have never been archived/published anywhere. Which adds to the depth of this challenge.

That said, I know from experience that I can have some degree of confidence that I've decoded data correctly if I can get a CRC (cyclic redundancy check) to work out. In my reading, it seems that 800bpi NRZI standard utilizes things called CRCC and LRCC. But this is where I could use some help.

That, and every data sample has 9 data signals: 8 data signals and a parity. So one would think that I could at least make sense of the parity bit on every data sample. Yet this also seems elusive to me.

This is so much more complicated than the simple one-track streaming data I decoded in previous years.

I'll await your thoughts, and thank you so kindly for reading this long rambling, and any future reply.

Best wishes always,
AJ / Forgotten machines

Report + Quote Reply

Chuck(G) — 25k Member — Joined: Jan 11, 2007 — Messages: 43,914 — Location: Pacific Northwest, USA

Thursday at 12:29 PM

Al, I do my 7- and 9-track NRZI reading on an HP 7970 drive with only the read amp board attached. There is a derived strobe with some rather interesting deskewing logic, but basically, it's the raw output. One of these days, if the need arises, I'll include software deskewing.

PE and CRC reading is done by a different (Fujitsu) drive.

I use a STM32F407 MCU to take that output and control the drive, make trivial tests on the returned data, time the gaps, etc. A parity error may cause a read-reverse, read-forward type of retry with the logic that if you can successfully read the last bytes in a block and the first bytes, you may be able to (a) either successfully read the block in reverse or (b) be able to "bracket" bad data with good. All of this gets written to a local (SD card) file and later transferred to a PC for detailed analysis.

After a few hundred reels of both 7 and 9 track NRZI tapes, I think I'm on the right track.

For details on physical tape formats, it's been so long that all I can remember is that the bitsavers sections on HP and CDC drives were most useful.

My take is that if you need an analog logic analyzer to read a tape, you're probably up against a lot of data loss.
anyway.

The major problems that surface are usually that of shedding, and transport issues.

Back in the day, I recall wasting a week supporting a customer who was interchanging PE tapes between IBM and CDC mainframes. The CDC drives (669) had no problems reading the IBM-written tapes, but the IBM drives called foul when reading CDC-written tapes.

The culprit turned out to be one of engineering. IBM drives took care while writing and were a bit sloppy reading. CDC drives were just the reverse--write sloppy but read carefully. It took a lot of firmware tweaks to get the CDC 669s to stop crowding the bits at the beginning of a block, as I recall. Lots of time a magnifier and Visomag.

All 9 track NRZI tapes, in my experience have an LRCC frame, but not all include a CRC one. If one is present, I check it.

Report + Quote Reply

firebirdta84

Thursday at 1:03 PM

Thanks, Chuck, this is great info, and I appreciate you sharing. As to
*"My take is that if you need an analog logic analyzer to read a tape, you're probably up against a lot of data loss.
anyway."*

True, but in this case, we're using it in place of a host system...so we may have data loss, or we may not. But we definitely have a loss of a host system at the moment. And thus, the logic capture is how we're "reading" the data.

What's cool is, it sounds like you have an operational system there that is possible to probe the signals on while it is in operation, and potentially get a baseline, especially if we do that during a successful read, and you have the results of what you actually read off the tape. THAT gets me excited!

Is your setup operational currently?

Report + Quote Reply

Chuck(G)

Thursday at 1:36 PM

Yes, it's operational. I've been sucking tape data on the rig since about 2018. That includes 7-track tapes. The schematic of the 7970 read amplifier is online; I think over at HP Museum.

Report + Quote Reply

firebirdta84

Thursday at 1:47 PM

This is very cool! Would you be open to running an experiment with me and for our efforts using your setup?

Something that involves the simplest of your 800bpi tapes that you have available and can successfully read.

Have you ever used Saleae software with a USB logic capture device before? (It sounds simple compared to what you have built so far)

Report + Quote Reply

Chuck(G)

Thursday at 3:36 PM

Negative on the Saleae--I'm strictly a "build it from the bare iron" sort of guy. I need to know exactly how everything works. As I mentioned, I've been using the STM32F407 MCU, which, at 168MHz has plenty of power to handle what amounts to 1960s early technology. Even my floppy disk reader is home-grown. Firmware for projects like the Greaseweazle makes me a bit queasy.
I am looking at the STM32H7 family of MCUs--running at 400Mhz with 1MB of SRAM on board and enough 5V tolerant GPIOs to choke a horse, it may be the next thing to use as an implementation base.
I'm not sure what you're asking, however. Do you want me to provide an 800 bpi NRZ tape for testing? A lot of what I have around is really the property of customers, but I may be able to ferret something out.

Report + Quote Reply

firebirdta84

Thursday at 8:50 PM

Thanks, Chuck, I appreciate all of your response there.

I'm not asking you to send me anything, but rather to do a test for me using your equipment with an 800 bpi NRZI tape, if possible.

A Saleae USB Logic Capture device is extremely inexpensive, and for this experiment, I'd like to send you one. The software is free to download and install on Linux/Windows/Mac OS, whatever you use: https://www.saleae.com/downloads/

If you were willing, upon receiving the Saleae device from me, you could hook up each probe of the Saleae to the output interface of your transport to the following 10 signals:

Data Strobe
Parity
Data0-Data7

Then, you could Start the capture with Saleae over USB, then start the 800bpi tape read process using your equipment. If I give you the correct settings for the software, The Saleae will record all of the signals coming out of your transport for the entire duration of the tape (or at least enough of it for the test).

Then, assuming that you're able to translate the data you take from this same tape into a file (or files) using your process, if you could share with me both the logic capture and the files from the tape, then I will finally have a "baseline" of known good tape, known working tape drive, AND known data on the tape to develop my tape read process.

This would help my process greatly, and hopefully enable me to create in software my own version of what you have created using your STM32F407 MCU.

Would you be willing to try something like this?

Thanks for considering it, and for your kind help thus far, and always!

Best
AJ

Report + Quote Reply

Chuck(G)

Thursday at 10:43 PM

Sorry AJ, my equipment is adjusted and used for revenue. I'm not ready to tear into it just yet--it took long enough to get it working. I'm not ready to risk messing it up.

Exactly how are you getting your data strobe? I ask this because getting a good de-skewed strobe is the very essence of a good tape read channel. In my own case, this involves staring at a 'scope while running an alignment tape through the machine, carefully adjusting each read channel delay. Not a simple job. Tape drive heads are imperfect animals and incorporate track-to-track skews as part of their nature. May I assume that you have the appropriate calibration tape?

Report + Quote Reply

firebirdta84

Friday at 9:53 AM

I understand, Chuck, thank you, and I fully respect your position. I congratulate you on being able to use what you've built for revenue, and not just a hobby. By contrast, I'm pursuing this solely for vintage compute restorations hobby efforts.

"Exactly how are you getting your data strobe?" Great question, and this is where my ignorance is evident as compared to your expertise in this area...confirming that you are most certainly the right person to ask about all of this:

My tape transport simply has a "Read Data Strobe" signal on J103 pin 2, so I'm simply capturing that as one of the 10 signals the transport outputs when reading a tape: https://bit.ly/3I5pk3b

"I ask this because getting a good de-skewed strobe is the very essence of a good tape read channel. In my own case, this involves staring at a 'scope while running an alignment tape through the machine, carefully adjusting each read channel delay. Not a simple job. Tape drive heads are imperfect animals and incorporate track-to-track skews as part of their nature."

Well, like a floppy disk drive, I had hoped that the alignment of the heads on the tracks would be "good enough" to get the job done. When you explain all of this, my approach certainly appears quite naïve. The concept of de-skewing is new to me, as of this conversation, but when you explain it, it makes perfect sense.

"May I assume that you have the appropriate calibration tape?"

Unfortunately, no. It makes perfect sense that there is such a thing, but I would have no idea where to begin to find such a prized item, much less acquire one. It was hard enough finding transports and moving them around. Before now, I had considered that quite an accomplishment in itself.

I guess if I'm going to succeed at any tape reading, I'll have to find one, or figure out some other more creative method to accomplish the de-skewing needed.

As always, I'm open to suggestions.

Thanks again for your helpful questions and guidance...I really do appreciate it!

Best,
AJ

Report + Quote Reply

Chuck(G)

Friday at 12:31 PM

I received my calibration tape from Al K. He may still have an extra one or two.
The calibration tape serves two purposes--it allows for correction of skew and provides a reference level signal.
Since your drive has an output for data strobe, the outputs that you're referencing are far from the raw read output of the tape head. Undoubtedly your drive also has CE procedures for adjusting skew and level.
In that respect, it's not much different from the output of my 7970 read channel. All the hard work has already been done for you. You just need to do the simple stuff--timing and tape motion control, basically. You could probably pull it all off with a Z80.

Report + Quote Reply

Chuck(G)

Friday at 12:49 PM

I recommend that you have a look at this document:
http://bitsavers.org/pdf/hp/tape/MVD-014_introToMagTap_Apr71.pdf
It's really very good at explaining the ins and outs of magnetic tape handling. A document from the good old days of Bill and Dave...

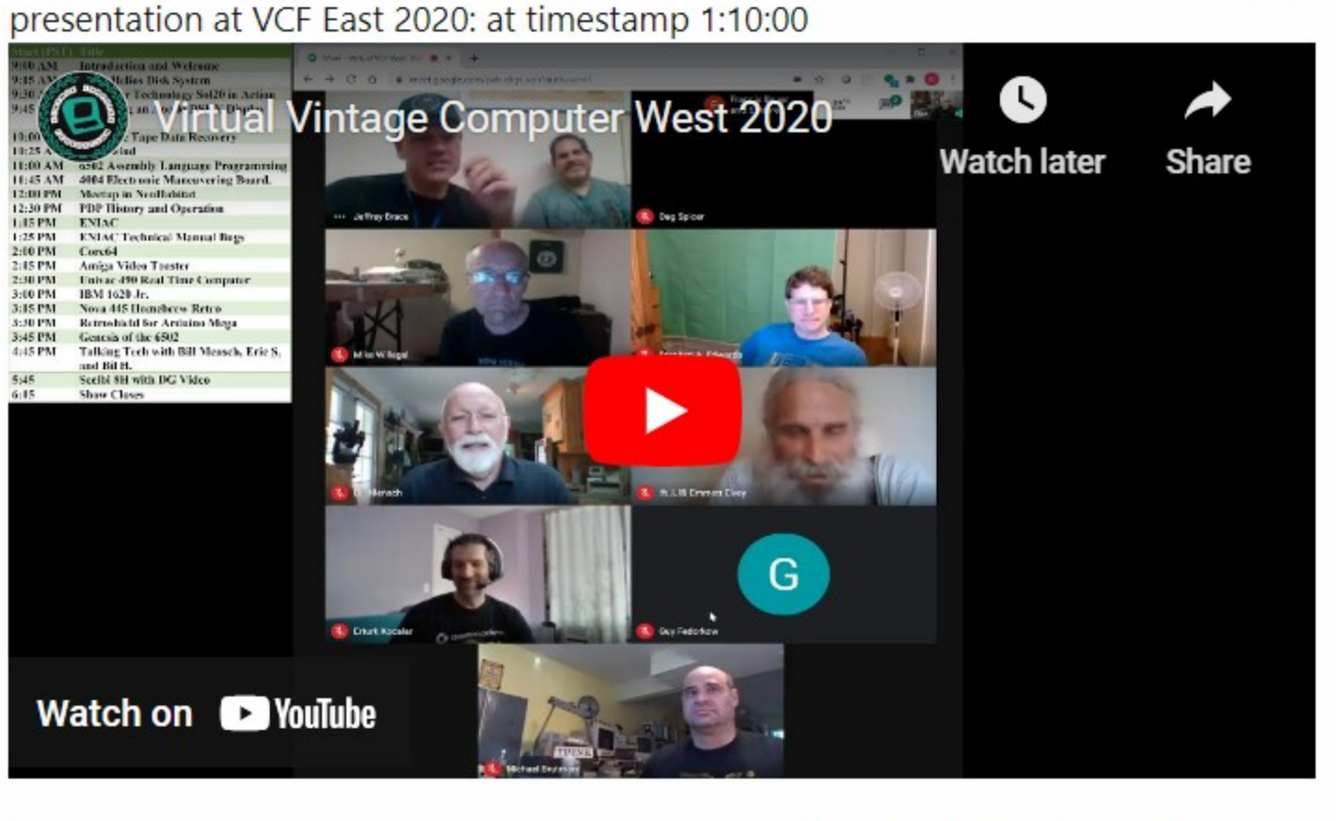
Report + Quote Reply

firebirdta84

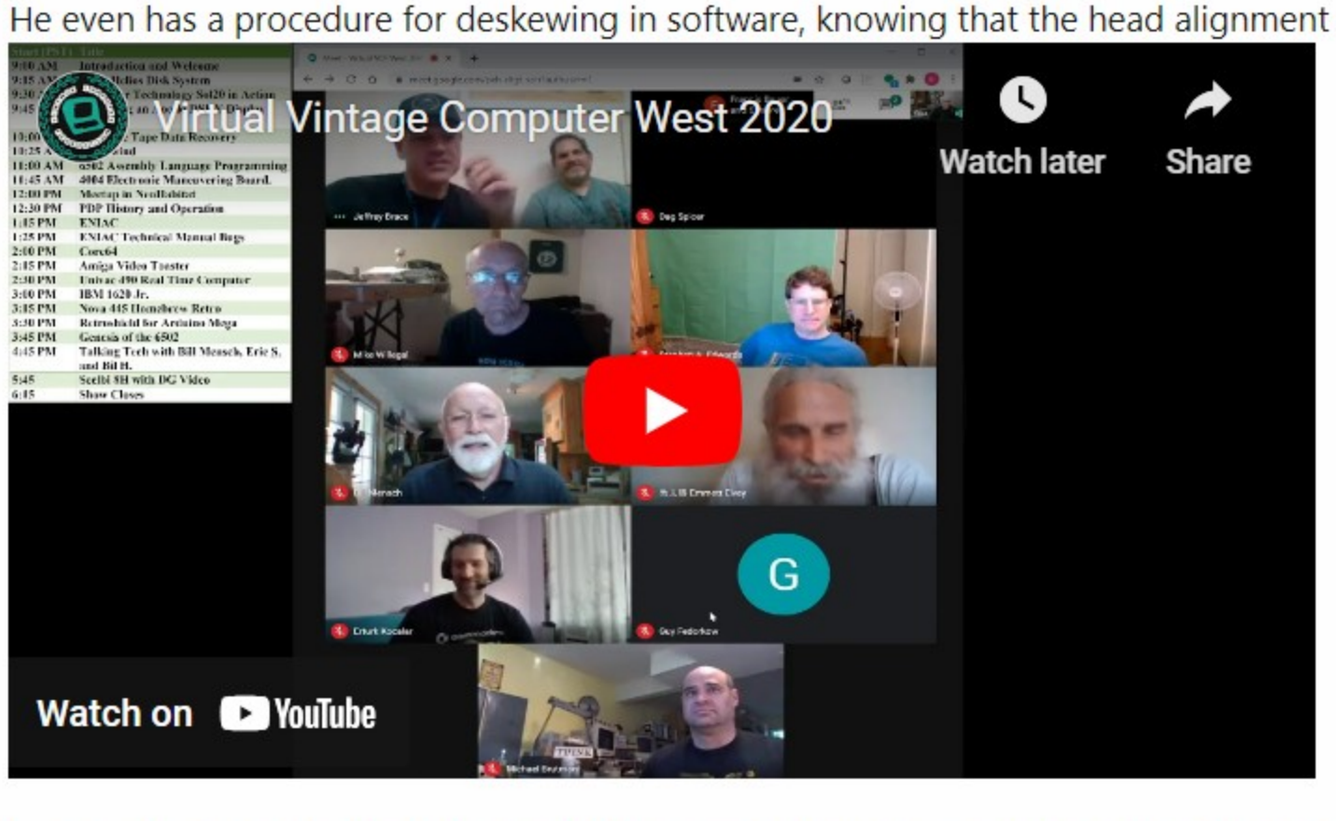
Friday at 1:24 PM

Thanks, Chuck...I appreciate those ideas.

Also, have you heard of Len Shustek's project to do something like what I'm attempting, entirely in software from analog captures? He did a video presentation at VCF East 2020: at timestamp 1:10:00



He even has a procedure for deskewing in software, knowing that the head alignment will always be off (at 1:23:21)



I came into this believing that, since I have successfully conquered decoding QIC tapes of old and unknown encoding format, that I could conquer 9-track tapes too. But I underestimated how much simpler it is to deal with timing encoding on a QIC tape's single track at a time vs 9 simultaneous tracks.

I'm undeterred, though, I've wanted to do data recovery on many 9-track tapes for years...and I'm still determined to get it done. 10 years agon, I started knowing absolutely nothing with my Universal QIC Reader, and was self-taught there, with a little help from Al Kossow, and perhaps from you also.

I'm entirely self-taught, and do not have an engineering background, so my approach is non-standard to say the least, and my learning curve is greater than it would be for those who have accomplished engineering careers, such as yourself.

but I'll get there. I really appreciate the time you're taking to help me through this!

Best,
AJ

Report + Quote Reply

Chuck(G)

Friday at 1:42 PM

Yes, I've seen Len's presentation and it's very interesting. I've toyed with the idea of using the analog head output. Modern MCUs have very fast and inexpensive ADCs, so it wouldn't be an insurmountable task. For me, the issue is how much better would it be than the current method.

I recall that there was a project funded by NASA? some years ago using a custom drive equipped with an IBM 3490 MR head. I don't know whatever became of the equipment.

Practically speaking, however, I haven't had any issues reading tapes that weren't physically damaged (which is a far greater problem in my experience).

--Chuck

Report + Quote Reply

firebirdta84

Friday at 1:50 PM

Thanks, Chuck, good to know. I checked the prices of the STM32F407 MCU hardware you say you use, and it certainly is affordable for me...WAY more affordable than a factory-original SALEAE Pro 16 capture device that Len used starting at $1,500 (I have knock-off Saleaes, which capture digital only using Saleae software, no analog support).

So, it seems that you may have a system that would be worth me replicating, and abandoning the logic-capture method that I'm pursuing now.

But is your work on this open source? Or are you keeping it private?

I wonder how much I'd have to start from scratch on this, if I went that route.

Anyway, thanks again for this conversation...it is VERY helpful!

Best,
AJ

Report + Quote Reply

Chuck(G)

Friday at 2:24 PM

I can furnish the source--there's nothing special about it. The nice part is that there are no external interface chips--the 407 is quite capable of sinking 20 ma of current running open-drain and has 5V tolerant inputs. I have a relay board that I use to switch between 7 and 9 track, but that can be ignored. Power for the 407 comes from the USB 2.0 interface. I can't claim to have had much in the way of problems.

Report + Quote Reply

firebirdta84

Friday at 2:47 PM

Thanks, Chuck, that's very generous of you! I should order a STM32F407 now from Digikey and at least make an attempt at this.

Is this the correct hardware model to use? https://www.digikey.com/en/products/detail/stmicroelectronics/STM32F407G-DISC1/5824404

Report + Quote Reply

Chuck(G)

Friday at 3:21 PM

No, you want the complete development board. Like this, complete with RTC battery:
https://www.aliexpress.us/item/3256804943859296.html

You'll also need the device programmer:
https://www.aliexpress.us/item/3256805308308820.html

There are lots of sellers of both on AliExpress.

Report + Quote Reply

firebirdta84

Friday at 4:02 PM

Thanks, Chuck, I just ordered one of each! This is proving to be quite the journey...and I really appreciate your help with this!

Report + Quote Reply

Chuck(G)

Friday at 5:41 PM

> firebirdta84 said:
> Thanks, Chuck, I just ordered one of each! This is proving to be quite the journey...and I really appreciate your help with this!

I'll be posting a bit here to show how it's hooked up and the toolchain you'll need. I assume that you know your way around Linux? (I haven't touched Windows since XP).

Report + Quote Reply

firebirdta84

Friday at 6:18 PM

> Chuck(G) said:
> I'll be posting a bit here to show how it's hooked up and the toolchain you'll need. I assume that you know your way around Linux? (I haven't touched Windows since XP).

Thanks, Chuck. Yes, I know my way around Linux, by no means an expert, but semi-fluent.

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9-track Mag Tape NRZI

firebirdta84, Chuck(G) · Thursday at 12:07 PM

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Conversation info
Participants: 2
Replies: 32
Last reply date: Yesterday at 3:46 PM
Last reply from: Chuck(G)

Conversation participants
Chuck(G) 25k Member
firebirdta84 Experienced Member
Invite more

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firebirdta84 Experienced Member
Joined: Jun 26, 2013 Messages: 242 Location: Central Iowa

Yesterday at 11:53 AM

Chuck, I've done a speed test on my tape drive, and by my calculations, it is reading my tapes at 18.5 inches per second.

The documentation for this tape drive only vaguely mentions 12.5 ips as a speed.

Is it possible that there is something wrong with the speed regulation, or do you find the speed of 18.5 ips within tolerance for a machine designed to read 800 cpi?

Or I wonder if my speed test or math was faulty... Thought I'd ask you before tinkering, as again, I have no baseline to compare to as of yet.

Thanks!

Report + Quote Reply

Chuck(G) 25k Member
Joined: Jan 11, 2007 Messages: 43,914 Location: Pacific Northwest, USA

Yesterday at 12:12 PM

I wouldn't worry about it. Generally, more speed means a better signal (induced EMF is roughly proportionate to the speed of the medium). The idea behind NRZI is that it's supposed to be self-clocking. I can read 200 bpi 7 track tapes on my drive as well as 556 and 800 with no change in tape speed.

The self-clocking aspect is why all 9 track tapes are odd parity. The idea is that at least one channel changes state during a frame. Old 7 track tapes could be either even or odd parity. The even parity ones created a problem--how do you encode a six-bit frame of zero? Well, you don't, because there's no way to tell one from a blank tape--nothing changes state. IBM had a workaround where they substituted a non-zero character for the all-zero null and simply excluded that character from their character set. Good times.

By the way, this is basically why 800 is pretty much the limit on NRZ recording--pack the frames too much closer and you start to have problems with unresolved tape channel skew.

Report − Quote Reply

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firebirdta84 Experienced Member
Joined: Jun 26, 2013 Messages: 242 Location: Central Iowa

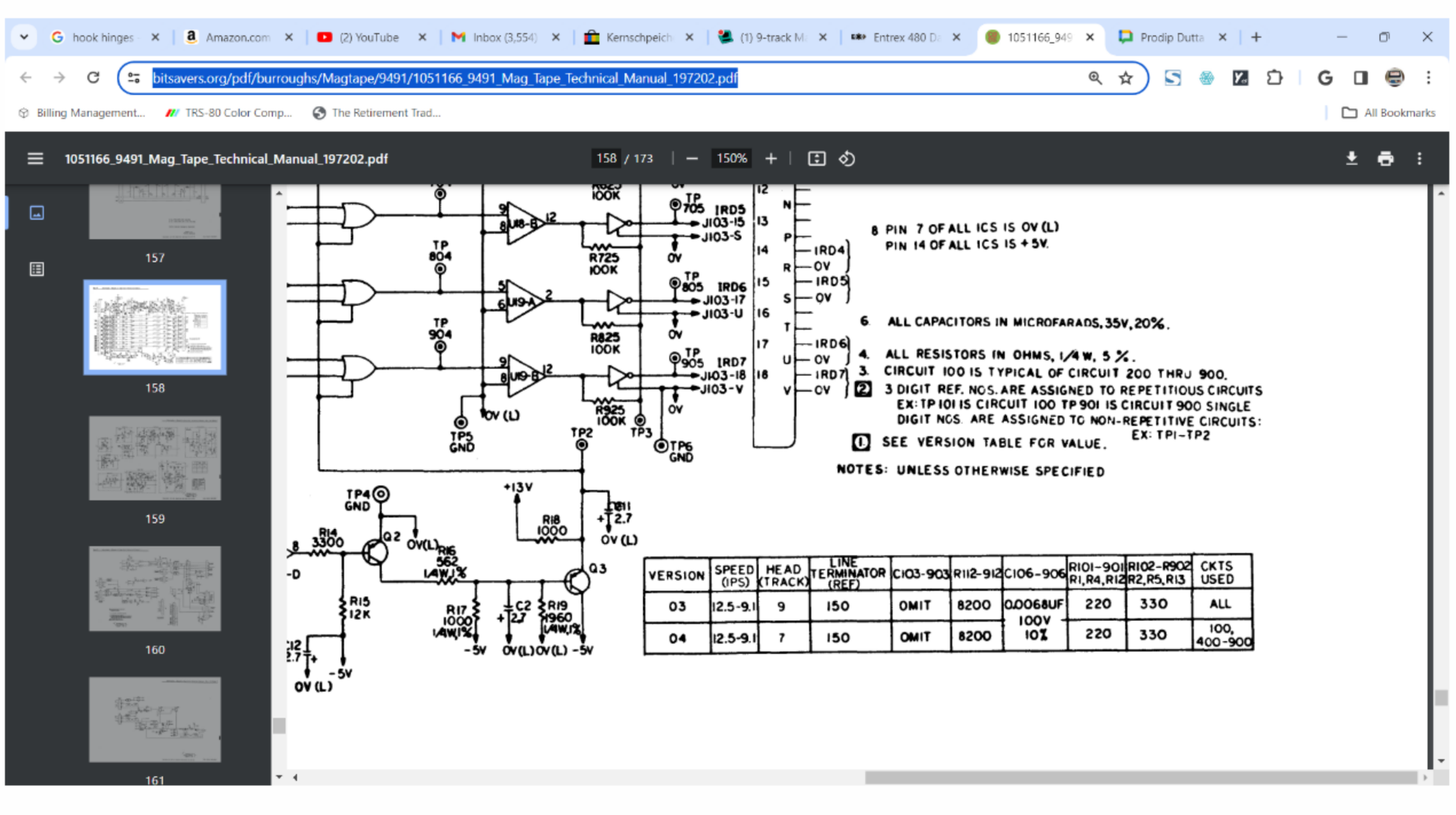
Yesterday at 12:23 PM

I just noticed that the model number of my tape drive is
Pertec T7840-9-18.75
Well, I wonder if the 9 means the number of tracks being read, and if the 18.75 means the speed?

The manual I have is actually branded Burroughs, and is the closest manual that Al K could find to the T7840, so perhaps it's not as good of a technical resource as I was hoping.

The manual Al found is for a Burroughs 9491, which he believed to be the same transport. It sure looks nearly identical in every other way.
https://bitsavers.org/pdf/burroughs/Magtape/9491/1051166_9491_Mag_Tape_Technical_Manual_197202.pdf

The manual only mentions speed of 12.5 in one place, on PDF page 158 in the lower right corner:



It says 12.5-9.1 If this were a range where 9-12 is the speed operating range, why is the smaller number listed after the larger number?

Anyway, perhaps I already have the answer, 18.75 is the correct designed speed?

Best,
AJ

Report + Quote Reply

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firebirdta84 Experienced Member
Joined: Jun 26, 2013 Messages: 242 Location: Central Iowa

Yesterday at 12:28 PM

> Chuck(G) said:
> I wouldn't worry about it. Generally, more speed means a better signal (induced EMF is roughly proportionate to the speed of the medium). The idea behind NRZI is that it's supposed to be self-clocking. I can read 200 bpi 7 track tapes on my drive as well as 556 and 800 with no change in tape speed.

Yes, thank you. I'll see about taking some analog readings, and move on. Perhaps you'll be able to speak to the signals I'm getting while I wait for the "special hardware" to arrive from China.

Are you taking your readings immediately after the read amplifier, before the TTL logic does any interpretations, and derives the "Read Data Pulse"?

On my transport, I think the amplifier and what I'll call the "signal-sorting logic" is all on the same board. So when you say "only the read amplifier board installed", I'm unsure of whether it includes this signal-sorting logic or not.

Report + Quote Reply

Chuck(G) 25k Member
Joined: Jan 11, 2007 Messages: 43,914 Location: Pacific Northwest, USA

Yesterday at 12:35 PM

> firebirdta84 said:
> Are you taking your readings immediately after the read amplifier, before the TTL logic does any interpretations, and derives the "Read Data Pulse"?

No, I let the drive electronics do their thing and derive the strobe signal. Just keep that circuitry well-adjusted. I suppose I could interpolate from the read amplifier output, but I frankly don't see the immediate advantage. It wouldn't be difficult, however, as the amps and the deskewing are on separate boards. Mostly a matter of unplugging the connecting cable and plugging in my own version.

Don't fret about the tape speed--NRZ is extremely tolerant of speed variation. 400% is not atypical.

Report + Quote Reply

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firebirdta84 Experienced Member
Joined: Jun 26, 2013 Messages: 242 Location: Central Iowa

Yesterday at 1:16 PM

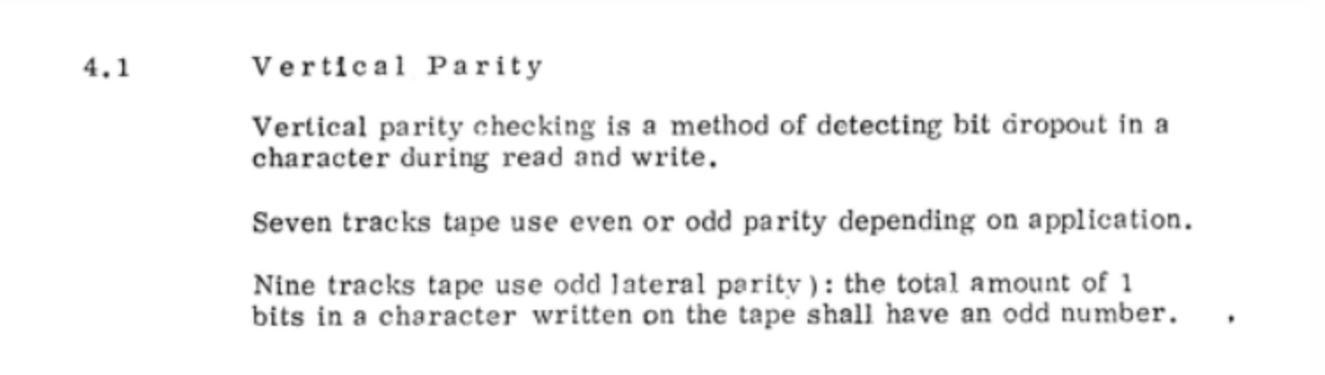
> Chuck(G) said:
> No, I let the drive electronics do their thing and derive the strobe signal. Just keep that circuitry well-adjusted. I suppose I could interpolate from the read amplifier output, but I frankly don't see the immediate advantage.

Well, this is interesting. It sounds like you ARE using the same output signals on your transport that I am for mine, only for me without any ability to align my heads and start with a known baseline skew adjustment. That said, the signals that I'm capturing with my logic analyzer now should tell at least part the story of what's going on with the tape.

Your specialized process is also capturing the post-interpreted TTL signals 5v high 0v low, just like I am...I think. I'm just looking at the signals and scratching my head right now, so maybe while I wait for hardware to arrive from China, I can learn what is right (or wrong) about the signals I'm seeing.

My biggest problem is the Parity, and understanding what all of that means in an 800 bpi. You wrote your own interpretive code on hardware, so that means you must understand it superbly, yes?

The biggest head-scratcher for me is that the Parity signal rarely changes throughout the record. And when trying to apply the parity to the other signals to see if I have an error or not, it seems that 50% of them are wrong. But I wonder if the Parity on this tape just works very differently than I think it does.


4.1 Vertical Parity

Vertical parity checking is a method of detecting bit dropout in a character during read and write.

Seven tracks tape use even or odd parity depending on application.

Nine tracks tape use odd lateral parity): the total amount of 1 bits in a character written on the tape shall have an odd number.

The manual for this transport does say

"Nine tracks tape use odd lateral parity): the total amount of 1 bits in a character written on the tape shall have an odd number"

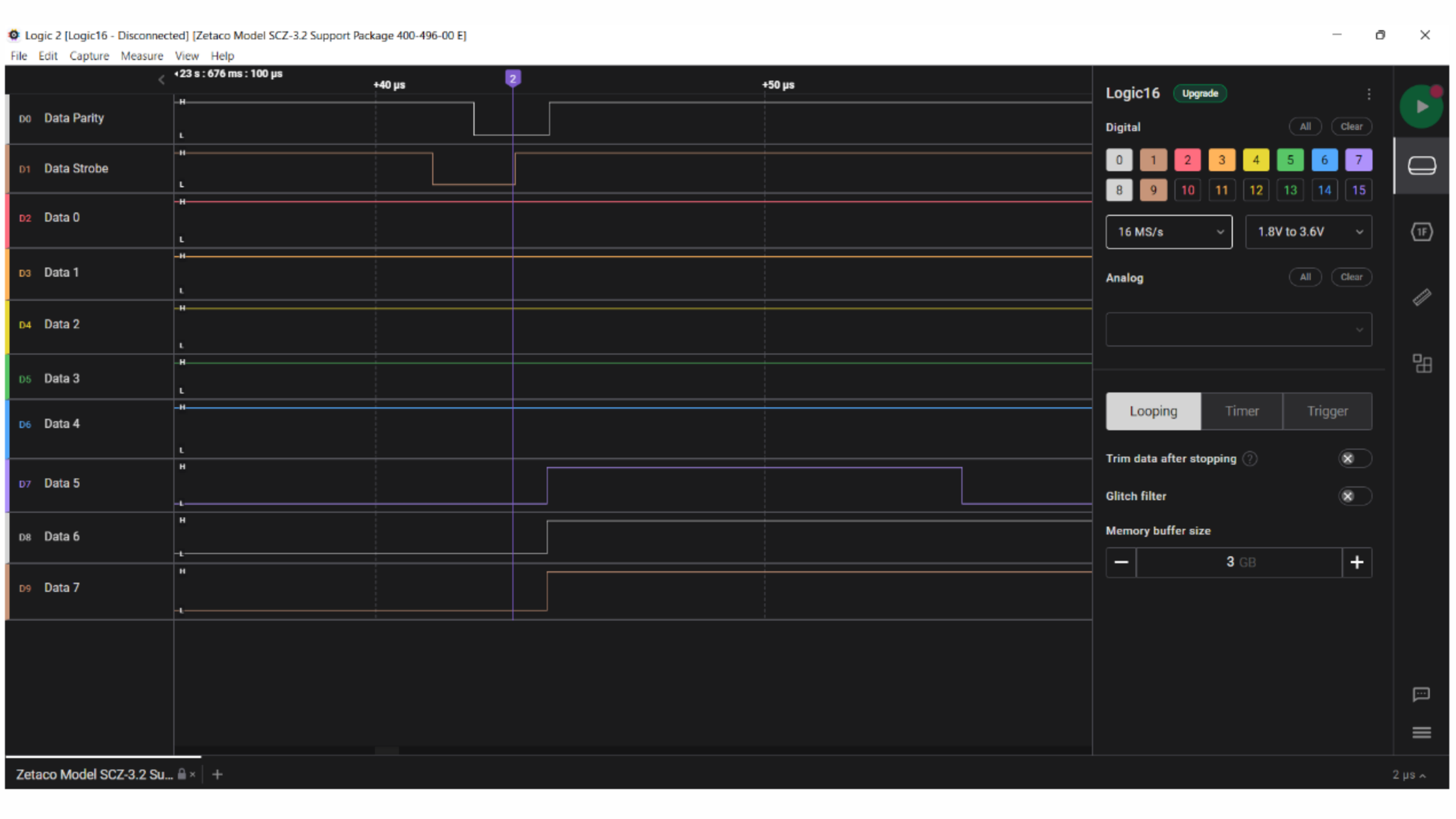
So does this mean that for every read at a data pulse, that you count the number of ones present in the 8 bits read, and if there is an odd number of ones, then the parity bit should be one?

AND, with your transport, are the signals active low or active high? In other words, is a high signal (5v) a one, or a zero?

You must have tackled these with your hardware.

Then, are you taking your readings on the leading edge of the data pulse, or the trailing edge of the data pulse?

Here we see that the Parity bit changes while the Read Data Pulse is low. (assuming active low here).



My manual says somewhere to read on the "trailing edge of the data pulse". So if signals are active low, this byte would be

00000111 P1

Odd number of ones here, so parity is correct...or is it? This is NRZI, right? So doesn't that mean that I have to calculate the bit change from the previous read, and not look at the current read as a valid value without comparing the change in every bit to the previous read?

These are probably all good things for me to understand fundamentally, and I appreciate you bearing with me as I ask these nagging questions...thanks for your patient help here!

Best,
AJ

Report + Quote Reply

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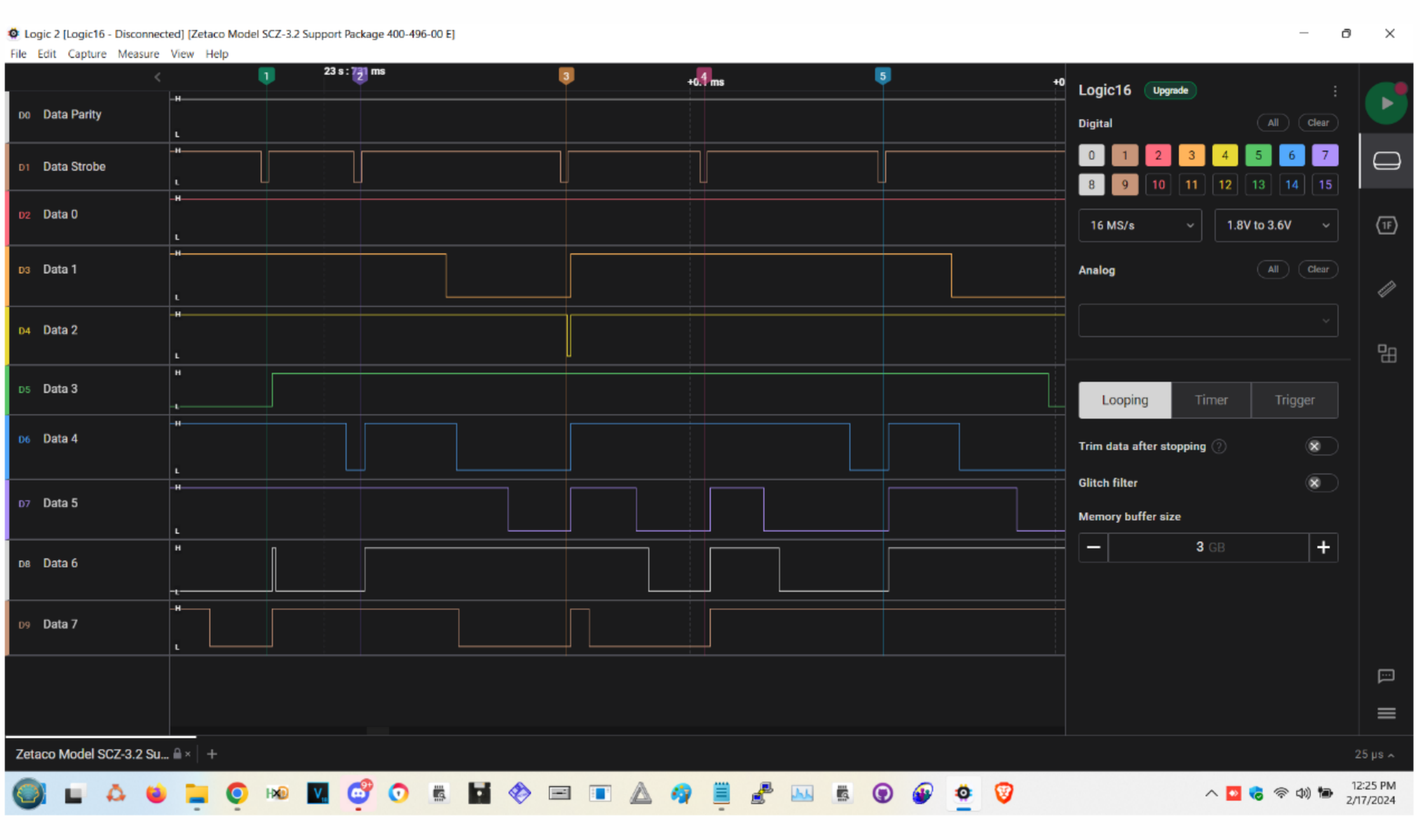
firebirdta84 Experienced Member
Joined: Jun 26, 2013 Messages: 242 Location: Central Iowa

Yesterday at 1:27 PM

In this sample, we have plenty of signal changes across 5 samples, yet the Parity bit never changes at all, which I find suspect.



Just reading the bits at each Data Strobe signal, I visually read:

00010011P0
00001011P0
01001101P0
00000111P0
00001110P0

Now, if I were to compare the parity value to each sample, it's wrong half the time.
Parity should be
Odd
Odd
Even
Odd
Odd

But if this is NRZI, I guess I have to look at the changes from the previous sample. Let me try it that way next.

Report + Quote Reply

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firebirdta84 Experienced Member
Joined: Jun 26, 2013 Messages: 242 Location: Central Iowa

Yesterday at 1:32 PM

00010011P0
00001011P0
==========
00011000P0

00001011P0
01001101P0
==========
01000110P0

01001101P0
00000111P0
==========
01001010P0

00000111P0
00001110P0
==========
00001001P0

And even here, the parity would be wrong. Across these 4 comparative samples, the Parity should be:

Even
Odd
Odd
Even

Yet it is Zero in all four samples.

Chuck, I know I'm being very verbose about this, but I really want to understand. Am I at least interpreting these signals correctly according to NRZI, or am I just way off base here?

Thanks again for all of your patient help!

Best always,
AJ

Report + Quote Reply

Chuck(G) 25k Member
Joined: Jan 11, 2007 Messages: 43,914 Location: Pacific Northwest, USA

Yesterday at 1:33 PM

The signals are complemented. See the attached document; in particular, see PDF page 50. Also note the maintenance on level and skew adjustment.

And yes, your parity channel seems wrong. Time to trace the signal back to the head, perhaps? On my unit, I can simply swap the PCB for any other channel to the suspicious one.

Attachments

07970-90383_7970B_7970C_Op...

Report + Quote Reply

Chuck(G) 25k Member
Joined: Jan 11, 2007 Messages: 43,914 Location: Pacific Northwest, USA

Yesterday at 2:47 PM

For reference, here's the core of my reading routine. Note that the data signals are low-true. What follows this is a bunch of code checking parity, etc. before writing to a file.

Code:
```
//  TapeRead - Read a block into a buffer.
//  -------------------------------------
//
//  On entry,
//    Buf = pointer to word (16 bit) buffer
//    Length = size of buffer in words
//    Direction = 0 for forward, nonzero for reverse
//    Track9 = nonzero for 7 track, 0 for 9 track (global)
//
//  Returns either the number of bytes read, or
//     0 - tape is blank
//    -1 - tape is offline
//    -2 - buffer overrun
//
//  If "Direction" is nonzero, the read will be in a reverse direction--unless
//  the tape is at BOT.  If so, 0 bytes will be returned.  In any case, the
//  data returned will be reversed in the buffer (i.e. same as read forward)
//

int TapeRead( uint16_t *Buf, int Length, int Direction)
{

  bool
    inGap;        // if we're in the gap

  uint32_t
```

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firebirdta84 Experienced Member
Joined: Jun 26, 2013 Messages: 242 Location: Central Iowa

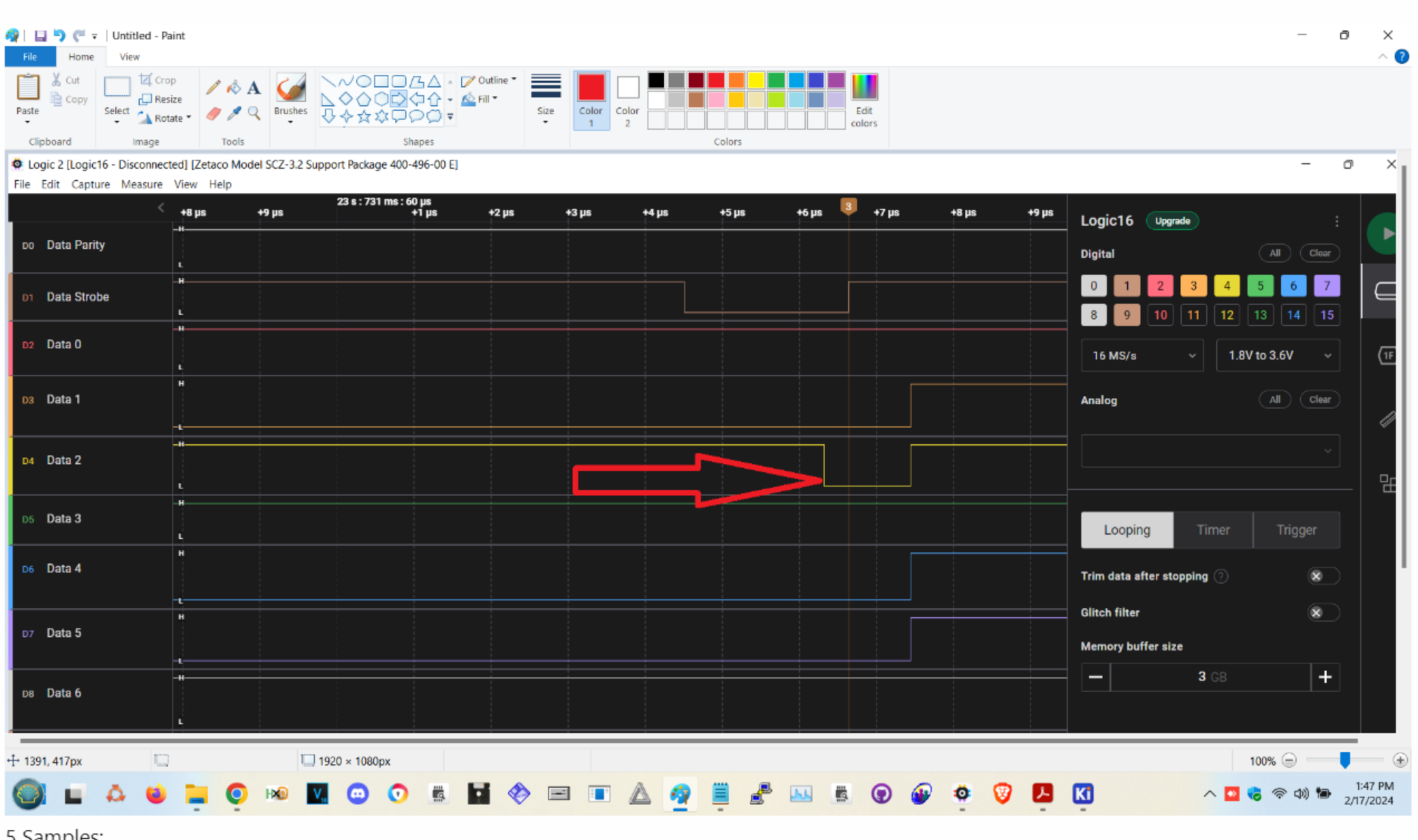
Yesterday at 2:51 PM

Thanks for this, Chuck, I'm studying this document. All this conversation is very helpful, Thank You!

Yes, I will be finding a way to take the parity reading right off the head, and seeing if the signals match. Capturing analog is the hardest part for me as of yet. I don't think I can capture signal durations with my scope yet.

But, meanwhile:

OK, now I looked again at my signals, and I found an instance where the 3rd sample, one of them changed after the leading edge, but before the trailing edge of the Read Data Pulse, which actually makes the parity work...I think. I had to zoom way in to see it. Check this out:



5 Samples:
00010011P0
00001011P0
01101101P0
00000111P0
00001110P0

NRZI comparison:
(is this the same as saying "The signals are complemented"?)

00010011P0
00001011P0
==========
00011000P0

00001011P0
01101101P0
==========
01100110P0

01101101P0
00000111P0
==========
01101010P0

00000111P0
00001110P0
==========
00001001P0

All parity should be
Even
Even
Even
Even,

so it looks like the fact that there is no change in Parity across these 5 samples may now actually be correct. If all above else is true.

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firebirdta84 Experienced Member
Joined: Jun 26, 2013 Messages: 242 Location: Central Iowa

Yesterday at 2:54 PM

And thank you for the code snippet...looks like C++, which *should* be easy enough for me to understand. I'll give it my best attention.

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Chuck(G) 25k Member
Joined: Jan 11, 2007 Messages: 43,914 Location: Pacific Northwest, USA

Yesterday at 3:46 PM

I do straight C90, not C++. I find that overuse of he C++ features can lead to obfuscation.

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