

Olivetti TE300

Purchased 8/6/2018, picked up 8/11/2018

"telescrivente Olivetti TE300 completa con rulli carta originali"

Serial number on teleprinter:

olivetti Te 318
no 539648

Serial number on tape punch (reperforator):

olivetti Pe 308
no 409556

Serial number of tape reader

olivetti Se 308
no 409876

Serial number on communications interface:

(Telegraphic power supply unit)

olivetti Telescriventi
lvrea
No 426720

"Rack" or "stand"

olivetti Telescriventi
lvrea
No 411942

Part numbers (Each of these labels is a white paper strip):

Keyboard is marked with label "863"

Functions unit is marked with label "F 813" (interesting... transposed 318)

Print head is labeled "832"

Current issues:

Shift key is sticking. Why?
Carriage return is slow. Doesn't always return to first position.
Reception errors (early May, 2020)
Hour counter gear disintegrated
Replacement capacitor doesn't fit

Key future needs:

X Parallelizer - rubber gasket on transfer reset plate
*** Horizontal return - tweak (but ok with modified n_tty.c function)
*** 3D printed print shaft coupler to print head
*** 3D printed timer gear
X Sticky shift function on keyboard - seems to have developed over time
X Draw schematic of electronic interface board
X Sticky keys on keyboard - how to improve? What is happening?
X Print carriage (position?) (done - sort of)
X Reader operation / testing (done)
? Rebalance electromagnet
X Measure serial output characteristics (done)
*** Understand timing between bytes received and print
*** Parallelizer - e-clip between levers?

Olivetti Operation Notes

RS-232 reminder - the Olivetti operates as DTE equipment
2 is transmit data from Olivetti (DTE) to computer (DCE)
3 is receive data from computer (DCE) to Olivetti (DTE)
4 is RTS from Olivetti (DTE) to computer (DCE)
5 is CTS from computer (DCE) to Olivetti (DTE)

66 rows / page, currently set for 79 columns
10 characters / inch horizontal
6 rows / inch vertical spacing

Punch on is DC2 - 0x12

Punch off is DC4 - 0x14

(What starts the reader?)

xcase characters:

tilde	~ = \^
pipe	= \!
l curl	{ = \{
r curl	} = \}
l quote	` = \'

underscore _ = back arrow
carat ^ = up arrow

stty lcase is same as xcase iuclc olcuc

wifi232 cheat sheet:

+++	enter command mode
ATH	disconnect
ATO	reconnect session

2/14/2022

Running Olivetti last night to copy and punch some hearts patterns. I don't get good reproductions of the hearts patterns when running at full speed. I'm not sure whether this is a reader problem or a punch problem. The main issue seems to be dropped bits in the "FF" pattern. Reading and punching manually (e.g. advancing the tape manually for each byte) is never an issue.

So, need more tests.

Interestingly, the ASR33 is much more robust.

Keyboard is a little "sticky".

I don't have

1/9/2022

Replaced the ribbon. Very nice.

11/3/2021

Had the teleprinter running for the first time in two months. Ran fine. Using wifi-232. BASH complains on login about something. I think I needed to comment out the stty command below again. Not sure if there is a way to do this automagically.

8/28/2021

Can't remember how to get login on ttyAMA0 from retrolab.

Seeing text come through. It's not dealing with the parity bit correctly. Why?

The problem was that I had commented out the following line in "setstty" to work with the wifi232 modem.

```
#stty cstopb parenb -parodd cs7
```

8/23/2021

The teleprinter has been running well. The keyboard is starting to get a little slow. I should lubricate the main print shaft.

I've seen relatively few errors. Last night punching the hearts book from the reader in local mode, bit 5 and 6 didn't always punch in a 0xFF. (The resulting punch number is 0xDF.) Punching slowly by advancing the reader manually worked fine.

I should test printing binary from the console. This may not work over the wifi-232.

The NULL key was very sticky. It locked the keyboard before freeing up.

4/27/2021

Last week (Wednesday) I ran the teleprinter for an hour on Twitter. The machine is running well.

Fusion 360 has gear templates. One remaining issue is to design the gear replacement for

4/12/2021

Brief run of the teleprinter over the weekend. Keyboard is a little slow at first. Printing has been working fine.

I should work on the gear replacement.

What else needs to be repaired?

3/6/2021

Clearly, I don't quite understand how the sessions are managed when one telnets in versus when one uses getty.

3/4/2021

Would be very interesting to

3/3/2021

A few things:

I've been printing a lot lately. Some Art1 prints and general teleprinting. The tty is holding up fairly well.

I've been using the wifi232 to login to retrolab. The "setstty" command complains about the following line:

```
stty cstopb parenb -parodd cs7
```

I think this command works when I'm logging in via getty on ttyAMA0, but not through telnet on the wifi232. Why?

Does this mean that I can't go from 7E2 to 8N2 without changing the modem settings?

Need to test...

Invoking shell from java, it complains "stty: standard input: Invalid argument"

<https://stackoverflow.com/questions/2536531/invoking-shell-from-java-it-complains-stty-standard-input-invalid-argument>

```
stty blah blah blah 2>/dev/null
```

1/5/2021

Working on rendering Olivetti printouts virtually. I've written two programs:

```
asciiv2.py  
makeimage.py
```

asciiv2.py generates an ascii text from an image file. The aspect ratio should be 4:3 in portrait.

makeimage.py constructs an image of the printed output using the Olivetti typeface. It can handle overstrikes now.

A few recent commands for making overstrike text files:

Generate two text files with different symbols

Merge the two line-by-line. For example:

```
paste -d "\n" sts129002195.txt sts129002195.txt > sts129002195over.txt
```

Strip out every other new line and replace with a carriage return:
sed 'N;s/\n/r/' sts129002195over.txt > sts129002195over2.txt

or

```
sed -i 'N;s/\n/r/' file.txt
```

40 column study - README.TXT

How to make this study:

40 column outputs are generated by calcoverstrike.py:

```
40cold2l1.txt 40cold2l2.txt
```

They are a pair of overstrike files, running dark to light.

Generate the opposite order with "tac" (reverse of "cat"):

```
tac 40cold2l1.txt > 40coll2d1.txt  
tac 40cold2l2.txt > 40coll2d2.txt
```

Next, paste into 80 columns:

```
paste -d "" 40cold2l1.txt 40coll2d1.txt > 80col1.txt  
paste -d "" 40cold2l2.txt 40coll2d2.txt > 80col2.txt
```

Then merge line-by-line the two files:

```
paste -d "\n" 80col1.txt 80col2.txt > 80col.txt
```

and insert the CR's every other line:

```
sed -i 'N;s/\n/r/' 80col.txt
```

12/22/2020

The teleprinter has been running fairly well. I've been printing ascii images and punching tape. I have infrequent punching errors in the tape. One bit was off in the arecibo message I punched a little while back.

I'm working on ascii images and the counter spur gear now.

Common metric modules: 0.5, 0.75, 1, 1.25, 1.5, 1.75, 2, 2.5, 2.75, 3, 3.25, 3.5, 3.75, 4, 4.5, 5

Typeface:

Most similar to Lettera 32, but the numbers are different (they have finer elements)
sans serif elite typeface?

10/29/2020

Last week I ended up fixing the Olivetti. I thought I documented it here. I reassembled the EM onto the case and the poor performance holding at the stop bit disappeared. There are still some sticking issues with the bits. Yesterday, I observed that:

'WHICH

printed as

'GHICH

This represents a sticky bit 5 / 6. In moving from ' to W, bit 7-5 go from 010 to 101, but end up at 100.

' = 0010 0111

W = 0101 0111
G = 0100 0111

I think this is indicative of friction issues in the parallelizer, either at the comb or in the lever section. My remedy will possibly be to tear down the parallelizer to shave off some width on the

10/18/2020

Whoa, what a day...

I set off trying to fix the "abusive parallelizer cycles". I ended up getting the machine stuck in a pretty broken state, but then recovered to something close the point I started at. Perhaps a little worse off...

Basically, I've been trying to make parallelizer adjustments. The key issue I'm seeing is triggering additional parallelizer cycles instead of holding. I adjusted the following today, observing a variety of issues / problems:

- clearing cross-bar height
- lever position pushing the transfer unit cage / copy frame up and down
- crank "M" in 288 that is held by a spring. No idea how far this is supposed to be stretched, or what its function is.
- axial position of the entry rockers. (I had moved these pretty far off the selection levers.)
- position of the EM (things feel pretty sensitive to the EM position... will have to work on this...)
- parallelizer start crank (still doesn't feel properly adjusted.)

I think the friction on the entry rocker guide combs is too high. I would like to adjust this, but I've had difficulty accessing the screws at the back of the parallelizer.

Currently, abusive cycles occur when the parity bit is 0. This means that the ...
Maybe eccentric... ?

I should check cable attachments, etc...

10/17/2020

I had the Olivetti on the bench today with the bottom plate off. I oiled many dry felt washers.

I had the EM off and reinstalled the cross-bar with a rubber gasket glued on. The gasket is a cut piece of bicycle inner tube. There doesn't seem to be a whole lot of difference in performance or noise. I had to move the cross-bar up to accommodate the rubber. It can sit too low and move the copy frame out of adjustment. When reassembling, I loosened the friction by moving out the nut out.

I think I see how to remove the functions unit, but I do not feel up to digging into a huge project like that (especially after many weeks of the power unit). Of course, if I had it out, I could 3D print other functions...

The microswitch on the functions unit is not connected to a function. It is closed when positioned down and open when positioned up. When down, it would suppress the print and carriage advance.

After reassembling, I had errors in bit 7. I tightened up the friction just a small amount. However, I think the spacer on the far end of bit 8 was shifted inwards. I moved it out and it seems to have improved performance. It's interesting that the errors I'm seeing are less bit 4 and more bit 7 now. I'll keep testing.

I'm still getting instances of "abusive parallelizer" cycles where the parallelizer continues instead of stopping and shifts one bit by picking up the start bit (always a 0). With the magnet reinstalled, I turned the balancing adjustment knob quite a bit counter-clockwise (about 100 degrees from where it was) and I have the timer knob set down around 20. I adjusted the position of the parallelizer release lever. I may need to adjust further. I will certainly test it more.

10/16/2020

I had the teleprinter running last night with no errors. I lubricated many felt washers with Nye Oil. I didn't realize the purpose of the felt washers is to hold oil for lubrication.

I installed a small rubber foot on the print head damper, but the carriage return wouldn't latch. I removed the rubber.

I would still like to install a replacement rubber gasket on the parallelizer clearing cross-bar.

I should write up the telegraphic power supply unit reverse engineering for the website.

—

Removed the teleprinter from the stand.

Removed the EM and clearing cross-bar.

Four leaf springs hold the selector levers for bits 1-4. The 4th was fairly loose. I bent the spring to tighten it. Perhaps this will improve bit 4 reception errors.

The levers I repaired look good. The friction looks fine. I don't think I'll take it further apart.

10/14/2020

A few observations:

Slow motion video of the parallelizer start mechanics shows a pretty even arrival of bytes, as one would expect, and that the parallelizer follows the byte stream. The function of the first and second entry bails is to buffer the arriving bytes with the cycle of the teleprinter. My sense is that the teleprinter is running slightly faster and sampling the bars entry at a higher frequency than the 110 baud operation. This would create an aliasing effect that might explain the short pauses in the printing every 5-8 characters.

I've noted that one of the cams seems to be set for a different baud operation than I would have expected. 110 baud operation in 8 bits (11 bits per byte) should correspond to 75 baud operation in 5-bit mode.

Take a look at baud settings noted earlier in manual. What are they set for?

There are a number of timing adjustments in the manual. I should check these.

When space (+) rec'd via RS-232, I expect about 63uA to RD1 base. I think R26 acts as a feedback loop to turn on the transistor and draw current away from RD1 base, shutting off the current to the EM.

I don't understand the purpose of D7. Is it correct?

10/12/2020

Cleaned up the PSU schematic some more.

Pulled lights from switch assembly and checked type. Think these are T5.5x30mm 24V 50mA bulbs. I ordered some from eBay. They may be different than 1A2 lamps used in US telephone systems.

Confirmed that the wiring of marking, spacing, and center (neutral) from the TTY is switched at the frame (rack or stand). The black and red wires are switched. This is the center and marking lines. Yellow is spacing. The manual incorrectly shows R as making contact and L as open. The diagram on the filter indicates marking is closed and space is open. The circuit makes sense. Marking is held at -14V, while spacing is held at +12V. The center (neutral) is normally negative (-13V) then switches as the serializer passes through the coding bits.

I understand the EM (electromagnet) circuit. The EM consists of two coils wired in parallel. Each of the coils is 210 +/- 10% ohms and designed for 40-60mA at 60V. The total resistance is about $1/R = 2/210$, $R = 105$ ohms (can I measure between pins?). When conducting, the collector of Q_RAi (NPN type 2N1893) is 0.8V and the emitter goes to ground. There is a 1kohm resistor (high W) in series with the EM. This gives about 53mA across the EM and the resistor. The power dissipated by the resistor is about 2.8W. No wonder it gets hot.

Q_RAi is controlled by the collector of RA1. RA1 V_b is normally held at 0V when Rx or the local line is negative. This creates a positive V_b at Q_RAi necessary to conduct to the EM. When a positive signal is received on Rx, the base of RA1 becomes positive and the transistor should conduct. This would drive the voltage of RAi to zero, stopping the current flowing to the EM.

The 2N1893 is documented in the SGS handbook. It is a high voltage (100V VCER) and high continuous collector current (500mA). I estimated about 4mA at the base junction when it operates and 53mA iCE. The transistor

The 12 and 20V supplies appear to be regulated. The -14V and 60V are unregulated outputs from bridge rectifiers 2 and 1, respectively.

NPN transistor

1. $V_C > V_E$ collector more positive than emitter
2. BE and BC both behave like diodes
BE is conducting (normally) and should have a V_{BE} of about 0.6V
BC is reverse biased
3. There are maximum values of I_C , I_B , and V_{CE}
4. When 1-3 hold, $I_C = \beta I_B$

A collector will go as close to ground as possible, typically 0.05-0.2V.

—

OYSTTYER:

set ASCII-63 tweets with

```
/! stty -iuclc
```

but then cannot use commands...

as noted earlier, need to set commands

I lubricated the controls for the shift mechanism to the right of the keyboard. With lubrication and a significant number of shift keypresses, the shift function seems to be operating much better now.

I printed quite a few tweets (accidentally) and I printed a weather report. Only two errors occurred. One line a LF was inserted. In the weather report, an "E" was substituted by a "J". E is 0x45, J is 0x4A, so this looks like a shift (0101 to 1010) that indicates that the start bit was caught. However, no further characters were corrupted.

I measured the timing gear again. I would like to print a new gear.

The gear is 8mm in diameter.

I have to measure the inner hole diameter! But I estimated it earlier.

There are 14 teeth on the left side of the gear.

The whole gear is about 5mm wide

I think the gear ratio is 2:3, so that there are 21 teeth on the right side.

Oh right... I want to make an enclosure for the motor capacitor, too...

10/10/2020

How does the sending / transmitting work in the teleprinter? We have spacing, marking, and common return or neutral

Center (neutral) is tied to -14V

Marking is tied to some + voltage

Spacing connects to the Tx pin

According to page 2.09 in "Theory", s.c. power for transmission contacts is set up as:

marking - supplied with power

center contact - this is the line

spacing - not supplied with power

The d.c. contacts are:

marking - positive voltage

center - line

spacing - negative voltage

From the PSU schematic, it would appear that transmission is set up for d.c (while the EM is set up for s.c)

I think the TTY holds the center and marking in contact. This would seem to connect a -14V to a (+) voltage with no connection to Tx?

Tx also goes to BRK switch, but is normally in the off position

There must be another connection to Tx that I'm missing...

Thinking that

Suspect that I've misidentified the poles of the relays. May need to switch 2,3 and 7,6

Power light is out. I should pull it to check type

1W8995 is still a mystery

2N708 may be a substitute, or 2N914

From: <http://www.wylie.org.uk/technology/semics/Italy/Italy.htm>

Google Books contains "A History of the World Semiconductor Industry" by P.R.Morris. The pages on early Italian efforts state that the history of the Italian industry "is largely that of one company", the SGS (Società Generale Semiconduttori) founded in 1957. In 1960 SGS developed a strategic relationship with Fairchild creating Fairchild-SGS. This lasted until 1968, after which they ran into financial difficulties. Fairchild sold its interest to Olivetti and the company reverted to being just SGS.

10/9/2020

Corrected schematic last night. Had a mistake between the -17V and ground.

Verified that my VAC measurement was incorrect. Must have had some sort of loose connection on the multimeter. Made measurements of voltages throughout the regulator circuit.

Will go back and measure voltages around the Tx and Rx functions.

Curious about voltages on the current loop and connections there. Need to double check.

10/3/2020

I've spent the past few weeks (a few hours here and there) tracing out the circuits of the power supply unit. So far, I've completed the circuit schematic for the main board. The board at the bottom of the power supply unit is difficult to remove, and I'm unsure that I want to take the entire thing apart. However, I could beep out the edge connectors to the switches.

The Olivetti operates in "s.c." or "single current" mode — a standard current loop.

9/26/2020

Continuing to work on schematic. Very difficult and confusing!

Questions:

What controls the relays?

What connects to the slots?

Where are the switches, lamps connected?

Why no connect to signal or frame ground on RS-232? Any other ground connects?

Why is the RS-232 Tx also connected to J1 pin 25?

There should be diodes across the relay inductors

Check:

JP S is really connected to everything on schematic (beep out)

D10 and D9 - may have reversed in schematic?

Beep out and check D3 and D4

9/25/2020

RS-232 Tx must be a -/+ 12 V signal (as measured) based on the TTY output MARKING and SPACING

9/18/2020

Attempting to KiCad the PU board

Card edge (J1) pins 18 and 21 should be connected? — YES and correct on schematic (jumper c.s.)

Double check C6+ connects to C3- — it does not and it is correct on the schematic

The current loop is likely 20mA?

We need:

A current loop source (voltage?)

Voltages for RS-232 (-12, +12V)

Maybe c.s. is current source?

9/17/2020

Pulled the power board. Something sounds loose. It is the relays. I can pull the lids off of them.

Components on power unit board (BOM):

Left of relays:

R1	1k	High W?, Writing is ambiguous in image
R3	470, 5%	
R4	150, 5%	
R5	680, 5%	?
R6	68k, 5%	BGO
R7	68k, 5%	BGO
R8	370, 5%	OVB
R9	370, 5%	OVB
R10	3.3k, 5%	1/4W
R11	3.3k, 5%	1/4W
R13	3.3k, 5%	1/4W
R14	3.3k, 5%	1/4W
R15	3.3k, 5%	1/4W Brown spot on right. Check***
R16	3.3k, 5%	1/4W
R17	3.3k, 5%	1/4W
R18	3.3k, 5%	1/4W
R25	2.2k, 5%	Can't distinguish bands - RRRG? measured 800ohm in circuit
R26	3.3k, 5%	
R27	3.3k, 5%	
R28	470, 5%	
R31 left	13k, 5%	
R32 left	370, 5%	

Right of relays:

R31 right	10, 5%	1/4W
Under R31	10, 5%	1/4W
R32 right	37k, 5%	
R33	33k, 5%	
R34	56k, 3%	GBOO
R35	33k, 5%	
R36	510	labeled "MS 3"
R37	10k, 2%	
R38	330	High W?
R39	510	High W?

Capacitors

C1	1200uF, 50V	ICAR
C2	1000uF, 25V	Ducati
C3	100uF, 25V	Ducati
C4	100uF, 25V	Ducati
C5	1000uF, 25V	Ducati
C6?	200uF, 150V	ICAR, unlabeled on silkscreen

Diodes (7)

D1	1X8055 / 17201	
D2	1X8055 / 17201	
D3	NCI 10K ??? 7151	metal can, marking on bottom
D4	1X8055 / 17201	
D9	R1004	Heavily tarnished / corroded leads
D10	R1004	Heavily tarnished leads
Z1	(1N)754 / AO / Silec Zener,	parens denote assumed marking

Transistors (10)

RD^L	SGS 2N1893 87126, Bipolar NPN TO-5	
	General purpose high voltage - page 291 in SGS small semiconductor	
RD1	IW8995/A SGS 7005, TO-18, NPN	

RDA IW8995/A SGS 87135 different print than IT, TO-18, NPN
IT IW8995/A SGS 7005, TO-18, NPN
SL SGS 1W9680 17148SX, TO-39 - NPN type "su grosso dissipatore on a large heatsink"
CD1 IW8995/A SGS 7112, TO-18, NPN
RG IW8995/A SGS 7112, TO-18, NPN
1 ASY80 / 7031, TO-39, PNP
2 ASY80 / 7031, TO-39, PNP
no mark ASZ18 / 1K51, TO-3 germanium low power switching transistor, PNP type

Rectifiers Type W04
Top Single phase bridge rectifier, 280V max RMS voltage, 1.5A
Middle"
Bottom "

Fuses
F1 ?
F2 200mA
F3 ?

Four terminal components must be bridge rectifiers?

Power supply unit:
Must create current loop signals from RS-232
Be able to switch between local and line (redirect tty output to input)

Relays - 14 terminal. 500 ohm refers to resistance of coil
ITT Swiss made A2612
There are two pins on the bottom of each relay. No doubt that these are the coil terminals.
Each of the four segments are probably single-pole, double-throw. Which terminal is the pole?
I assumed the top terminal in each column is the pole. But it may be the middle row of terminals?

TO-18: The tab is located 45° from pin 1, which is typically the emitter.

SGS data books:
<https://www.rsp-italy.it/Electronics/Databooks/SGS/index.htm>
<https://www.web-bcs.com/transistor/tc.php?lan=en>

9/5/2020

Last week the Olivetti started acting up again with "abusive parallelizer cycles" like a few months ago (May?) No amount of changing the magnet and range finder / timer knob got it working. I plan to take it apart to have a look at some point. I may also tear down the parallelizer to see how it is faring. It would be good to work further on the clock / time gear.

If open up:
- parallelizer
- clock mechanism
- test lamps
- interface

Watching TubetimeUS deconstruct a board. He has all the parts off and takes images. Manipulates the images to overlay front and back. He kicads all of the parts. I am thinking this would be an interesting method to use on the interface electronics.

8/26/2020

I switched the MAX3232 breakout to the second receiver line and it started working again. Part of the problem could be a tolerance for the higher voltage, especially when a long "break" is sent from the teleprinter. Maybe I should add a voltage divider to the input?

The Unix V7 doesn't seem to be sending CR and LF nulls. It may instead issue a timed pause. I might add a teensy into the path to manually add another CR character and nulls for timing as a fix / hack to the Olivetti. The teensy would listen for CR's and NL's and add the appropriate characters. It would be disabled for binary transmission by a switch.

I might add a shift register to see the bytes coming through...

8/23/2020

Voltage dropped on the Olivetti pin 2 transmit... The signal is coming through, but the peak-to-peak is only 2.4V (-1.2 to 1.2V). Looks like it dropped by factor of 10?

No... ok on Olivetti output. The RS-232 input to the pi is borken...

I think using the "BRK" key is stressful on the MAX232s. I burned out the link sprite, and now I think I borked the Sparkfun breakout. Durn it.

I verified that the RS-232 output is normal from the Olivetti. The MAX232 board drags it down, somehow.

8/15/2020

Printed Log up through 8/5/2020

Baud rate

If set for 50 baud in a 5-bit machine,

Then each bit arrives $\Delta_t = (7.5 \text{ bits}) / (50 \text{ bits/s})$

The corresponding 8-bit machine baud rate is:

$11 \text{ bits} / \Delta_t = 75 \text{ baud}$ (actually 73.3)

If the machine is set for 75 baud, then the corresponding 8-bit baud rate would be 110.

8/5/2020

Read back "spiral" punch code that was sent to the plotter into file "readback". These are the differences:

spiral on left, readback on right

1. 0x1 5055 (PU) becomes 7075 (pu) — these are due to stty settings
2. 0x4 5350 (SP) becomes 7370 (sp)
3. 0x8 5055 (PU) becomes 7075 (pu)
4. 0x14 5044 (PD) becomes 7064 (pd)
5. 0x361 39 becomes 30 - digit "2994" becomes "0994"
6. 0x5fc 36 becomes 34 - digit "3376" becomes "3374"
7. 0x78b 37 becomes 27 - digit "3178" becomes "31'8" (so, probably interpreted as 31)
8. 0x7a7 32 becomes 20 - digit "2824" becomes " 824"
9. 0x82e 5350 (SP) becomes 7370 (sp)

Four errors occurred:

5. 39 to 30 0011 1001 to 0011 0000
6. 36 to 34 0011 0110 to 0011 0100
7. 37 to 27 0011 0111 to 0010 0111
8. 32 to 20 0011 0010 to 0010 0000

These are unusual in having more than one bit error...

Common errors in text today:

"t" became "@" — 0x74 became 0x40

"t" became "p" — 0x74 became 0x70 0100 to 0000

"space" became unprintable... space is 0x20

8/3/2020

Downloaded several patents for different parts of the teleprinter and associated devices. The main inventor is Giuseppe Ricciardi. Most are filed in 1966 in Europe and issued by the US Patent Office in the late 1960's.

Of particular interest:

US 3,418,856 - RANGEFINDER FOR A START-STOP TELEGRAPH SELECTOR

Shows the “timer knob” is actually a range finder.

US 3,465,100 - MECHANICAL SETTING AND/OR READING DEVICE FOR CODE UNIT ON TELEPRINTERS AND SIMILAR DATA PROCESSING EQUIPMENTS

This is the “selector disk” of the parallelizer.

US 3,418,856- INK RIBBON CARTRIDGE FOR A TYPEWRITER, TELEPRINTER OR SIMILAR OFFICE MACHINES

US 3,306,417 - KEYBOARD MECHANISM FOR GENERATING CODE WITH SELECTABLE CODE MEMBER SETS

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1965 ECMA-10 standard:

2.3 Tape coil

2.3.1 Outer diameter

The maximum outer diameter of a coil of punched tape shall be 190 mm.

The X 3.6 1965 (Known as USA R1973) (Perforated Tape Code for Information Interchange) is the “mirror image” of the ECMA standard.

7/24/2020

Going to run the Olivetti

Oiled the print shaft

Rotated the print shaft a few times. Ran the print head across the print shaft.

Forgot how to punch tweets...

Create ASCII punch text with “pt” shell script

pt text to punch

and copy-paste into tweet

execute a shell command in oysttyer:

!`<command>`

e.g. !/metar kphl

/like `<menu code>`

/re `<menu code>` reply text

Oysttyer commands: <https://oysttyer.github.io/docs/userGuide.html>

What command to print punch text?

ppt

7/1/2020

Twitter threads

una telescrivente Olivetti completa con rulli carta originali, starting 8/11/2018

<https://twitter.com/ef1j95/status/1028405238259232768?s=20>

Acquiring the last parts and documentation, 8/25/2018

<https://twitter.com/ef1j95/status/1033468434095517698?s=20>

Serializer restoration, 9/1/2018

<https://twitter.com/ef1j95/status/1035872164157775872?s=20>

Machine suddenly speeds up to 150 baud, 9/16/2018

<https://twitter.com/ef1j95/status/1041488933341876226?s=20>

Parallelizer restoration saga, starting 9/23/2018

<https://twitter.com/ef1j95/status/1043966732266864641?s=20>

Copy frame, 10/2/2018

<https://twitter.com/ef1j95/status/1047057698511097856?s=20>

CAD of copy frame levers, 10/7/2018

<https://twitter.com/ef1j95/status/1048625385104203781?s=20>

3D printed copy frame levers, 10/15/2018

<https://twitter.com/ef1j95/status/1052015626347302913?s=20>

Parallelizer copy frame with 3D printed levers, 10/19/2018

<https://twitter.com/ef1j95/status/1053454984145199109?s=20>

Rebuilding the parallelizer, 10/20/2018

<https://twitter.com/ef1j95/status/1053677907963510784?s=20>

Then the motor capacitor dies, 10/20/2018

<https://twitter.com/ef1j95/status/1053809736834002944?s=20>

Stroke bar repair, 12/8/2018

<https://twitter.com/ef1j95/status/1071361408410021888?s=20>

First print victory, 12/11/2018

<https://twitter.com/ef1j95/status/1072675557832359937?s=20>

Disabling ENQ punch suppression, 1/12/2019

<https://twitter.com/ef1j95/status/1084111547037822978?s=20>

Power Unit teardown, starting 9/28/2019

<https://twitter.com/ef1j95/status/1178121537892868096?s=20>

Motor assembly tear-down, 10/5/2019

<https://twitter.com/ef1j95/status/1180489172056002560?s=20>

Motor speed regulation circuit and repair, 10/5/2019

<https://twitter.com/ef1j95/status/1180570699901128704?s=20>

Print head restoration, 11/17/2019

<https://twitter.com/ef1j95/status/1063978235980144640?s=20>

Reception errors, electromagnet operation, and selector disk, 5/9/2020

<https://twitter.com/ef1j95/status/1259294413118980097?s=20>

5/31/2020

Punch (for neil and me)

N3RD++ ST.

#HENGINEER (in different fonts)

5/26/2020

Work to do:

- Buzzing sound when print carriage is towards the right side. Document what is causing this. What are the potential fixes?
- Timer gear
- Print shaft coupler

Questions:

What is the timer knob actually changing?

5/24/2020

Working pretty well. Expect to have errors in bit 4 again at some point, but reception errors have ceased for now.

5/23/2020

I think there are two things going on with the teleprinter: there seems to be an error in which the parallelizer does not hold correctly after one cycle. Tweaking the magnet and timer settings seem to help, a little. The other error seems to be printing FF. I thought the two were related, but cycling with the power off and triggering the parallelizer often leads to printing the resulting FF character. This would imply that the bridge to the suppression bar is not working correctly.

Today:

Popped the cover off again.

Turning the timing knob all the way forward prevents the parallelizer holding bridge from catching the counter-rotating lever. Watching some of the errors, it definitely looked like the release crank was getting switched inadvertently. That is, it didn't appear to be a lack of suppression.

I loosened and fiddled with the crank position using the two locking screws close to the counter-rotating lever (see 271). I tried to move the crank slightly away from the EM armature, although shifting the EM a little may have been a good alternative. This improved performance for a little bit, then the parallelizer wouldn't activate at all. I adjusted the tension knob on the EM clockwise until the parallelizer started to activate. The timer knob is set at about 30. I had good performance without errors.

I closed up the machine. One thing to watch: earlier when closing, the chad chute wasn't lined up with the chad box. A pile of chads was building up inside the machine, which is a risk for jamming (or worse).

5/18/2020

Over the weekend, I spent time studying the mechanics of the selector disk and the bit errors. The notes on the selector disk are written up in a series of notes on the parallelizer.

I think I understand the mechanics of the parallelizer and the selector disk better. Both are started by a start bit, but the mechanisms are separate. The selector disk has a start mechanism that might be failing from time-to-time and that is the source of the extra bytes.

The timing knob settings depend somewhat on the unbalancing knob setting. The unbalancing knob is turned towards clockwise, which puts some tension on the upper spring. I think this will adjust the movement relative to switching the bits from low (down) to high (up). It may shorten the low relative to the high. But it requires a lower timing knob setting — now around 30 or so.

However, the timing knob should only affect the parallelizer timing, not the selector disk timing?!

I moved the timing knob to extreme values. When typing a "U" character manually, the error I see is an 0xFF. So, the disk continues spinning and it reads the magnet in a non-pulsing state... FF. Makes sense. But why does the disk continue? And does it only do this when the parity bit is 0? ("1" sometimes gives errors... and the parity bit should be 1.)

5/14/2020

Accidentally overwrote pt script. Restored from backup, but it wasn't the newest version. Doh.

Moved unbalancing knob and adjusted timing knob. I'll have to record current values. Seems a little more stable, but still getting some reception errors off and on.

It could be the stopping mechanism of the selector disk, or a triggering of the start mechanism.

5/11/2020

Parallelizer and EM examination for reception errors

Currently, timer knob is set at about 47.5

The EM "unbalancing knob" position depends on whether the magnet is operating in d.c. or s.c.
d.c. uses reverse polarizations in the current to switch the electromagnet.

s.c. uses an open / closed circuit (which is what I would expect for current loop operation).

Reference: page 2.12 in Olivetti TE-315 Theory of telegraphy...

It looks like mine is set to operate as s.c.? But the text is confusing and shows d.c. configuration with the top spring held all the way forward (loose)...

I also know my magnets are wired in "parallel" not "series". I'm not sure what implication this has.

Mine makes sense if it is in s.c. operation. The lower spring pulls the armature back into space when the magnet is de-energized.

Looking back through images, there was a rubber cap on the end of the print head damper! What happened to this piece?

5/10/2020

I adjusted the magnet to maximum clockwise rotation. This moves the top spring in the EM to the lowest position and hence least tension. The reception errors seem to have diminished, but suggests that further EM adjustment is needed.

Moving the magnet adjustment counterclockwise tenses the top spring.

Timer gear measurements

From inner diameter to outer diameter: 0.1072" - 0.112"

closer teeth are 0.028"

Took a lot of photos of the gear.

Motor capacitor:

about 50-52mm in diameter, 90mm high

Look at specs for replacement

5/9/2020

Machine is running around 120 baud with reception errors

Took the case off

Now measuring 9 bits, 84.40ms (107 baud)

Now measuring 11 bits, 101.2ms = 109 baud

5/8/2020

Reception errors -- similar to March 6, 2019?

Reception errors occur in both local and remote

Check the speed of transmission. Is it still operating at 110 baud? (probably)

5/7/2020

Future punch quotes:

"Your Mission: RESCUE HOSTAGES" - from choplifer

"FIRST SORTIE"

5/6/2020

xcase letters:

```
~ = \^
| = \|
{ = \{
} = \}
` = \'
```

Note that _ is "back arrow" and ^ is "up arrow" in ASCII-63.

I wrote little wrapper scripts for various punching activities. Starting with ASCII punching, I modified pattern.py so that the INIT and RESET strings are DC2 and DC4, and hence start the punch.

pt = run pattern.py with text "PUNCH TEXT". This can be printed or redirected to a file.

mp = take a string of characters in a file and add DC2 and DC4 to it.

flag = add U*U*U* at the start and end of a file generated by pt

Fun with ASCII-63:

l-series... "ladders" of ~B~B~ characters

p-series... various punch text phrases

Look at the patterns with, for instance,

ppt < p7

Tonight: a lot of reception errors. Looks like parallelizer is triggering too rapidly. I wonder if it is related to speed? Or stiff mechanicals? The basement was pretty cool tonight.

Is this the first time I operated since recompiling the kernel? I want to say that I used it last night.

5/5/2020

Been punching a lot of tweets.

Can now use Hugh Pyle's pattern code.

e.g.

```
pattern text --part tweet1 " READY PLAYER ONE "
```

5/1/2020

I think I figured out how to start and stop the punch in oysttyer.

I set up code to cause ppt: to start and stop the punch, as well as turn off the word wrap. It's a hack, but it seems to work.

4/29/2020

Have oysttyer control the punch so that only tweets are sent to the reperforator:

Punch on is DC2 - 0x12

Punch off is DC4 - 0x14

Image showing these on January 27, 2019

Maybe I can encode this in a tweet using an emoji or other character?

The control character in the tweet could also cut off the wrap function

4/27/2020

Saturday and Sunday ran through some great tests of the Olivetti online via twitter. Thoughts for the project:

- Have two bells ringing at the beginning of each tweet. It's quite a hack. I have to change this to the double space location.
- Can a tweet start the punch?
- Can punch control codes be embedded such that the CR and LF functions are not output?
- Could I receive uuencoded tweets?

Other Olivetti needs:

If bit 4 is stuck low, what are the mechanics in the parallelizer and can I fix it?

4/24/2020

Created new Twitter developer account and twitter account:

Developer: OlivettiTTY

Account: @OlivettiTTY

App: OTe318

<https://developer.twitter.com/en>

Created Twitter app called OlivettiTE318

API key: I6JFfMzKpzWmo2kmH9ILUjImN

API secret key: Fc9E1PnpX08lwrqPmgavXQkRt4f6P5HFVZpTP430jM3Z18K1Aj

For oysttyer - access token provided below:

Access token: 940197928743948289-3bihqacKnOZwmQgaSGF2VzsUOAynfin

Access token secret: t37vGLrFLbOL9Zp7YguUuc4bL6mfH3ln37y8JV4zP1Omk

<https://github.com/oysttyer/oysttyer/wiki/Built-in-commands#stream>

4/23/2020

Tabulated recent print errors

1 -> !	bit 4 high->low (stuck low)
W -> G	bit 4 high->low (stuck low)
U -> E	bit 4 high->low (stuck low)
S -> C	bit 4 high->low (stuck low)
S->A?	bit 4 and bit 1

NOTE: ECMA-10 standard calls the bits "tracks" and starts from track 1 (right-most) and ends at track 8 (left most). By this convention, bit 4 corresponds to track 5 on the tape.

What direction of bit (stuck down or up? Or just slow either way?)

Tonight: started to get more U->E errors. Tugged on the parallelizer a bit.

Next up on teleprinter:

- tweet from Olivetti (with xcase)
- script to help with troubleshooting bit / timing errors
- maintenance
- Scripts to print characters and character patterns
- Punching different alphabets
- Various repair projects
- ASCII art
- PiDP build and teleprinter interfacing

Created Twitter developer account

<https://developer.twitter.com/en>

Created Twitter app called OlivettiTE318

API key: I6JFfMzKpzWmo2kmH9ILUjImN

API secret key: Fc9E1PnpX08lwrqPmgavXQkRt4f6P5HFVZpTP430jM3Z18K1Aj

For oysttyer - access token provided below:

Access token: 940197928743948289-3bihqacKnOZwmQgaSGF2VzsUOAynfin

Access token secret: t37vGLrFLbOL9Zp7YguUuc4bL6mfH3ln37y8JV4zP1Omk

4/22/2020

It could be that I can edit the .inputrc file (/etc/inputrc, or local ~/.inputrc) to turn off the "\n" key getting swallowed by readline?

Confirmed operation of xcase on Olivetti last night.

I had a difficult time logging in at first. The "shift" was stuck, so control characters were being sent.

I'm getting intermittent errors on bit 4 (counting from 0).

4/21/2020

Curious why bash is intercepting the xcase escape character.

bash is version 4.4.12

```
~$ bash --version
GNU bash, version 4.4.12(1)-release (arm-unknown-linux-gnueabi)
Copyright (C) 2016 Free Software Foundation, Inc.
License GPLv3+: GNU GPL version 3 or later <http://gnu.org/licenses/gpl.html>
```

This is free software; you are free to change and redistribute it.
There is NO WARRANTY, to the extent permitted by law.

I downloaded the bash source for 4.4.12. There is an xcase.c file:
/support/xcase.c
and also a description of readline

I figured it out.
bash needs to be executed with --noediting
--noediting
Do not use the GNU readline library to read command lines when
the shell is interactive.

Will have to learn more...

Wrote a script "owheeltbin" that prints a table of the characters with bit patterns. I'm going to use this to debug the bit errors I get from time to time. These are, no doubt, due to some stickiness in the parallelizer.

To do:
- tabulate frequent letter transpositions in printouts
- note the bit patterns

4/20/2020

I figured it out. xcase is mine.

I was messing around with copying the stdin to a file:

```
cat /dev/stdin > foo
```

testing to see which control characters came through. I noticed with xcase enabled, the backslash was not being echoed, as expected. Maybe Bash was the problem?

Running sh, I get an effective xcase input!

4/19/2020

Working on xcase...

November 30, 2019 from @33asr:

This behavior is documented in `man 3 termios`: "IEXTEN Enable implementation-defined input processing. This flag, as well as ICANON must be enabled for the special characters EOL2, LNEXT, REPRINT, WERASE to be interpreted, and for the IUCLC flag to be effective".

"Of course I'm not the first to hit this snag!" <https://lists.gnu.org/archive/html/bug-coreutils/2010-02/msg00087.html>

man 3 termios and search xcase

```
XCASE (not in POSIX; not supported under Linux) If ICANON is also set,
terminal is uppercase only. Input is converted to lowercase,
except for characters preceded by \. On output, uppercase char-
acters are preceded by \ and lowercase characters are converted
to uppercase. [requires _BSD_SOURCE or _SVID_SOURCE or
_XOPEN_SOURCE]
```

What I learned from Pyle video: The first backslash when operating in LCASE should not echo back. So something is wrong with my system...

4/18/2020

Used Olivetti to render 35 iterations of John Conway's Game of Life

4/17/2020

Turned off any login prompts for user EMF with file ".hushlogin" in home directory
touch .hushlogin

lcase works for output but not for input (why?)
ICANON must be set. But this should be on. Is it getting turned off when logging in? Check.

4/16/2020

Looking at output of Linux to Olivetti on the punch tape, there are multiple points where a 0x11 is sent. This is DC1? It could be an XON character, although why it would be sent, I'm not sure (check n_tty.c)

4/15/2020

I'm going to try the IEXTEN in stty
Then I will try the FTDI usb controller. Prolific doesn't work.
ixten = enable non-POSIX special characters

Update: IEXTEN worked! I could successfully execute lowercase unix commands. This is exactly what the n_tty.c code would suggest (quoted below).
Have to try LCASE or XCASE now...
LCASE = xcase iuclc olcuc

Also getting some substitution errors again. I played around with timing, but this is probably related back to sticky parallelizer.

The keyboard is also quite a bit stickier.

Next up on teleprinter:

- xcase?
- script to help with troubleshooting bit / timing errors
- maintenance
- Scripts to print characters and character patterns
- Punching different alphabets
- Various repair projects
- ASCII art
- PiDP build and teleprinter interfacing

4/14/2020

Before I revert the kernel on retrolab, try using a USB RS-232 adapter instead of the GPIO. I may get better results? Looking for a device that gives /ttyAMC0 device?

I tried using a USB adapter. I created a getty login for USB2. It worked with the ADM3A.
However, I couldn't get it to work with the terminal.

lsusb:

Bus 001 Device 011: ID 067b:2303 Prolific Technology, Inc. PL2303 Serial Port

The Prolific chipset only works to 300 baud. This must be the problem there.

stty settings I don't understand:

echoke = crtkill = kill all line by obeying the echoprt and echoe settings
echoe = crterase = echo erase characters as backspace-space-backspace
(***this may explain the weird characters when getty runs? Clearing screen?***)

stty settings to test:

icanon = enable special characters: erase, kill, werase, rprnt (**test turning off?)
opost = postprocess output (**test turning off? what does this mean?)
istrip = clear high (8th) bit of input characters (**currently off. What happens if on?)
cread = allow input to be received (interesting?!)
olcuc = translate lowercase characters to uppercase (should I set this???)

I may need to have the iexten flag set. In n_tty.c, it looks like both IUCLC and IEXTEN need to be true:

```
if (I_UCLC(tty) && L_IEXTEN(tty))
    c = tolower(c);
```

If I need to troubleshoot, add:

```
printk(KERN_DEBUG "I can modify the Linux kernel!\n");
```

printk function causes a message to be written to the kernel log buffer, which can then be viewed using the dmesg command

lsmod lists kernel modules installed

Interesting thread on

4/12/2020

Olivetti started. Works fine in local mode. Keyboard is a little sluggish. Punch is working.
I worked to get it connected to the Raspberry Pi via the ttyAMA0 interface (GPIO). The Pi (retrolab) has a new kernel that includes XCASE and OFILL with CRDLY -- the routine that creates delays after carriage return. My hack to the CRDLY routine includes sending another CR character and two more NULLS.

Somehow, I seem to have burned out the MAX3232 on the Linksprite GPIO board. The transmit seems broken. I'm not sure why. The GPIO UART still functions as expected. I think I have a few options to fix:

(Note that the RPI GPIO is 3.3V logic!)

1. The shield only uses one channel of the MAX3232. Perhaps I can wire a bodge to the other channel?
2. I have a MAX232. This will do 12V to 5V. I think I also have a 3.3V to 5V level shifter, so that could work.
3. I have the MAX3232 shield I've been using with the Teensy.

Based on success with the AMD3A and Pi getty, I modified (see "General notes microcomputing") I modified override.conf for the following:

```
[Service]
Type=simple
ExecStart=
ExecStart=/sbin/agetty -i --nohostname --autologin EMF --noclear ttyAMA0 110 tty33
```

The hardware connection is the Pi GPIO (ttyAMA0) to the Sparkfun MAX3232 breakout board, through NULL modem cable to the Olivetti RS-232.

I get a clear login text from getty and the prompt. I can execute any aliased command in upper case, but lower case commands do not work. For some reason, the iuclc setting for stty doesn't seem to work.

I'm wondering if the problem is the terminfo setting for tty33?

```
/lib/terminfo
/usr/share/terminfo
ncurses will search ${HOME}/.terminfo first, then /etc/terminfo (this
directory), then /lib/terminfo, and last not least /usr/share/terminfo.
(README in /etc/terminfo)
```

https://www.gnu.org/software/termutils/manual/termcap-1.3/html_mono/termcap.html

4/6/2020

What does an initial hookup to the Pi look like?

Use the Teensy?

4/3/2020

Would like to set up Olivetti to connect to retrolab instead of trurl (the 2012? Macbook Pro).

I should backup the retrolab SD card before I make changes. Retrolab also needs to connect to the IMSAI for disk transfers (although haven't done any in a long while.) It would be nice to recompile the linux kernel to support the teleprinter.

1/23/2020

From video of punching tape, the reader moves steadily, but the punch has a "rest" between every 7 bytes. Why?

How long is the pause?

11 bits / character

110 baud

100 ms per character, 10 characters / second

I have a photodetector (I think) in the Sparkfun kit. I can set up an LED and photodetector circuit and measure the output with the oscilloscope. I'll have to convert current to voltage? Actually, it's a photoresistor, so a simple circuit will suffice. It needs to be set up as a voltage divider. The recommended resistor value is 10Kohm.

I hooked up the photoresistor and tried to measure light changes passing through punch tape, but the resistor area is too big. I couldn't see holes passing. I used a 10Kohm resistor and the 5V source from the teensy.

The teleprinter had some errors. In one or two instances, a carriage return was not detected (strange, since multiple returns are issued by the teensy). This also happened printing with Josh this past weekend. I accidentally logged into the living computer museum and was having difficulty with a lot of FF's received (which is the parallelizer disk triggering without a valid byte).

I adjusted the timing knob from about 45 to 60. This seemed to get rid of the FF's.

I logged into living computers. It took a while with the nulls.

12/18/2019

Can't get rdr.sh to work. Reads in some bytes (420 in foo3)

12/17/2019

0.1 seconds / character

Try:

- try new reader script to read in tape (turns echo off)
- need scripts to punch bookmarks - 4hearts with right number of nulls. consistent length.
- remove 0x11 from hearts to see if punch until keypress works
- change keypress to a specific character (think issue is reading delete)

OK, echo works fine, but teensy still forces lower case when reading. Verified that the tape is correct. Reading in is incorrect. This is consistent with teensy program. There is nothing (no escape code, for instance) to turn off the folding of upper case to lower case (UCLC). I guess that I could use the "binary" escape codes (turn APC_Rx_NLCR and APC_Rx_DELAYS off).

The teensy doesn't do character processing to the TTY other than adding CR's to LF's and NULLS for timing. Turn this off when punching a strict binary file using the escape codes "a" and "b". You must also use 'stty raw' to stop the processing of special characters, parity, etc.

Reading in is more of a challenge. The teensy controller converts from upper case to lower case. Currently, there is no way to turn this off. I could define an additional escape sequence, but I think I'll use the ones that are already there. Turning off the folding feature will enable me to read in ASCII files from the punch. Binary is more challenging, since technically one would want to use a raw stty setting, but then there is no way to terminate the read. A possible solution is to read until a timeout.

12/15/2019

Punched PGP key.
Ran out of paper tape just at the end.
Moved some paper tape to old roll to fit new roll into TTY. This is the first roll of the 7 that I purchased.

12/14/2019

Punch is working fine with reader. Punched I <heart> TTY.

12/12/2019

Binary data on / off with Teensy controller - send special escape characters or just reset (?) the interface. From Hugh Pyle's "profile" file, two aliases are defined:

```
# For "cooked" mode, just reset
alias ttext='stty sane && tput reset'
```

```
# For "pass-thru binary" mode, set raw stty (no NL->CRNL, etc) and also send the custom escape to set the firmware into raw
mode
alias tbinary='stty raw && printf "\033[?7\033_ab\234"'
```

```
ansi_escape.h defines the following:
#define SEQ_BINARY "\033_ab\234"
```

\234 or 0x9C is the string terminator
but I don't see where it actually processes these codes in the commands...

Had some success punching from the shell...

```
# profile tty aliases and settings
```

```
# For "pass-thru binary" mode, set raw stty (no NL->CRNL, etc)
# and also send the custom escape to set the firmware into raw mode
# Esc[?7l is reset auto-wrap mode, cursor remains at end of line after
# column 79 (Note: Olivetti will automatically CR).
# ESC[?7h to Set AutoWrap Mode.
# String Terminator is 0x9C or 0o234
alias tb='stty raw && printf "\033[?7\033_ab\234"'
```

```
# To return to text mode, send custom escape and reset some normalcy to tty
alias tt='stty sane onlret onlcr oxtabs && printf "\033_AB\234"'
```

```
# Can also try ESC[!p - soft terminal reset?
```

12/8/2019

Spent a good chunk of time printing Mandelbrot images from trurl (2013 MBP). The Olivetti connects RS-232 to trurl via the Teensy board. Everything is functioning pretty well. Getty is running on cu.usbXXXX via a script in

12/6/2019

Linux TTY support

drivers/tty/n_tty.c

Instructions to build kernel:

<https://github.com/hughpyle/ASR33/tree/master/rpi/kernel>

<https://www.raspberrypi.org/documentation/linux/kernel/building.md>

* 2019/12/03 Experimental implementation of CRDLY, NLDLY and XCASE
* for mechanical terminals - Hugh Pyle <hughpyle@gmail.com>

<http://man7.org/linux/man-pages/man3/termios.3.html>

ICANON Enable canonical mode (described below).

XCASE (not in POSIX; not supported under Linux) If ICANON is also set, terminal is uppercase only. Input is converted to lowercase, except for characters preceded by \. On output, uppercase characters are preceded by \ and lowercase characters are converted to uppercase. [requires _BSD_SOURCE or _SVID_SOURCE or _XOPEN_SOURCE]

12/4/2019

stty discoveries:

cr1 is the longest delay time, cr3 is the shortest (who knew?)

Unix Version 7

is backspace / rubout (?)

@ is cancel line

delete is ... ?

12/2/2019

SSH into Living Computers misspiggy and run

mand79

mande

punch and paper programs... (bcd and ppt)

maze

banner

"UNIX 50"

"My other machine is a PDP 11/70"

Probably should run on Pi instead of MacBook Pro

Should also connect to IMSAI

Need a clean way of punching tape...

Need teensy to handle upper / lower case better...

--

Successfully (but with some difficulty) logged into pdp1170@tty.livingcomputers.org.

Using the "shift" key to get "@" caused it to stick, rendering subsequent keys as control characters. I'm not sure why the shift key was sticking?

Comms seemed a little flakey. Not sure if this is the teensy. Connection just flat-out dropped at some point.

Printed mande, mand79, a small maze, and tested bcd and ppt. The last two are more compelling on a monitor because of the lack of a vertical bar character, "|".

12/1/2019

Would like to:

- Tweak Teensy to send two CR's to Olivetti - DONE (I think - should verify with scope...)

- Test horizontal return of carriage. Why does it get stuck one character ahead?
- Get a direct serial connection to RPi?
- Tweak Teensy in order to send to punch ***
- Should I connect to IMSAI? To Sol?

Fun stuff:

Logging into PDP 11/70 at Living Computers
 ssh menu@tty.livingcomputers.org
 or for direct to "misspiggy" pdp11/70:
 ssh pdp1170@tty.livingcomputers.org
 login: ef1j, ScciQpes (now tty-friendly)

"misspiggy" runs Unix Version 7, which was the last Bell Labs release in 1979.

Problems yesterday:

In local mode, reperforming a tape was giving errors, mainly in not punching 0xFF correctly. Other patterns seemed to work ok. Perhaps what is needed is a slight adjustment in the timing, although I haven't had any other errors.

11/30/2019

Using teensy interface to trurl (2013 MBP), ran the shell as user ef1j. Horizontal return is a bit slow. Not all CRs return to the first column. I'd like to figure out why, but an easy solution seems to be to issue two CR's instead of one.

11/16/2019

Measured the capacitance of three ICAR replacement filters / snubbers.

2 measure capacitance at 1.564 and 1.560 uF.

1 measures capacitance at 1.380 uF.

These measurements are with resistors and inductors, of course.

I marked the 1.38 uF cap.

So, which one to install?

—

Current issues:

Horizontal return is not making it back every time

Snubber can be replaced now

--

Installed snubber. I think I installed the 1.560uF.

11/6/2019

KMP silk ribbon

11/2/2019

The Wifi232 modem has the "PET" mode that strips the 8th bit:

ATPET1 sets bit 8 to 0

ATPET0 turns this off

OK, that worked.

Successfully logged in to Pi via telnet from Wifi232 modem

I changed user name to "EMF" - all caps

I changed password to "YES" - all caps

I can log in, but I can't type any commands due to all uppercase...

I also don't have to use LF now. Can use CR

Can't figure out how to get the term settings set properly. E.g. tty33

infocmp – compare or print out terminfo descriptions

infocmp dumb
infocmp tty33

can an stty command help?

* [-]iuclc
translate uppercase characters to lowercase

MORE WIFI232 reminders:
AT\$SU=8N2 sets 2 stop bits

11/1/2019

The pseudo-terminal allocated to the client is configured to operate in
“cooked” mode, and with XTABS CRMOD enabled (see tty(4)).

Run telnet in debug mode:
~\$ sudo /usr/sbin/in.telnetd -D options -debug 9999

Since telnet sends in cleartext, I can also capture packets to see what is going back and forth.
Perhaps the login account I made was incorrect, too. Try again!

Note on raw setting:
raw (-raw) If set, change the modes of the terminal so that no input or
output processing is performed. If unset, change the modes
of the terminal to some reasonable state that performs input
and output processing.

On RPi, these should be the "cooked" mode parameters for the tty

raw:
same as -ignbrk -brkint -ignpar -parmrk -inpck -istrip -inlcr -igncr -icrnl -ixon -ixoff -iuclc -ixany -imaxbel -opost -isig -icanon
-xcase min 1 time 0

cooked:
same as brkint ignpar istrip icrnl ixon opost isig icanon, eof and eol characters to their default values

brkint - breaks cause an interrupt signal
ignpar - ignore characters with parity errors ***THIS MAY BE THE PROBLEM? (BUT SEE NEXT...)
istrip - clear high (8th) bit of input characters
icrnl - translate carriage return to newline (***)CLEARLY NOT HAPPENING!
ixon - enable XON/XOFF flow control
opost - postprocess output
isig - enable interrupt, quit, and suspend special characters
icanon - enable erase, kill, werase, and rprnt special characters

The most up-to-date terminal names for Telnet are at:
<https://www.iana.org/assignments/terminal-type-names/terminal-type-names.xhtml>

use or try

AT\$TTY=TELETYPE-33

IDing system as above didn't change anything. Still can't login via telnet.
Used tcpdump to capture login attempts from wifi232:
on Pi (ip address is 10.0.1.2).

To see live captures:

sudo tcpdump -XX -s 0 -i wlan0 host 10.0.1.2

To save to pcap file:

```
sudo tcpdump -i wlan0 -w wifimodem1.pcap
```

Then can look at pcap file with Wireshark.

Characters are coming through and echoed back. They are 7-bit with even parity, as expected. The parity bit does not seem to be stripped out. The text is in upper case.

10/31/2019

PrinTTY Shop with "banner"

Terminfo for Teensy:

```
# asr33 with auto-margin capability, pure-binary mode, etc
```

```
# compile with 'tic'
```

```
tty33-amx|model 33 teletype with 'teensytty' firmware,
```

```
    hc, os, xon, am,  
    cols#72,  
    bel=^G, cr=^M, cudl=^J, ind=^J,  
    cub=\E[%p1%dD, cub1=\E[D,  
    cuf=\E[%p1%dC, cuf1=\E[C,  
    hpa=\E[%i%p1%dG,  
    smam=\E[?7h, rmam=\E[?7l,  
    sc=\E7, rc=\E8,  
    is2=\E[!p, rs2=\E[!p,  
    clear=^j^j^j^j^j^j^j^j^j^j,
```

hard_copy	hc	hc	hardcopy terminal
over_strike	os	os	terminal can over- strike
xon_xoff	xon	xo	terminal uses xon/xoff handshaking
auto_right_margin	am	am	terminal has auto- matic margins
cursor_down	cudl	do	down one line
scroll_forward	ind	sf	scroll text up (P)
parm_left_cursor	cub	LE	move #1 characters to the left (P)
parm_right_cursor	cuf	RI	move #1 characters to the right (P*)
save_cursor	sc	sc	save current cursor position (P)
restore_cursor	rc	rc	restore cursor to position of last save_cursor
clear_screen	clear	cl	clear screen and home cursor (P*)
column_address	hpa	ch	horizontal position #1, absolute (P)
enter_am_mode	smam	SA	turn on automatic margins
init_2string	is2	is	initialization string
reset_2string	rs2	r2	reset string

\E is an escape character

in man terminfo:

```
33|tty33|tty|model 33 teletype,  
    bel=^G, cols#72, cr=^M, cud1=^J, hc, ind=^J, os,
```

while the Lear Siegler ADM-3 is described as

```
adm3|3|lsi adm3,  
    am, bel=^G, clear=^Z, cols#80, cr=^M, cub1=^H, cud1=^J,  
    ind=^J, lines#24,
```

One issue is that the Teensy inserts CR after LF. This is great for text and for interactive mode, but it will cause problems with punching... need a way to turn off -- perhaps by DIP switch.

Wifi232 modem:

ATN1 for telnet negotiation

need to work on term settings for ef1j?

This can be in file ~/.telnetrc

On the modem:

ATNETN -- 0 is no telnet code processing, 1 is process telnet codes

AT\$TTY=YourTTYSetting -- default is "ANSI" should it be tty33? or 33?

Success connecting to retrolab RPi with Wifi232, but could not login.

Used commands:

ATNET1

AT\$TTY=tty33

Login prompt must use LF not CR! Also with password. But always comes back with "LOGIN INCORRECT"

10/30/2019

Notes on screen:

Before you begin to use screen you'll need to make sure you have correctly selected your terminal type, just as you would for any other termcap/terminfo program. (You can do this by using tset for example.)

10/29/2019

Had login shell running last night via screen on mac (trurl, MacBook Pro 2016)

Teensy is handling I/O from terminal. Device is /dev/cu.usbXXXXXX

Connect with screen:

```
screen /dev/cu.usbXXXXXX 9600
```

In screen:

```
C-a : exec ::: /usr/libexec/getty std.9600
```

see /etc/gettytab for std.9600 definitions and man gettytab

/etc/gettytab for 110-baud

```
alstd.110|110-baud:\
```

```
:np:nd#1:cd#1:uc:sp#110:
```

np = terminal uses no parity (i.e. 8-bit characters)
nd num 0 newline (line-feed) delay
cd num 0 carriage-return delay
uc bool false terminal is known upper case only
sp num unused line speed (input and output)

110-baud is called by tty33

```
-lty33lasr33lPity the poor user of this beast:\n      :tc=110-baud:
```

tc is "table continuation"

***Note: would not use this gettytab b/c hardware is handing speed, CR, LF, UC conversion, etc.

BASH - login shell

/etc/profile

~/bash_profile:

~/bash_login:

~/profile:

BASH - interactive, non-login shell:

~/bashrc

About bash on the mac:

<https://apple.stackexchange.com/questions/51036/what-is-the-difference-between-bash-profile-and-bashrc>

.bash_profile is executed for login shells, while .bashrc is executed for interactive non-login shells.

When you login (type username and password) via console, either sitting at the machine, or remotely via ssh: .bash_profile is executed to configure your shell before the initial command prompt.

But, if you've already logged into your machine and open a new terminal window (xterm) then .bashrc is executed before the window command prompt. .bashrc is also run when you start a new bash instance by typing /bin/bash in a terminal.

On OS X, Terminal by default runs a login shell every time, so this is a little different to most other systems, but you can configure that in the preferences.

https://www.stefaanlippens.net/bashrc_and_others/

How I think things are supposed to work (for a typical setup):

.profile is for things that are not specifically related to Bash, like environment variables PATH and friends, and should be available anytime. For example, .profile should also be loaded when starting a graphical desktop session.

.bashrc is for the configuring the interactive Bash usage, like Bash aliases, setting your favorite editor, setting the Bash prompt, etc.

.bash_profile is for making sure that both the things in .profile and .bashrc are loaded for login shells. For example, .bash_profile could be something simple like

```
. ~/.profile
```

```
. ~/.bashrc
```

Got the login running... but found out that screen sort of screws things up.

If I login to ef1j then run screen, the prompt is ok.

If I run screen as another user, screen inherits the properties of the current shell, apparently.

10/28/2019

AltSoftSerial documentation:
https://www.pjrc.com/teensy/td_libs_AltSoftSerial.html

Add LEDs to indicate activity on the lines...
470 ohm resistors to 3.3V? and LEDs...

10/27/2019

Installed coupler hack. Horizontal control is moving more slowly. The carriage can't get back in time to print next character without some delay. Typing is working better, though.

Tried to file down some rough spots on the print shaft. May need to fabricate new one at some point...

Working on Teensy interface today.
Bought Sparkfun MAX2323 breakout and Teensy 3.2
Soldered header pins to both

Installed Arduino 1.8.10
Installed Teensyduino

Tried compiling / verifying teensytty, but ran into these errors:

Multiple libraries were found for "AltSoftSerial.h"
Used: /Applications/Arduino.app/Contents/Java/hardware/teensy/avr/libraries/AltSoftSerial
'class AltSoftSerial' has no member named 'setBreak'

Note:
NB depends on a hacked AltSoftSerial:
<https://github.com/hughpyle/AltSoftSerial/tree/hacking>

Info on AltSoftSerial:
https://www.pjrc.com/teensy/td_libs_AltSoftSerial.html

Copied files in AltSoftSerial-hacking to:
/Applications/Arduino.app/Contents/Java/hardware/teensy/avr/libraries/AltSoftSerial

and made backup of original AltSoftSerial:
/Users/emf/Dropbox/Personal/Olivetti/RS232/AltSoftSerial-backup

Sketch compiled and transferred ok.

Has this error when initially compile:
/Applications/Arduino.app/Contents/Java/hardware/teensy/avr/libraries/AltSoftSerial/
AltSoftSerial.cpp:80:13: warning: 'tx_break' defined but not used [-Wunused-variable]
static bool tx_break = false;

Commented out this line in AltSoftSerial.cpp:
#define RX_INVERTED

Extra NULL characters - commented out "sendToTTY(0)" in main loop:

```
} else {  
    // Keep the line open so timing errors are minimized  
    //EMF commented out:  
    //sendToTTY(0);
```

Not sure what the function of this is.

Can send characters to , e.g. by
echo U > /dev/cu.usbmodem65282701

but can't get anything on
/dev/tty.usbmodem65282701

CU and TTY:

<https://stackoverflow.com/questions/8632586/mac-os-whats-the-difference-between-dev-tty-and-dev-cu>

The idea is to supplement software in sharing a line between incoming and outgoing calls. The callin device (typically `/dev/tty*`) is used for incoming traffic. Any process trying to open it blocks within the `open()` call as long as DCD is not asserted by hardware (i.e. as long as the modem doesn't have a carrier). During this, the callout device (typically `/dev/cu*` -- `cu` stands for "calling unit") can be freely used. Opening `/dev/cu*` doesn't require DCD to be asserted and succeeds immediately. Once succeeded, the blocked `open()` on the callin device will be suspended, and cannot even complete when DCD is raised, until the `cu` device is closed again.

That way, you can have a `getty` listening on `/dev/tty*`, and can still use `/dev/cu*` without restrictions.

Correct, one case where this matter is if you want to use (in Unix and friends) `'cat'` to capture serial port data to a file like `'cat /dev/cu.xxxx >file.txt'` which does not work with `'tty.'` because of the blocking. At least not on MacOS.

So...

- Eliminated bit inversion of both Rx and Tx
- Removed NULL characters sent to `tty` after bytes received from `tty` (I think...)
- Found out:

The CPU was resetting due to problem expecting inverted Rx.

Coming in for U: 0 1010 1010 11

But expecting inverted: 1 0101 0101 00

So the first "1" coming in acted as a start bit. The frame was reduced by 2 bits.

This caused a break condition that forced a reset of the CPU ("HARDBREAKTIME")

W is sometimes printing as G

W = 57 = 0101 0111

G = 47 = 0100 0111

This is the same error as before. (Bit 4 counting from 0).

10/25/2019

Print shaft coupler broke again on 10/19/2019. One pin pulled out / sheared off. It was sitting on the right side of the machine on the plastic "shelf" that holds the folding comb gear (?) for the horizontal control.

There is more scratching and damage to the print shaft. A small metal shaving is visible on the print shaft coupler in photos. I am worried that it is getting too rough.

I rebuilt the print shaft coupler using two loops of a large paperclip as support and epoxy to build up a more 3D structure to hold the pins. The coupler is not sliding on the shaft well, but it is improving as I cut away some of the epoxy. Perhaps a grease would help, rather than the light oil (NyOil) I'm currently using.

The horizontal bars that the print head rides on had loosened. One bolt had come out far enough that it blocked the print head from moving.

10/18/2019

Current `stty`:

```
~/Banner$ stty -F /dev/ttyAMA0
speed 110 baud; line = 0;
min = 100; time = 0;
-icrnl -imaxbel
-opost -onlcr
-isig -icanon -echo
```

"wrapping" things in a `/bin/sh` command doesn't work:

```
~/Banner$ time sh -c "cat foobar70 > /dev/ttyAMA0"
```

```
real 0m30.200s
user 0m0.008s
sys 0m0.009s
~/Banner$ time echo -ne '\r\r' > /dev/ttyAMA0
```

```
real 0m30.496s
user 0m0.001s
sys 0m0.000s
```

```
~/Banner$ time echo -ne '\r\r' > /dev/ttyAMA0
```

```
real    0m30.343s
user    0m0.001s
sys    0m0.000s
```

```
~/Banner$ time echo -ne '\r\r' > /dev/ttyAMA0
```

```
real    0m30.547s
user    0m0.001s
sys    0m0.000s
```

```
~/Banner$ time echo -ne '\r\r' > /dev/ttyAMA0
```

```
real    0m30.419s
user    0m0.001s
sys    0m0.000s
```

```
~/Banner$ time echo -ne '\r\r' > /dev/ttyAMA0
```

```
real    0m30.024s
user    0m0.003s
sys    0m0.001s
```

```
~/Banner$ time echo -ne '\r\r' > /dev/ttyAMA0
```

```
real    0m0.266s
user    0m0.001s
sys    0m0.000s
```

foobar70 has 2052 bytes, so that makes at least 7 "pushes" through, as expected.

```
~/Banner$ stty -F /dev/ttyAMA0 sane
```

```
~/Banner$ stty -F /dev/ttyAMA0
```

```
speed 110 baud; line = 0;
```

```
~/Banner$ stty -F /dev/ttyAMA0 -a
```

```
speed 110 baud; rows 0; columns 0; line = 0;
intr = ^C; quit = ^\; erase = ^?; kill = ^U; eof = ^D; eol = <undef>;
eol2 = <undef>; swtch = <undef>; start = ^Q; stop = ^S; susp = ^Z; rprnt = ^R;
werase = ^W; lnext = ^V; discard = ^O; min = 1; time = 0;
-parenb -parodd -cmspar cs8 -hupcl -cstopb cread clocal -crtcts
-ignbrk brkint ignpar -parmrk -inpck -istrip -inlcr -igncr icrnl ixon -ixoff
-iuclc -ixany imaxbel -iutf8
opost -olcuc -ocrnl onlcr -onocr -onlret -ofill -ofdel n10 cr0 tab0 bs0 vt0 ff0
isig icanon iexten echo echoe echok -echonl -noflsh -xcase -tostop -echoprt
echoctl echoke -flusho -extproc
```

Running Linux kernel 4.19.66-v7+

10/17/2019

```
time cat foobar > /dev/ttyAMA0
```

times out after 30.0X seconds (usually something like 30.03)

Makes me think there is a timeout on the shell. Something like:

```
#####
# Executes command with a timeout
# Params:
# $1 timeout in seconds
# $2 command
# Returns 1 if timed out 0 otherwise
timeout() {

    time=$1

    # start the command in a subshell to avoid problem with pipes
    # (spawn accepts one command)
```

```

command="/bin/sh -c \"\$2\""

expect -c "set echo \"-noecho\"; set timeout $time; spawn -noecho $command; expect
timeout { exit 1 } eof { exit 0 }"

if [ $? = 1 ] ; then
    echo "Timeout after ${time} seconds"
fi
}

```

Detailed here:

<https://unix.stackexchange.com/questions/43340/how-to-introduce-timeout-for-shell-scripting>

10/16/2019

Trying to connect Olivetti to RPi (retrolab):

stty settings - confirmed the output with an oscilloscope

8N1:

```
stty -F /dev/ttyAMA0 cs8 cstopb -parenb 110
```

7E2:

```
stty -F /dev/ttyAMA0 cs7 cstopb parenb 110
```

Weird timeout issues at 110 baud with raspberry pi serial.

I get maybe 10 seconds of printing, then the serial stops. I can force the printing again by sending more output to /dev/ttyAMA0, such as "echo -ne '\r' > /dev/ttyAMA0". It drops some characters. I managed to get a full printout of a file by sending it twice?

It seems to happen at 300 baud, too, although more characters get through. 9600 baud is fast enough that the communications don't timeout...

Does it have something to do with groups?

```
crw-rw---- 1 root dialout 204, 64 Oct 16 20:18 ttyAMA0
```

Doesn't help to run as root (sudo).

10/14/2019

On mac os:

```
toe -a | grep tty:
```

```

hp+printer  "standard" printer info for HP ttys
hp+labels   "standard" label info for new HP ttys
glasstty    classic glass tty interpreting ASCII control characters
scrhp       screen relative addressing for new HP ttys
tty33       model 33 or 35 teletype
tty43       model 43 teletype
tty37       model 37 teletype
tty40       teletype dataspeed 40/2
elks-glasstty ELKS glass-TTY capabilities
memhp       memory relative addressing for new HP ttys
dumb        80-column dumb tty
putty-vt100 VT100+ keyboard layout
putty       PuTTY terminal emulator
putty-256color PuTTY 0.58 with xterm 256-colors
qdss        qdss glass tty
vt100-putty Reset PuTTY to pure vt100
vanilla     dumb tty

```

man terminfo for term settings

/usr/share/terminfo/*/*

tty33 is in /usr/share/terminfo/74 it is a binary file

use infocmp to look at file:
infocmp tty33

```
# Reconstructed via infocmp from file: /usr/share/terminfo/74/tty33
tty33|tty35|model 33 or 35 teletype,
    hc, os, xon,
    cols#72,
    bel=^G, cr=^M, cud1=^J, ind=^J,
```

From man terminfo(5):

These capabilities suffice to describe hard-copy and "glass-tty" terminals. Thus the model 33 teletype is described as

```
33|tty33|tty|model 33 teletype,
    bel=^G, cols#72, cr=^M, cud1=^J, hc, ind=^J, os,
```

while the Lear Siegler ADM-3 is described as

```
adm3|3|lsi adm3,
    am, bel=^G, clear=^Z, cols#80, cr=^M, cub1=^H, cud1=^J,
    ind=^J, lines#24,
```

I don't see any way that I could automatically convert from upper case on the terminal to lower case...

Is there a way to always add the 6th bit to make all characters lower case? But this could only apply to the alpha characters...

Basically want to or 0x20, but only to alpha characters 0x41 through 0x5A

On the Olivetti:

Can I move the platten forward towards the print wheels?

Can I improve the horizontal control such that the 396 tooth to lock printing head return control rod is in the proper adjustment according to the manual? I currently have it set back further because not all returns release the return control rod...

10/13/2019

Spent some time wrapping up the horizontal control. I positioned the print head damper such that the first character wheel strikes 29mm to the right of the left-most vertical control gear on the platen (per diagram in book, 394). You can place the wheel against the platen to check its position by removing the ribbon cartridge, then rotating the print shaft while lightly pressing on the stroke bar. Eventually, a stroke will execute. The maximum horizontal position was set to about 80 characters, so this fills the page pretty well. The horizontal control was tweaked such that consistent returns were obtained. The automatic return may skip one character ahead. Carriage returns seemed to come back correctly to the desired start column.

I still get some errors on bit 4:

"D" instead of "T" (44, 54)

and

")" instead of " " (29, 20) - strange!

"LF" instead of " " (0A, 20) - also strange? 0000 1010 instead of 0010 0000

These latter two -- I adjusted the timing knob again a little.

There seems to be a clicking sound in the machine that I can't identify.

The motor is running hotter? This worries me...

10/12/2019

Rebuilt the teleprinter, reinstalled cable ties, etc.

Key actuation:

Found the actuator for the "O" key. It is next to a strut of some sort and the movement was very sluggish. I peeled these apart

and spent some time lubricating and working it. I worked on three other key actuators. These are the long, flat bars visible on the back of the teleprinter with the bottom plate removed. On reassembly, the "O" keys and others work very well. The jamming clutch does not trigger. I can type fast. The exception is backslash, "\", which I cannot get to print.

Timing knob:

Timing knob - errors at about 30 and 95. Set half-way, around 52.

Stroke timing:

Readjusted stroke timing back to original. Type is somewhat lighter. The adjustment is accessible from the front without removing the lamp. If the set screws are towards the back, trigger the stoke bar and turn until they come around.

Try this (from the mac)
screen /dev/ttyUSB1 110
Control-A and then Shift-: (shift-colon)
exec ::: /usr/libexec/getty std.110

Not sure where getty is on raspberry pi

See also:
https://elinux.org/RPi_Serial_Connection

Note this issue:

Note that on older software by accident the internal pullups of the RxD GPIO pins were not enabled, this could lead to lots of serial garbage being picked up if the GPIO pin was touched, or even if a finger was nearby. In extreme case this could lead to kernel warnings and other problems.

10/11/2019

Built a second snubber circuit. No change in behavior from the first, but teleprinter works much better at 110 baud. Fewer misprints / errors.

10/10/2019

I wonder if backing off the axial position of the "centrifugal weights" (p241) would help?
I should measure the distance specified at 4.2-4.6mm to see if that is correct.

—

84 teeth on horizontal control gear.

It is adjusted with a piece on the underside that sets the automatic return. Two squares - the rightmost indicates full movement and shifting counter-clockwise towards the second indicates setback from the edge of the paper. I moved clockwise so that I have roughly 75 columns.

10/9/2019

1000V
How much charge in a spark?
30000V/cm field strength
1mm? = 3000V (so, order 1000V is accurate)
spark is about a millisecond? Shorter?

$P=IV$
 $V=IR \rightarrow I=V/R$
 $P = V^2/R = 10^6/10^{-3} = 10^9 \text{ W}$ (if this were DC)
resistance is on order of 10^{-3} Ohms (1 mOhm)

1000V is 1000 J/C
The resistance is 1mOhm
Time is less than a ms

$$V=RI \rightarrow R [=] V/A [=] (J/C)/(C/s) [=] Js/C^2$$

$$I = 1000/10^{-3} = 10^6 \text{ C/s}$$

So... 1000C if that is over 1ms. 1C if over 1microsecond

$$1F = 1C/V [=] C^2/J$$

$$R \cdot C [=] \text{ s}$$

The current RC time in the FS filter is:

$$1 \text{ ohm} \cdot 1.8e-6F = 1.8e-6s \text{ (~2 microseconds)}$$

$$50 \text{ VAC? (Assume 50V fully charged) =}$$

Having two poles or coils, motor should be $2 \cdot 60\text{Hz} / 2 = 30\text{Hz}$ or 3600 rpm
But then how is speed controlled by voltage?

Answer: It's an induction motor, not a synchronous motor.

$$1\text{hp} = 746\text{W}$$

"The running torque of a single-phase induction motor is proportional to the square of the line voltage."

Why no limiting resistor to limit in-rush current? Possibly because the step-up transformer

ISPT manual: 50, 75, 100 baud operation

for 5-bit, 7.5 bit total the equivalent 8-bit (11 bit total) would be:

50 73

75 110

100 146

So there is your 146 baud.

—

Remember,

2 is transmit data from Olivetti (DTE) to IMSAI (DCE)

3 is receive data from IMSAI (DCE) to Olivetti (DTE)

4 is RTS from Olivetti (DTE) to IMSAI (DCE)

5 is CTS from IMSAI (DCE) to Olivetti (DTE)

Making adjustments to weights:

3.5 turns out: 70.4ms for 8 bits = 113 baud

4.5 turns out: 72.2ms for 8 bits = 111 baud

11 bits, 99.4ms

Snubber circuit in place. 0.86uF capacitor and 10 Ohm resistor. No inductors, yet.

Some sparking. It looks like this has been occurring for some time based on buildup of material on the centrifugal switch posts.

10/7/2019

Checked resistances

On the resistor:

R-12: 94.1Ohms

R-K: 352.8 Ohms
K-U: 101.7 Ohms

On the motor:

T-Z: 33.7 Ohms
T-V: 63.0 Ohms
V-Z: 30.1 Ohms

10/5/2019

Removed L, K jumpers from spark suppressor filter (FS). Separating contacts of RV switch, I measured continuity between L and K. This seems to indicate that FS is shorted, as I suspected.

With L, K disconnected, the motor runs at a slower speed. I see sparks on the IC switch, which shows that it isn't separating sufficiently. Third power-up attempt resulted in motor not starting, but power unit turning on. Confirmed that the (new) thermal switch opened. Closed it fine, restored L, K and ran as usual.

10/4/2019

- Make a movie of the speed regulator turning on
- Check limiting resistance and ballast resistance
- Could FS be shorted?
- Check timing of parallelizer shaft (see TE-318 adjustments)
Photos seem to be consistent with diagram. Verify and document.
- What is the motor clutch?
- Is there a short anywhere else?
- Is the wiring consistent with the diagram? e.g. is the limiting resistor actually in the circuit?

My current guess is that the behavior is consistent with the limiting resistor shorted, the FS shorted, or they are taken out of the circuit on purpose to run the machine at 150 baud. The voltage decrease over this resistor should be about 0.43, so at 171VAC, the voltage over the motor is 71VAC (without the motor in place). This would explain why changing the voltage down to the 50-baud value (151VAC) didn't change the speed.

Motor resistance:

Machine speeds up - 9/17/2018
Motor capacitor leaks - 10/20/2018

10/3/2019

9/10/2018 was the original measurement of 110 baud (108)
74ms for 8 bits transmitted (just looked - 55ms for 6 bits = 109 baud)
The 110 baud could have been due to the failing motor capacitor. Once the cap failed, it started to slow the motor down (probably by shorting).
Or it could have been due to friction in the parallelizer caused by broken parts? (seems unlikely)

- Make a movie of the speed regulator turning on
- Check limiting resistance and ballast resistance
- Could FS be shorted?
- Check timing of parallelizer shaft (see TE-318 adjustments)
- What is the motor clutch?
- Is there a short anywhere else?
- Is the wiring consistent with the diagram? e.g. is the ballast resistor actually in the circuit?

Why is the speed the same?
Why doesn't the regulator function? Could it be just too fast at 60Hz, 120V?
But the 125Hz blink on Arduino (is that a valid way of measuring?) tracks the 75 baud stripes.

10/2/2019

I managed to pull the top plate from the speed regulator mechanics. The top-right screw and knob unscrew. There is a flat on the knob shaft that can be used to remove the knob. I can see some of the contacts.

The three contacts towards the back of the machine is "IC" the centrifugal switch.
The central contact is "RV" the speed regulator.

The "fine control" speed knob was turned fully in the counter-clockwise direction. The range is about nine full turns. I turned the knob clockwise 9 turns, then backed it off counter-clockwise 4 turns. There is now some play in the lever that it pushes on.

I made connectors for the new E-T-A thermal fuse and installed. No change in behavior.

Figured out the speed adjustments. Will take some photos.

Replaced fuse.

Rewired.

Powered on.

Verified that IC contacts change. It looks like regulator contacts are not touching.
55ms for 8 bits = 145 baud

Centrifugal weights:

With axial screw facing me, I turned the top screw 4.75 turns clockwise to tighten

Screw facing AWAY from axial screw turned 4.5 times clockwise.

Turned both back 4 turns, as directed in manual.

No change in speed.

Turned both clockwise one turn (three turns back)

No change in speed.

Backed both off two turns (so out five)

No change in speed.

Voltage between 16 and 21 is 151.1VAC. This is the 50 baud voltage. Should I change it?

With voltage set to tab 21, the 8 bits is 56.8ms... barely a change!

Set it back to tab 22.

Centrifugal screws one-half turn back from all the way clockwise... no change in speed.

11 bits, 75.8ms = 145 baud

(If this was 5-bit baudot, it would be 100 baud)

***But now I have to move the timing knob to 60.

9/30/2019

Questions:

1. What effect will there be replacing the thermal fuse?

Fashion correct tabs (DONE)

Fashion plastic holder tab - 3 holes

2. Can I slow down speed with the regulator coarse adjustment screw? What is on the reverse side?

3. Should I change motor input power to 145V (50 baud)? What speed would the teleprinter run at? Could it do local mode at that speed?

Build a circuit to adapt RS-232 voltages to 5V for Saleae

Thinking of speed...

If the setting is 75 baud for 5-bit baudot,

Baudot uses 5 bits, start bit, and 1-2 stop bits = 7-8 bits

ASCII uses 8 bits, start bit, 1-2 stop bits = 10-11 bits

Set up for 75 baud, taking into account motor frequency speed,

$75 \cdot (8/5) \cdot (60/50) = 144$ baud

This is the measured baud rate of my machine (I measure 142-144 baud)

1 baudot stop bit looks like 2 ascii stop bits... $8/5 \cdot 60/50 = 1.92$

If this is true, changing to the 50 baud voltage should drop the teleprinter to 96 baud ascii (max) IF I multiply $144 \cdot 50/70$. But, if I multiply by the ratio of the voltages ($145/171$) then the baud rate is 122.

A new calculation of the baud rate

The TE-315 at 75 baud transmits 7-8 bits in 0.093 - 0.1067 seconds / bit (9.3 to 10.7 ms), assuming 220V at 50Hz.

The TE-318 on the same motor settings will transmit 11 bits.

10.7 ms (8 Baudot bits) to transmit 11 bits = 102.8 baud

9.3 ms (7 Baudot bits) to transmit 11 bits = 118.3 baud ($\cdot 60/50 = 142$ baud)

I think the second is correct, assuming that there are 5 bits, 1 start bit and 1 stop bit for the TE-315.

The voltage runs a little high (175-177 versus 171) which might account for a little more speed (up to 145 baud). This is the range of baud rates that I've measured.

Basically, I've learned that the baud rate is completely controlled by the mechanics of the teleprinter. The interface electronics do not control the communication rate. The machine seems to be running at the fastest speed. I'm not sure if the speed regulator device is working or not.

Further reflection:

According to product literature, the TE-315 machine runs on 7.5 bits (1.5 stop bits). Do things still make sense?

7.5 bits at 75 bits / second = 10ms / bit.

10 ms to transmit 11 bits is 110 baud (!)

Accounting for frequency and voltage, $110 \cdot 6/5 \cdot 177/171 = 137$ baud

9/26/2019

Have been analyzing electrical systems.

Learned:

- TTY is powered by 110V, 60Hz

- "Power supply unit" acts almost solely (apparently) as converter between current loop and RS-232.

- There may be some handshaking signals between the power supply unit and the TTY.

9/15/2019

Powered up Olivetti last night.

Having problems with LF in both receiving and local mode.

It tends to print additional characters. Will have to check which ones. Some of them are nulls, I think.

0A is LF 0000 1010

0D is CR 0000 1101

Is this consistent with persistent problems on bit 4?

Reading tape and reperforating worked fine - better than expected.

***Today:

Moving timing knob (see Diagnostics, 283) slightly forward seemed to help the reception errors (now set from between 5 and 10). I got LF's without errors after a while, typing in local mode and punching without problem.

Second power up, I was reading and reperforating a tape and the machine got stuck printing "P" (0x50 or 0x70). It looks like the parallelizer was stuck, possibly due to a jam in the transfer frame. Powered down and powered back up, but it continued.

Powered down again and pushed on the feelers a bit. After powering up, it recovered.

The "O" key made a strange buzzing sound at one point. This key always gives problems when typing - locks up the keyboard.

Future:

Idea with Josh: folding tape to make larger patterns

Test 90 degree folds

7/24/2019

Have had generally good printing results. The ribbon is beginning to fade.
The parallelizer started producing errors again after printing via "DUMP" in CP/M.

"space" becomes "(" - ascii 20 to ascii 28 - 0010 0000 to 0010 1000

"0" becomes "8" - ascii 30 to ascii 38 - 0011 0000 to 0011 1000

sticky bit 4 again. See 3/5/2019. I've seen this before, but I don't always document it.

06/14/2019

VSPPOOL is ready for:

ASCII art

Twitter print

Could be improved by cutting off print beyond 72 (75?) characters

Is there something that gives a signal that the teleprinter is ready to receive?

—

Measured the output of paper tape on the Olivetti. (Series of "U" characters with NULL ahead.) Each character in the sequence is 75ms. That's 13.33Hz

11 bits in 76.8ms zoomed in slightly more. That's 13.02Hz. I would view this second measurement as more accurate. Each byte is 11 bits (1 off, 7 data, 1 parity, 2 stop). So that's 143.2 baud, within about 5% of 150. Saved images SDS00009.jpg and SDS00010.jpg of NULL and U characters, respectively.

Coming out of the IMSAI with the console pause programmed at 3000H, 8 bits is 53.2ms = 150.4 baud

Each byte is 73.15ms.

The time between the start of each character is 146ms.

So the pause corresponding to 3000H is $146.0 - 73.1 = 72.9$ ms

06/09/2019

Used the new Siglent SDS1202X-E scope to look at the RS-232 output of the Olivetti.

Confirmed that the Olivetti baud rate out is roughly 142-144 baud. This should be within tolerance for 150 baud.

Next:

- Check output of IMSAI serial
- Print DUMP of bytes read in (problem - not running CP/M or monitor)
- Want to work on parallelizer. Install spacer c-clip? Rubber gasket?

06/08/2019

VSPPOOL3.ASM (VSPPOOL.ASM on the CP/M disk)

Tried reading in VSPPOOL.COM from paper tape, but I was getting a few bytes / errors. The idea was this: dump

VSPPOOL.COM to tape using PIP

PIP PTP:=VSPPOOL.COM[O]

Read back to IMSAI using a short loader program that's toggled into the front panel at address 0000H. It should read VSPPOOL.COM in at 0100H.

Quick inspection shows that some bytes are incorrect - dropping bits. e.g. B7 came in as 37. Dropped last bit.

Check the loader serial configuration. May want to change to 1 stop bit from 2?

5/31/2019

Why does it seem like the Olivetti prints 4 characters then pauses for a beat?

This is from CP/M. Is it due to the way CP/M handles output?

Is it aliasing between the pause cycle and the baud rate?

Can I "see" it on the scope?

5/22/2019

IEEE article on Olivetti

First mainframe was built around transistor technology

For transistor supply, started SGS Microelettronica (Società Generale Semiconduttori, founded in 1957 by Adriano Olivetti)

The parts marked "ASY" are possibly germanium transistors

Confirmed. Uses european "pro electron" standard. "AY" refers to a a low power germanium switching transistor with serial number Y80. What I thought was "IW8995" is actually "1W8995" another transistor type - looks like a silicon signal transistor type NPN.

Here's the list of electronic components:

2N1893 - big	Bipolar Transistors - BJT NPN General Purpose, "small signal", TO-39 case
TW8995 - small	guessing this is 1W8995, too
IW8995 - small	
IW8995 - small	NPN silicon transistor, TO-8 case
IW9680 big	see https://archive.org/details/CQ_elettronica_1979_12/page/n53
IW8995	
IW8995	

ASY80 germanium low power switching transistor

The "IW" is printed as a roman "I", but it is likely a "1".

3/30/2019

"Demodulating guide blade" moves the entry wedge, which in turn pushes the "entered wedge".

Motor circuit - page 2.41 - explains the motor circuit and the phases of starting and regulating the speed. The steady speed should be 2500 rpm.

3/23/2019

"TELEPRINTER" (11)	I <HEART>	"TELESCRIVENTE" (13)
"FERNSCHREIBER" (14)	TTYS	"TELETYPE" (8)

TELETYPEWRITER

10 bits / inch

"TELETYPE" (8)	I <HEART>	"OLIVETTI" ()
"FERNSCHREIBER" (14)	TTYS	"CREED" (5)

3/11/2019

A BASIC program that prints all over-strike combinations of characters

```
print all characters top row
print diagonal of over-strike characters
  1, 2, 3, 4 ...
  1+2, 2+2
  1+3, 2+3, 3+3
  1+4, 2+4, 3+4, 4+4
  ...
starts with 0x20 = 32
```


0001,1001,1110,1111,0011,1100,1101,0101,1010,1000,1111
19EF3CD5A8F

Printing errors: See 3/4/19 for list of
Dismayed at recent printing errors.

- Check speed.
- Check parallelizer, especially round bit 4/5.
- Are these levers sticking?

Can focus on some ASCII art...

3/4/2019

LOVE.BAS:

- Different characters instead of strings. Try these: \ / X O . ; - #
colon won't work in a print string?
- Other two- and three-character combinations look promising: /X -0- \0 ^
- Modify LOVE.BAS to enable overprinting of different characters?

- ASCII art
need to learn how to generate from images

Tried a few characters. Got decent prints with \ and .
Got misprints with #, O

When printing #:

sometimes gives +

= 010 0011

+ = 010 1011

SP sometimes gives (

sp = 1-010 0000

(= 0-010 1000

When printing O:

Missing spaces and extra line feeds

O = 100 1111

When printing XO:

X sometimes becomes H or N (less frequently)

X and H are understandable, differ by only one bit:

X = 1-101 1000

H = 0-100 1000

N = 0-100 1110

Seems like bit 4 is sticky, sometimes bit 5.

Increased delay to 0x3000 in BIOS, but didn't help much with misprints. May switch back to 0x2C00.

Guessing magnet or parallelizer are a little tweaked...

3/3/2019

Now printing from IMSAI in assembly and BASIC. Tried printing Tarbell CBIOS (TBCBIOS.PRN) and made it to about page 13 before getting a lot of errors. BIOS delay was "0x2400". I increased this delay to "0x2C00".

Common print errors - noted on print out

Want to lubricate print shaft.-done

LOVE.BAS

Modified to print to tty (LPRINT statements) and center text.

2/20/2019

Tweaked the horizontal control, but still can't get 80 characters across. Still about 75 or so.
I loosened the horizontal great that trips CR and reengages the horizontal movement.
If it is set too far back, it moves past the tripping bar and gets stuck. Stiffening the damper helped a little.

Try this:

Enter a carriage return. This seems to start somewhat more to the right. (Or line it up with characters printed at that point)
Hold the carriage there.
Set the damper so that this is the maximum horizontal travel.
Also, read up on horizontal control.

2/14/2019

Disabled the ENQ suppression of the punch. The left-most feeler / actuator controls the suppression. The other associated with ENQ drives the mechanism and suppresses the carriage and stroke.

Below the functions unit, there are three hook / bend mechanisms that act to suppress different functions. The first two are carriage and stroke. The third is the punch suppression. I detached the hook mechanism from the link connecting to the actuator / feeler / functions unit. I slid the hook out beyond the bend. This works and does not seem to affect other functions.

I think I could take apart this mechanism and remove the piece I displaced completely. But it seems to work, so we'll keep it as is.

I verified that I can now punch 0x05.

Before closing up, I would like to see if I can adjust the horizontal control to print (or print closer to) 80 characters across. Currently, I think I am getting 74.

2/12/2019

OK, learned more about how feelers work and actuate different functions. Feelers move up when code received. This enables the rotation of an actuator that can push or pull rods (e.g. pull the bell clapper) and suppress either the carriage advance, character stroke, or both.

The ENQ function has TWO feelers. One initiates the responder, and the second suppresses the reperforator. I figured out how to disconnect the response mechanism. I have to find the rod or mechanism that suppresses the reperforator, or somehow disable this function.

I believe the left-most feeler (looking from the bottom or top from the keyboard) is the ENQ start mechanism. The second one from the left may be the feeler that controls the reperforator. Both seem to have identical codes, which I've observed before.

I was thinking of removing a spring or otherwise deactivating the ENQ "actuator" but this would prevent suppressing the carriage advance and stroke suppression of a control character (probably not a HUGE deal.)

BETTER to remove the connections to the actuator to the rod(s) that are activated or find where the rod suppresses the movement of the rod connected to the punch. As I observed (in Notability notebook) the punch is connected by a rod which moves forward to engage. Every character except ENQ moves this rod.

2/11/2019

I wonder if the switch / actuator on the functions unit somehow suppresses the print... ???

2/9/2019

Thursday was printing, then the printer started acting up (misprinting characters / reception errors.) Serializer / send was working fine. Suspected the parallelizer copy frame was misadjusted again. Took apart, but copy frame vertical position on read looked fine. Nothing mechanical obvious. Pulling out the magnet seemed to make it worse. Bumping it around a bit may have helped. Adjusting the magnet and the timing knob made things worse.

I popped open the lower cover and reseated the cables. These may be becoming loose. After this, the teleprinter started to work better. I tweaked the timing knob and have had few errors. I continuously printed nearly a page of all of the characters.

The printer seems to print in groups of 5 characters. I'm not sure whether this is the Olivetti or the Sol.
5 characters = 50 bits

- Punch suppression by ENQ -

I looked at the mechanism for the autoresponder. I unhooked a spring connecting the functions unit to the autoreply mechanism and could get it to stop triggering. However, the character 0x05 still does not punch. Somehow the functions unit suppresses the punch. I can see that there are three bars leaving the functions unit. One activates when CNTL-R is entered (the punch runs) but does not when CNTL-E is entered (punch does not operate). When a normal, printing character is operated, two of the bars move.

2/5/2019

150 baud = 15 characters / second

2/4/2019

Interested in the typeface of the Olivetti.
Somewhat similar "O" to Olivetti Lettera 32 with Techno typeface.
The numbers are not Techno, though.

Also similar to:
Olivetti Techno Pica by Setag 1950s

Reference to Olivetti Techno Pica by Seta 1950's.

1/26/2019

Does the teleprinter issue CTS / RTS signals?

1/14/2019

This weekend punched a number of different patterns.
Wrote BIGPATT which includes several different patterns
Inverse patterns can be accomplished by XOR FF the original pattern?

XRA M - XOR memory pointed at by HL with accumulator

XRI byte - XOR accumulator with immediate data

*** Would like to include a "pause" function by keypress *** or print 5-10 cycles

what about 8 cycles? Could keep track by rotating 0x01 (or other starting number) until carry

1/9/2019

Recompiled PUNCH2.ASM to set a delay of 0x8000. This is a pretty long delay, but I didn't get punch errors in the print. I think each delay loop is something like 24 cycles, so this is close to 800ms per punched byte.

I made several patterns by feeding the punch into the reader. Sometimes I get dropped bits, but generally successful. What is the pattern of dropped bits? Are there particular bytes that are problematic? What are they coding for as control characters?

bit 0 in 0x81 (after 0x7E)

bit 4 in 0xFF (after 0x00)

I made patterns by punching characters then using the punch backspace to adjust their spacing. I tried "X" and "O". (I thought "K" would be interesting, but it isn't symmetric. A sequence of "H" and "I" would be interesting.)

--- NEED TO ---

- Add numbers and symbols to PUNCH2.ASM
- Accept a string to PUNCH2.ASM
- Try some other fonts for punching
- Space Invaders, Pac Man, Galaga

1/6/2019

Punch fun

Punch patterns - circles (7E2)
 feeding tape into punch for endless punch in LOCAL?
 ALL WORK AND NO PLAY...
 repeating messages and words?

Able to read simple punch programs in via EN 0100 command and tape reader
 Write a modified version of DUMP.ASM that outputs the correct format

MIT SIO-2 has ability to set serial through initialization routine.
 Does IMSAI SIO?
 Does PROC TECH 3P+S?

CP/M + teleprinter on IMSAI
 need to write a tty / punch / reader for CBIOS

IMSAI use - more general printing of text and files
 SOL use - hacking punch patterns and small program development

What was the green switch on the right for?

Operator manual, p. "Inserting batches of forms"

Open the upper doors of the machine and release the platen release lever.
 Make sure that the green push-button, situated on the right-hand side of the machine under the platen release lever, is depressed.

Indeed - holds paper guides away from platen and allows paper to be inserted more easily. Also pull back the tractor feed when starting paper.

Today:
 wrote "ENTDUMP" which is a modification to DUMP.ASM that prints an ENT file format.
 Edited it entirely in ED on the Sol-20. Fun times.
 It works ok. It assumes the code is at 0100 (as any loadable CP/M program). It's a hack.

I punched the ENTDUMP. However, once the Sol is in SET I=1 mode, NULL or other characters (CR?) produce an error and it drops back into console input mode. Starting the tape from "EN" resulted in a successful "read".

What I need to do is have it send its output to the printer / serial port (with the appropriate leader messages)
 Note that LF is not needed, only CR after each entry line.

So... some tweaking. My interest here is specific to the Sol and its unique entry methods.

Changes to ENTDUMP:

- Use TTY not console (will complicate "EN 0100" message output).
- Need to modify PCHAR routine?
- Control output speed?
- Strip LF from output. Only need CR.
- Choose 0000 (for target, other progs) or 0100 (for those running on CP/M, too)?

1/1/2019

- Punch hacks -

Last night I copied a punch tape in local mode. It should be possible to copy other tapes, like patterns and messages (although not sure how 8N1 tape will work versus 7E2.)

- pattern punching and feeding into reader in local mode
DONE! WORKS! Copied both zig-zag and text ("RETROLAB")
- looping the reader tape
- feeding the punch into the reader for continuous printing

Neil visited and took a look at the teleprinter. In high school he used one in a programming class with a time share system. The time share machine was at another high school. Since machine and dialup time was very expensive, they would punch a program in local mode, then feed it into the reader while connected to the server. Programming was in BASIC. (Which variant?)

GOALS in 2019:

Display the restoration and operation of Olivetti Te-318
Arduino? print server with twitter feed.
What have people done?

Twitter to Teletype:

<https://github.com/swindonmakers/snhack.github.io/wiki/Twitter-to-Teletype>

12/31/2018

Tested the speed of the machine using the blinking Arduino sketch / LED output. The 75 baud band was moving more than before. The "fine adjustment" screw doesn't seem to do anything, but I manipulated the top "rough adjustment" screw and this had an effect. I turned it clockwise and got a nearly stationary pattern. Nothing in timing changed.

(NOTE on 10/4/2019: the "rough adjustment" screw noted above is the screw attaching the top plate to the regulator device. I mistook this for the adjustment screw for the counter weights that are accessible to the left of the square assembly with the contact switches.)

I noted in my Notability doc that the manual's R/L movements in the parallelizer are the opposite of those in my machine.

12/30/2018

Would like to replace the rubber gasket on the transfer reset plate.

Test the speed?

Today: test the pacing of output.

In SOLOS, slowing down the output gave an almost perfect data dump:

```
SET N=3  
SET S=3F
```

SET N produces three NULL characters after each CRLF
SET S changes the output speed. 0 is fastest, FF is slowest.

There are still some "NULL" characters being printed. That could be the position of the stroke bar.

Using SET S=2F, I could print successfully from CP/M. Initially, with several space characters at the beginning of the line, I was getting the "NULL" circle symbol. The stroke bar was vibrating with each character, but not cycling. The errant strikes were likely due to the unevenness of the stroke bar. I backed it off a little and the printing seems to be working more or less flawlessly. I

12/29/2018

Last night: printed ok. Still getting reception errors, especially when printing messages with PUNCH.ASM

In local mode, reading a tape results in punching a copy of the tape. Interesting way to duplicate tapes (if it works.)

Took the cover off to work on the parallelizer. The parallelizer is (was) not copying the sensed levers. There was not enough movement in the rockers and setting ties (or "first operation setting levers.") The setting levers need to be displaced enough for the first operation bails to catch them in the work or space positions.

I pushed the copy frame down when it was in its maximum downward displacement, which fixed the rocker movement problem. The rockers now exhibit more up-and-down motion and the setting levers move, catching the bails. I can manually enter bits through the parallelizer selector disk.

I'm not sure how to permanently fix this problem. (I had noted it before?) Last adjustment was October 23.

I have to test this in operation.

I wonder if I should replace the rubber gasket on the transfer reset plate?

TODAY:

- Check p. 9 of "Adjustments" for speed / operation settings.

Dickens of a time today. I made several adjustments in the parallelizer and I haven't had consistent printing working.

The copy frame seems to have moved up again. I'm not sure what isn't holding it properly. I moved the transfer reset plate up a small amount. I also sheared one of the bolts holding it to the frame, but I found a (star bolt) replacement in my parts bin.

The reception seems very sensitive to the vertical displacement of the EM. I've pushed it as far up as it could go. If it is lower, I'm getting "abusive parallelizer" cycles (repeating same character.)

I made two movies. One of "PATTERN.ASM" of the holiday pattern. This seems to work without a problem. The other movie is of 40 characters of repeating "U" and "*" being sent to the Olivetti via TYPE. Here, it starts off ok, but then starts to have issues. I'm beginning to suspect it is the timing. Bytes are coming in faster than the teleprinter can cycle? By slowing down the incoming bytes, I should be able to get reliable punching and printing.

I had played around with the top screw near the speed control knob. I wonder if this affected anything? Could it have slowed down the Olivetti? Can I check with the "strobe?"

12/23/2018

Olivetti projects

Sound recordings

Video: parallelizer, punch

Switch for "75 baud" operation?

12/21/2018

General work. I think the parallelizer needs some adjustment. I should have moved / tweaked the position of the EM magnet. I forgot to do this. The rod holding the entry rockers was loose. (Correct friction noted on 290 of diagnostic guide.) this may require some additional tweaking.

290 - Check the friction of the entry rockers

I also tightened the left side of the transfer reset plate. The nut had become loose there, too.

Getting somewhat more consistent printouts. I resolved the poor line start (characters overprinting at beginning of line or missing characters) by adjusting the return. I loosened the gear at the top of the axle connecting to the "printing head feed and return clutch."

396 - Check the release of the tooth to lock the printing head return control rod

I still get NULL errors and some misprint characters. Additional points to consider:

Getting very few perfect "PUNCH.ASM" prints, except that "PATTERN.ASM" (the zig-zag holiday pattern) seems to work well and without errors now (even with periodic printing by the print head.)

12/19/2018

Thermal switch - E-T-A brand
0.4 A, 3 contacts

12/18/2018

While I was falling asleep, I thought that the carriage return problem may be due to the placement of the horizontal control gear (specific name?)

Or... ignoring handshaking signals

The carriage is also off by about a centimeter. Should it be in the inner slot on the horizontal ratchet or the first?

$1/110 = 9.1$ ms
 $1/150 = 6.7$ ms
about 2.4 ms difference

two stop bits

$18.2 - 13.4 = 4.8$ ms

is this enough time to make a difference for the carriage return?

- handshaking issue? Check handshaking signals to and from Sol?
- Need to monitor up to six channels... but only have one MAX232?
 - 6 and 8 are tied together. What if I "untie" these?
 - 4 and 5 are most important - request to send (RTS) to clear to send (CTS)

** ***so, when printing - look at transmitted data from Sol to Olivetti and RTS to CTS from Olivetti to Sol***
pin 2 on Sol (3 on Olivetti), pin 4 on Olivetti (5 on Sol)?

Remember - something else is going on in the interface box to regulate the RS-232 baud rate (?)

- what is the circuit?
- trace wiring from connectors to interface box

Take a closer look at the motor circuit diagram

- what are the symbols?

Open the Olivetti and look at the thermal switch

- what brand? Part number? How is it wired?

First operation bails

- since putting the print head on, haven't been able to manually enter a bit pattern. Why?

Could the errant printing (DEL - 7F) be related to... received errors. E.g. frame ground, etc.? Triggers disk start, but all marks, due to EM energized.

Something weird or buggy about the EM current? ***Could be thermal switch cutting in / out?***

12/17/2018

It looks like bits 4 and 5 (or 5 and 6?) may be stuck together.
Later: look at whether these are near the bit I needed to adjust.

Hugh Pyle - asr33
Scripts to convert bitmap fonts for teleprinter
<https://github.com/hughpyle/ASR33>

Quick tear-down last night. Got the Olivetti back on the bench to take a look at the serializer. Sure enough, bits 4 and 5 were stuck. Wiggling freed them, but I adjusted the locking screw / connector on bit 5 a little to the left. I tested the reader and got

the proper output. I captured the data to the Saleae Logic. The ASCII decode worked fine. It shows a baud rate just below 150 (~146) and has no problem detecting. Bits are between 6.68 and 7.1 ms long (what is the average?) There are two stop bits.

12/16/2018

Worked long enough this AM to get a few "bookmarks" and holiday greetings printed. Then started getting some reception errors again (FF).

Serializer is giving errors. I captured frames with the Saleae Logic. I can take a look at the timing.

Next steps:

- disassemble.
 1. Check the serializer and reader.
 2. Look at the thermal fuse. What type? How is it wired?
 3. Look at position of horizontal control.
- additional adjustments (can do this on the stand)
 1. back off the stroke cam on the print head just a tad.

Why do I get FF errors? Seems like the parallelizer is "seeing" an errant start bit. Does it depend on the previous byte?

12/15/2018

*** Reader throwing errors again. Fix must not have held. Will need to disassemble!

*** Need to adjust carriage return. Think that the horizontal control is off. Need to move it more to the right.

Punch throws errors when print head engaged. I've had very few perfect prints with PUNCH.ASM today.

Backed off the EM adjustment. The dial is nearly all the way clockwise. I turned about 90 degrees counter clockwise. I'm getting few reception errors in print mode. (But this changed with time). Later, I fiddled with this and the timing knob, but printing seems to have gotten worse.

Printed PUNCH.ASM using PIP. Several pages printed without too many errors.

7E2 punch bookmarks

elite hacker:

U*U*U^@^@^@3733T H4X0R^@^@^@U*U*U*U

patterns

RS-232 pins installed on cable for the Olivetti:

- 1-11 - not sure what 9, 10, 11 do. Could be current loop?
- 16, 17 - confirmed that these are NOT installed, actually.
- 20, 22

12/13/2018

Set up twitter account: OlivettiTe318

Idea: print tweets sent to account

I feel like a 30th-level retrorestorer. (Well, maybe a little lower...)
I feel like, "Oh, how sweet... you recapped a Mac SE/30."
I am the ALPHA-GEEK, restorer of the OLIVETTI TE 318!

12/12/2018

- What would be interesting to film / document?
print head movement without the ribbon in place
- Can I get faster printing from the Sol?
- Should I package it up? The reader still needs some work... and I need to investigate the fuse / speed control. But it would be fun to assemble it in some sort of working condition. With the light and everything... the bell...
- Stroke bar looks like it is holding up. I have my doubts about the print shaft / print head coupler, but we'll see.

Today: Fixed the reader. The problem was two of the rods were switched between the reader and the entry bars for the serializer. Bit 2 and 3 were essentially out of order. So, a "10101010" (lsb on the right, msb bit is parity) would read as "10101100". I confirmed that the reader was detecting the correct bits, they were just activating the wrong bits on the code block of the serializer. I also lubricated the reader parts and worked them to get the movement smoother.

I reattached the baseplate, then I reinstalled the bell and the light. I installed the top cover, but do not have it attached. The paper guides and punch tape guide are back in. It looks good and is much quieter.

I really want to run LOVE.BAS on it.

12/11/2018

Yesterday:

Reinstalled all parts and tested. Some print activity observed, but not printing while fully running. Manually operating the stroke bar while powered down works. It strikes the paper fine. However, while the received bytes are moving the print carriage, the head is not making contact with the paper. I adjusted the print "impression control" which is the lever on the right of the printing head. That did control the impression when manually operated, but did not produce a change when powered on.

I suspect a few things could be happening. The stroke is initiated, but perhaps too late? Moving the stroke bar forward might help. The stroke bar repair is pretty rough---the surface facing the printing bar is uneven. I'm guessing I will get uneven prints if I can get it working. Diagnostic manual states 0.1-0.2 mm clearance, which is close to contact. I may have 1mm or so.

Overall, however, I think that the motor speed needs to be adjusted. The machine is operating faster than it should. I've noticed this from the baud rate being closer to 150 than 110. Could this also explain the errors in the paper reader? (more likely that this is a parity issue?)

NEXT STEPS

- WARNING: Check alignment of reperforator timing belt! I missed the fact that the print shaft and the reperforator gear have alignment marks that should be synchronized. In my photos, I don't see an alignment tab?
- WARNING: a little more noise last night. I think the right-side bearing is off center slightly. Adjust.
- Adjust stroke bar closer to print bar on printer head. Should be 0.1-0.2 mm according to check 322 in Diagnostics.
- Also check "print vane support plates" that were reinstalled. Would play there have any effect?
- Should I try to operate the teleprinter through the variac?
- See 242. Motor speed - centrifugal switch.

Work:

Checked and corrected reperforator belt. Alignment mark is triangle punched into reperforator side. There is a notch on the reperforator gear. Alignment is easy - loosen gear from print shaft and rotate until aligned with print shaft gear, then tighten. Initially I had it misaligned and the reperforator was not operating.

I worked on the stroke bar. There is a little play in the stroke bar during a normal (non-printing) cycle. If the stroke bar is too

close to the paddle on the printing bar of the print head, this will lead to erratic or "abusive" printing---the print wheel will continue striking. I still couldn't get the wheels to hit the paper, although putting a thick piece of paper between the platen and the print wheel showed that it was working.

I tried adjusting the speed, but there is no effect. The thermal fuse button is pushed out, but the circuit is still closed (power is making it to the rest of the machine, at least.) I am wondering if this is bypassing the speed control circuit. I will check the circuit diagrams.

*** FOLLOW UP - CHECK ***

I adjusted the print vane support plates to hold the print vanes and the stroke bar more tightly.

The winning move:

In timing diagnostics, page 9b, "Timing of the `print and strike sliders' recovery cams," it states to test the impression and to adjust the stroke cam. I adjusted the rotation of the stroke cam by loosening the two set screws and rotating the top of the cam away from me. I noted the initial and final positions through the notches next to the recovery cam. The figure seems to indicate that the slider recovery cam should be rotated? I think I got it right...

After the winning move, I was able to get clear print on the page held by the platen.

12/9/2018

Yesterday / Friday: Removed the stroke bar and the print carriage. Stroke bar is held in by two gripping plates, a coupler to the print mechanics (rod?) and two snap clips (e-clips). The plates were somewhat hard to access, and hopefully it won't be too much trouble to get them back in.

I am attempting to rebuild the stroke bar with JB Weld epoxy and a 2mm steel rod.

12/2/2018

The broken plastic piece is a part of the function group. As far as I can tell, these "read" the code bars to perform special functions - such as running the autoreply, executing a CR or LF,

There are 16 readers in this model. The one that is broken is the third from the right when viewed from the front of the machine. It's not clear that this is actually attached to a function, so this may be fortuitous - but it is a warning that the others may also break.

The function group has a label "F 813"

Page 20 of Te-318 guide "Adjustments" shows the print vanes and code bars. The function "slide" or "sensing slide" is referenced. 18 is the "space" slide sensor. In my Notability notes, I figured out how the sliders "read" the ASCII code. 17 corresponds to "ENQ". Assigning the other sliders will require somehow seeing their profiles.

12/1/2018

Designing some ideas for the coupler replacement.

Print shaft is 10.8 mm outer diameter. The shaft flat is 5.5 mm thick.

The slots for the pins and e-clips appear to be closer to 3.1 mm wide. The pins measure at about 2.9-3.0 mm in diameter.

I think a plastic part 1cm thick wouldn't be too bad.

The small e-clips are about 4.4mm in outer diameter.

I tried glueing the pins again. This time I surrounded each pin with glue, almost up to the point it will contact the rod.
Glued around 8PM. Takes 24 hours to cure.

Bad news. Another part fell out. Plastic, broken. Looks like a piece of the function group.

11/30/2018

What if I molded a new part from epoxy?
Can it survive as plastic? Or is metal necessary?

Need set screws - to measure

Design coupler
Fabricate

In the meantime:

Re-glue pins in current setup? With more support against shear?

11/28/2018

Over the holiday, used JB Weld to reattach pins to print shaft / carriage coupler. (Not sure what else to call this?) Reassembled carriage and tested, first by hand, then under power. I successfully printed several words. This confirms receiving and printing are ok. The areas where the print bar is chewed up / damaged will not print. These areas will need to be repaired, but because the print bar merely pushes the print lever on the carriage, the fix should be somewhat simpler, either as a built-up epoxy or a metal "tab".

The coupler failed at the end of my test. One of the pins sheared off and the epoxy fractured and debonded. I will need to fabricate a new one.

Need new ribbon, too. (Ordered)

11/21/2018

Lubricated print carriage some more and worked the strike mechanism. It is still a bit stiff, but I can turn it by hand.

I understand the design of the "coupler" from the carriage to the print shaft -- it allows centering of the coupler on the shaft. There are two axes of translation enabled by the pins.

11/19/2018

Alan Fletcher REUTERS logo design - is there a corresponding typeface?
<https://www.alanfletcherarchive.com/archive/logotype-1>
But this is a 5x5 typeface

Noted earlier (somewhere?) that L/R in manual is incorrect.

Character wheel / print slider assembly is part 832.

11/18/2018

Worked on print carriage. Required substantial oiling and work. Need to finish by lubricating the print strike mechanism. Otherwise, appears to be operating correctly. Can dial in and print all characters. Documented in Notability.

11/17/2018

Not getting 100% accuracy in punching right now. Not sure why. Started off ok, but then moved the Olivetti. Starting missing a few bits here and there. Doesn't seem to be a pattern.

Removed print carriage. Documented in Notability.

11/9/2018

Messages to print:
X PUNCH IT IN

11/10/2018

Printer carriage:
Removed right side belts and carriage return spring

Try to remove just print carriage or all rods?

11/7/2018

Series of U and * are read back from tape reader as "C,"

Could be Sol settings? (8N2?) But the printer sends correctly from the keyboard.

Take photos of print carriage assembly. Think about disassembly.

Make more symbols for punch program. Make it more user friendly? Meh.

Future:

Rebalance electromagnet

11/6/2018

Reperforator fixed. Had to push upright and take the baseplate off. One of the levers (CHECK SPECIFICS) was pulled out. Not sure why, but I also removed another piece of plastic from the top-most (print? receive?) vane - the one closest to the keyboard, presumably.

The green switch that overrides the off / on signals for the reperforator should be: UP - override
DOWN - stop / start (?) by signals

Haven't confirmed that 0x12 restarts the punch.

Adding a delay in the punch program made it far more accurate. Think I had zero errors! This was all punching while the machine was upright, though. We'll see what happens with it in the normal operating position!

Tested the punch reader, too. It sends consistent, but wrong characters. Could be because parity was set and Sol is expecting 8N1 or 8N2. But the keyboard is sending fine with the current settings.

—

The punch was working great with the Olivetti standing upright. It started to get more transmission errors in its normal position. The magnet probably needs to be adjusted. Currently, the magnet setting dial is turned entirely clockwise. The timing dial is set to "0". There are fewer errors now. With the punch program and only a small delay between bytes, I was able to consistently print messages without FF errors.

The reader is still a bit of a mystery. It will take some work.

11/4/2018

Last night had the Olivetti printing "banners" on the reperforator from the Sol using "PUNCH.ASM," a program I wrote. I revised the program to slow down the characters being printed and implement space. We'll see how that works. It still receives some FF errors at the punch and one of the bits started to fail (I think bit 7?) Not sure if that's happening at the parallelizer or after at the punch.

The "green switch" in the reperforator keeps the punch ON. I found that sending 0x14 to the Olivetti turns the punch off (this is one of the bytes in "K" in the punch / banner program.)

11/2/2018

Thinking of repairing the printer carriage "coupler" with a metal-filled epoxy. What are the best products? What is possible?

10/27/2018

Installed new motor capacitor. Motor seems a bit quieter. Did not change the speed issue. Still around 150 baud.

Capacitor is cool to touch after some use. (Double-checked later. Seems to be ok.)

Received and sent with some errors, but a lot of success, both in local mode and to / from the Sol.

Successfully received carriage return from Sol and also line feed. Both worked as expected (!)

Switched Sol.

I have it set for 150 baud (S3-3 ON, all others OFF)
Parity on: S4-5 ON
Even parity: S4-1 OFF
Two stop bits: S4-4 OFF

Three test messages printed. Some "FF" errors.

10/26/2018

Replace motor capacitor with Kemet received yesterday.
Although it is called a "start capacitor" it seems to be wired as a "run capacitor". I can't see how the centrifugal switch takes the capacitor out of the circuit in the main book. The papers that came with the machine are a little more complicated - the capacitor doesn't seem to be wired directly to the motor in this case.

10/24/2018

Bit pattern in parallelizer:

Viewing from the rear of the machine, the left-most feeler / selector lever is bit 1 and the right-most is bit 8.
Viewing from the front of the machine, the right-most punched hole is bit 1 and the left-most is bit 8.
This also agrees with the punch tape. Viewed from the front, the reperforator bit pattern is the LSB on the right.

IDEA:

Looks like I can remove the print carriage by sliding it off the rail. Need to remove belts and one gear.
Also: broken part looks like it clips on and can be removed. This is a good sign! Can fabricate a replacement or try to repair the current one.

10/23/2018

Worked on the copy frame adjustments. It was more difficult than I had anticipated. I could tighten the copy frame to the shaft without removing the selection levers. However, there still seemed to be some play. I followed the directions on p. 288 by adjusting the vertical position of the copy frame when it was in its most down-ward position. One challenge seems to have been the friction in the feelers, which had gotten much tighter due to the copy frame lever shaft coming out of the left hole. This became more apparent when I went to reassemble the frame (back frame bar and top frame attachments) and they wouldn't fit. The shaft had come out and was holding the whole copy frame to the right.

It all seems to be working better, including better movement of bit 4 (noted as 5 previously)

10/20/2018

Update: received copy frame levers (16 copies) from Shapeways on Wed. Oct 17. They are thicker than the originals by 0.3-0.5mm. The inner diameter is also slightly too large, but I expect them to work fine.

I reassembled the copy frame outside of the machine. I filed down one side of each lever that was installed in order to fit them in. With 8 levers, I am calculating that I filed off about 0.4-0.5mm per lever. With a ridge on the opposite side, the levers still have reasonably good separation. It is a bit tight, and I might consider shaving them down a little more. With my better understanding now of how the parallelizer is built, taking these in and out is less difficult.

I rebuilt the parallelizer, this time starting by placing the copy frame in and installing the different bails and rods. Basically, it was unnecessary to tear down the parallelizer to the extent that I did.

There are two issues: Several of the connections to the shafts (attachments with locking screws) may need to be adjusted. The main copy frame lever that connects to the lower parallelizer shaft is almost certainly not tightened enough. I can tighten this by removing the back-most feelers and copy frame lever assembly. This sets the height of the copy frame. Initially it was too high and not pressing into the selection levers. Page 288 in the adjustment manual describes the necessary adjustments to the copy frame.

I manually tested the parallelizer. It seems to read the selection bits with the exception of bit 5 (note: actually bit 4-EMF 10/24). The selection lever sticks somewhat in the forward (towards the front) position. This is the "riposo" setting - a "0" state.

I have one extra e-clip. This is from the center of the top shaft that connects the rockers. It sat between the 5th and 6th rocker. The extra washer is from the lower shaft where it bolts to the external frame.

Observation on the operation of the selector disk with and without power:

When the power is off, the selector disk continues to rotate when the electromagnet is installed. The magnet is powered off, so it is in the "riposo" or "rest" state. Thus, the selector disk continues to trip - a start bit is the first "0" or "riposo". When the magnet is energized, it holds in the "lavoro" or "work" state. The selector disk will hold until it receives a "0".

IS THIS CORRECT? - looks like it.

Testing - not getting accurate "reads" but did at some point seem to get a proper "U".
Note that "U" is 55 - 0-101 0101 and "*" is 1-010 1010 (with even parity).

I WAS however receiving consistently from the Sol with very few errors during repeated characters. Then it started getting very poor. I was adjusting the EM magnet top and the timing. I noticed a faintly chemical smell and observed a liquid pooling on the bench beneath the teleprinter. I powered down and observed that the motor capacitor had started leaking. This the 8uF / 450V / 50Hz ac capacitor that generates the second ac phase for the motor. The motor wasn't keeping speed. The capacitor was VERY hot to the touch (could not be handled without a cloth). I removed the capacitor from the frame (but not its wiring) and cleaned the cables of the leaking (presumably) oil with, I am certain, no pcbs.

The capacitor is listed as a "motor start capacitor" but it seems to be wired for continuous operation to generate the second phase in the motor. It's specifications would also seem to confirm that it is a "motor run capacitor."

*** Need to measure dimensions of the motor capacitor for replacement.

Capacitor is about: 90mm long, 50mm diameter max (length may be closer to 88mm)

Ordered two replacement capacitors

First is a KEMET ordered from Mouser

0-C878BF34800SA0J, C878BF34800SA0J 470V 8uF 5%

0-C87-8-B-F-3-4800-SA-0-J

8 = 10000 hours at 470V

B=UL listed,

F = M8 bolt, metal can

4800 = 8uF

SA = packaging

0 = internal use

J = 5% tolerance

30mm diameter, 78mm height

Second is a Ducati ordered from Newark element14

Model 4.16.10.13.06, DUCATI 4.16.10.13.06 CAP, 8 μ F, 450VAC, 5%, PP, CAN

Documentation shows 3000 hour expected life at 450VAC

32mm diameter, 58mm height - quite a bit smaller than original

*** While waiting for the capacitor

Check the vertical position of the copy frame

See page 288 in manual. Should have 0.9mm clearance of feelers above sensed / selection levers

Disassemble back feelers and copy frame levers

Tighten the copy frame where it connects to the shaft

Check position of 5th bit sensed lever - see manual

10/6/2018

AutoCAD 2018 - making copy frame lever replacements

Draw inner circle

Draw outer circle

Draw triangle

Use Subtract to remove edge of triangle extending past small circle
Group triangle and circle, copy
Paste and rotate to other side
EXTRUDE all shapes up
Draw circle
PULL (PRESSPULL) down through middle cylinder
SUBTRACT (this takes a while to get the hang of - type command, pick objects that will stay, hit enter, pick objects to subtract, hit enter)
MERGE

I extruded the lever arms and the inner cylinder to different heights, then presspull to generate the hole in the center. An easier method would be to extrude all to the same height, then subtract, via presspull (presumably?) a rectangular section acting on only the copy lever arms.
Tried it... actually worked quite well.

10/1/2018

Copy frame disassembly - the second set of feelers are out. I was able to push out the top shaft with the rockers. I cleaned the rockers and metal spacers between them. Many spacers were stuck together by either the melted rubber gasket material or dried grease.

I was able to remove the lower shaft locking nut by holding the flats on the shaft and turning the bolt (counter-clockwise - right threaded). I haven't been able to remove the locking screw on the other side. Why not use the same locking mechanism? I'm afraid of stripping the hex driver and I've macked up the flats a bit with the needle nosed pliers.

- I need the proper wrench and hex driver (metric!)
- try oiling hex nut to loosen it up
- will also clean the combs of the copy frame assembly

9/30/2018

Successfully removed the copy frame from the parallelizer. Extensive notes are written in Notability documenting the tear-down and part positions.

With the copy frame out, I started cleaning one set of feelers. I need to clean the holders, copy frame bars, etc., then figure out how to remove the central shaft and print replacement parts.

I am somewhat confident that I can get it back together again.

Cool idea: vinyl sticker of punch tape

9/23/2018

A lot of progress (?) this weekend. It is clear that the copy frame is the part to fix. The levers of the copy frame shaft are broken. Only two levers currently work correctly. The remaining feelers sit down in the selection levers and jam the parallelizer.

I had a good chunk of the parallelizer removed this weekend. The EM magnet from the back, and the cross-bar that it sits on. This provides better access to the copy frame. I had the cross-bar off and cleaned off the rubber. I spent a lot of time cleaning the top of the feelers to allow smooth action.

I translated sections 3.2.2-3.2.4 of the Te-315 course book provided by Mattis Lind and Johannes Kok. I marked up drawings in Notability and understand better how the copy frame works and how the bits are transmitted to the copy bars.

Getting into the parallelizer proves to be challenging. The shaft that holds the rockers on top is possibly removable. I removed the right nuts that control the friction in the copy frame. Then I removed the locking pins (?) on the shaft that held the springs. The shaft can slip out on the right side.

The problem is the lower shaft. There is a black nut on the left that rotates the whole shaft. There may be a nut on the right inside the frame that can be loosened. I'm not sure removing this will do anything? It's not clear how this is put together or works.

- What holds the bar in place? Difficult to see... there are two felt (?) pads.
- If the nut were loosened on the copy frame shaft, wouldn't the top of the copy frame still need to be removed?

- I wonder if the whole copy frame can come out? Need to trace copy frame lever back to its shaft and see.

Bit pattern:

Looking from the front, bit 1 is left-most entry bar, bit 8 is right-most. (NOTE: THIS IS INCORRECT - 10/24)
Bits 5 and 7 are the only ones in which the feelers are working correctly. Mirror may help determine why others are not working.

9/21/2018

Thoughts:

Depending on the result of the parallelizer, the keypress may or may not result in printing (although it seems that the punch always prints...) Thus, the position of the feelers and first operation selection levers will determine the action.

Sometimes difficult to remember that keypresses are transmitted to the serializer, leave the machine as a current loop signal, and return through the parallelizer, which decodes and sends to the entry bars!

9/18/2018

Stayed up WAY too late working on the Olivetti.

My Arduino pulse light worked with 1ms on, 7ms off (20% duty cycle). The 50 baud markings strobed on the motor speed indicator. There is some drift. The drift direction is towards the viewer. The fine-tuning adjustment knob had no effect on the drift. Pressing keys affected the speed, causing the strobes to move in the opposite direction (opposite of spinning direction?) The speed changed slightly over time and may have stabilized.

I have to verify that the strobe is actually 8ms or 125 Hz.

I still do not understand why the transmission sped up. It must be electronic?

When the parallelizer rotates, each "needle" (see 281) is sequentially pushed in or out by the "entry wedge" (see 277) as it passes by. The needle connects by a rotating shaft to the "sensed lever" or "selection lever". Two "feelers" push down on the selection levers and transmit the state to the copying frame.

I removed the "clearing cross bar" (p. 289, also called the "transfer reset plate" on p. 15 of the Te-318 guide) which holds the top of the copy frame and limits the vertical displacement of the feelers. (When the copy frame raises back up, it actually levels out the feelers.) Two small bolts and nuts allow the plate to be adjusted vertically; two metal tabs hold it in place. The plate can be removed by unscrewing the back of the parallelizer from the frame, which allows the side plate of the parallelizer to be bent enough for the metal tabs of the transfer reset plate to come out. There was a rubber gasket glued to the bottom of the reset plate which had degraded and become very tacky. Several feelers closest to the back were stuck in the rubber. This likely limited their travel and resulted in the broken parts below, since the feelers act opposite of each other; one travels up, while the other travels down.

I removed several more broken plastic pieces and saved these in the "broken and recovered parts" case. There appear to be at least 4 bits out of commission. One broken piece fell further down towards the selection levers.
To access the parallelizer from the back, I removed the electromagnet (EM). Three screws hold the EM onto the frame. I remounted the EM afterwards.

One thing I do not understand is how the feelers move during the cycle and how they are transmitted to the copying frame? What other parts are there?

Can my Saleae Logic 8 analyze RS-232 signals? Newer versions can. Not sure what the voltage limits are on mine. This would be helpful for analyzing the output of the serializer, the baud rate, and any missed signals. Warnings about ground loops and DUTs with ground connections.

Next up:

Continue to explore the parallelizer disassembly. Can I get down into it?

***What is causing the parallelizer to stick? Why does it stick less when in the vertical position?

Why is the keyboard now jamming in the vertical position?

9/16/2018

Hooked up Sol to Olivetti with NULL MODEM connector.

Still set at 150 baud, so nothing changed in speed.

On the Olivetti: The "RS" light is now on.

The parallelizer is sticking. Once unstuck, the Olivetti could receive from the Sol. I can see the entry bars / print vanes moving

in response, as well as the punch. The magnet looks like it has more action than when the Olivetti is in local mode. Is the current higher? The print carriage advances every time and even returns when it reaches the end. I punched some tape. Repeated "O" and "P" gave the same punch results (I could observe that this did not always happen, but my tape output was consistent.) The output (see Notability notes) of the tape did not correspond to the input characters, other than the same pattern repeating.

Input: O and P

O = 4F = 100 1111 = 1100 1111

P = 50 = 101 0000 = 1101 0000

Both should result in parity bit being sent

What is punched (with tape direction pointing down, bits are, from left to right, parity,7,6,...1

1110 1000 - 68

1111 1100 - 7C

The 68 character might be the "P" if the start bit is missed. There are more high bits in both.

The 7C character might be the "O". There are more bits.

HOWEVER, some punches may not be working due to the broken pieces I pulled out.

Check the STOP BIT on the Sol. Change to see if that affects the input / output.

Check more characters. Which holes are punching and which are not? Which seem to flip randomly?

Take a picture of the broken parts again. I think these are marked with the bit number. One of them may be "1".

I tried my Arduino sketch. The light flashes, I can see it with my phone in "slow motion" mode. However, I couldn't see a strobe effect with 50% duty cycle and 8ms period. Two things:

Try a lower duty cycle

Try using the phone to measure the speed

Test frequency of arduino output with scope

Here's the Arduino sketch:

```
// Blink LED.
// LED_BUILTIN corresponds to pin 13 for the Arduino UNO (it will also blink the onboard LED)
// Cathode (short LED lead) goes to GND
// Resistor connects anode to pin 13. I used 330Ohm. 220 is usual.
```

```
void setup() {
  // initialize digital pin LED_BUILTIN as an output.
  pinMode(LED_BUILTIN, OUTPUT);
}

// the loop function runs over and over again forever
void loop() {
  digitalWrite(LED_BUILTIN, HIGH); // turn the LED on (HIGH is the voltage level)
  delay(4); // wait for 4ms
  digitalWrite(LED_BUILTIN, LOW); // turn the LED off by making the voltage LOW
  delay(4); // wait for 4ms
}
```

Examined the parallelizer from the top. May be a way to get in there to take a look at the broken pieces. I will continue to explore this.

9/17/2018

I removed the tape guide from the chassis. Three machine bolts held it in place. I used a hex nut wrench. The parts are stored in a plastic bag.

No luck working on parallelizer. Cannot improve reception, but I have a better understanding of how it works. As the parallelizer spins, the entry wedge is pushed in or out by marks (in) or spaces (out), which pushes each "needle" towards or away from the parallelizer axis. This twist is transmitted along a bar, e.g. See 281 in Diagnostic Guide, which pushes the bits to the "entry bars." When a signal is first received, the start bit causes the parallelizer to start rotating by triggering the parallelizer release crank (266). The plastic lever, which looks like the hammer bone in the ear, also connects to the EM magnet. "Mark" is towards from the parallelizer and "SPACE" is away from it. Hence, when the magnet is energized, it is held

in "MARK" (current flowing) and the parallelizer is held stopped. When the stop bit (SPACE) triggers the parallelizer, it rotates.

Currently, the parallelizer froze up again and is not running very well. It gets "caught" and is resistant to turning. Two black plastic pieces also fell out of the parallelizer while I was working on it. The first was at the bottom of the parallelizer. The second was loose inside the parallelizer. I took photos of the parts. They are black plastic parts shaped with a cylinder at the top. These are connectors to the bars entry (?) and are deep in the parallelizer. I'm not sure how I will replace these, but I assume that at least two bits will not be functional now.

Sent bytes from Sol are not received by printer, but could be handshaking signals are not controlled. Should keep working on this by finding the appropriate NULL modem cable or adapter. (acquired)

I played with the setting of the parallelizer speed (timer knob, 283) and EM settings and tried to get these back to their original positions. They had no effect on reception by the parallelizer, except to sometimes trigger it.

The timer knob is in the correct position relative to the sector. That is, the last sector fits in the last tooth in the wheel exactly as shown in 283. I adjusted the "clearance" of the knob by eye on #284, but this could be improved. The sector was unmovable at first. I loosened the nut holding the knob and oiled the connections.

Strangely, the machine really started acting up at the end of my time working on it last night. All keys were jamming the keyboard. I put the baseplate back on, and the machine down in its correct configuration (not standing on end). The keyboard unlocked and typing worked, but the characters to the Sol were garbled. I determined that the bits being sent were still accurate, but faster. It is closer to 150 baud now. I determined this using the oscilloscope, which shows about 66ms for 9 bits (136 baud). Adjusting the Sol baud rate to 150 (S3-3 ON, all others off), I could capture ok. Something sped up in the machine! I tried making fine tuning changes to the motor using the red knob on top, but this did not affect the bit pattern. Something with speed regulation is off.

Here is an idea: I can check the motor speed. The proper way to check is to use a tuning fork probe at 125Hz, but I think I can use an Arduino flashing an LED at 125Hz. This is 8ms per pulse.

Arduino blink sketch:

<https://www.arduino.cc/en/tutorial/blink>

I found a NULL modem 25 pin adapter. I'll use this to connect the Sol. I also found two "black boxes" for wiring up different serial port configurations.

NOTE: one has frame ground connected to signal ground. This is incorrect! Frame ground should be isolated from signal ground.

RS-232 pins installed on cable for the Olivetti:

1-11
16, 17
20, 22

Next up:

Can I measure the motor speed with Arduino?

Think it's time to take a more careful look at the signals from the Olivetti.

Map wiring back to control board

Also, get on the light bulbs

9/15/2018

Confirmed that Sol worked at 110 baud with RPi last night with 8N1.

Set Sol to 7E2, 110 baud according to switches (page VII-14 and 15 in Sol-20 manual) and connected to Olivetti via cable, gender changer and home-built NULL modem cable. (Only 2, 3, 7 connected - may want to connect more handshaking signals eventually.) At this point, I successfully got number characters to transmit to the Sol from the Olivetti, but characters were resulting in the control codes associated with the lower bits of each character. I could successfully transmit most of the punctuation, too.

I confirmed that the proper bits were being transmitted using the oscilloscope, so the Sol was truncating the high order bits.

This morning I changed the S3 settings on the Sol. The manual states (Table 7-3) 7 bit operation is S4-2 and S4-3 OFF and ON, respectively. This actually gives 6-bit operation (I believe), resulting in the Sol dropping bits. For instance, "H" was coming (0x48) out as BS (0x08). Changing S4-2 and S4-3 to ON and OFF, respectively, enabled characters to successfully pass through from the Olivetti. The tape reader also transmitted ok, but so far I only have tapes with gibberish.

H	48	0 100 1000
C	43	0 100 0011

Next up:

Work on the parallelizer! See if we can successfully receive bytes and at least punch them.

Are bytes SENT from the Sol received by the teleprinter? Again, may need more control signals. Need a null modem 25 pin cable.

Check out the light bulbs and order spares / replacements.

9/14/2018

The Sol-20 also does 110 baud. Propose to test 110 baud at 8N1 with pi to verify, then switch over to 7E2 to test with Olivetti.

9/12/2018

Looks like ADM-3A is the only machine I have that will do 7E2, but 110 baud is not working. All other rates seem to work, down to 75 baud. Using black null modem cable attached to ttyAMA0 (rs-232 shield on pi). Troubleshooting notes in "ADM-3A Log"

9/10/2018

Hooked up to ttyAMA0 on the Pi using a string of adapters to go from 25 pin male to 9 pin male. Ended up having to use a null-modem cable (although need to verify pin outs). This command:

```
stty -F /dev/ttyAMA0 110 cs7 parenb -parodd
```

should set 110 baud, 7 bits, odd parity, but it seemed like some of the settings were not "taking hold." Perhaps not actually compiled in? Characters are received, but "space" output "t" on the Pi, "7"? gave "f" and that was it. There was an echo back, which surprised me. Perhaps this is internal to the teleprinter?

```
space = 1 010 0000 0 start bit
t      = 0 111 0100 0
```

Also, thought that this is 100 baud, but 100 is not supported. 110 is typical of teletypes. Looking at traces, I calculate 74ms for 8 bits transmitted, which is 108 baud, close to 110.

Some info on baud rate settings at stackoverflow:

<https://stackoverflow.com/questions/12617702/dealing-with-serial-port-at-100-baud-rate>

"You're actually in luck. 100 baud is low enough that you can compute a divisor that will do it (1,152) with typical 16450-compatible serial ports (which is pretty much what everything is) and linux supports custom divisors with the spd_cust parameter to setserial."

Thinking: control lines may be causing issues.

I see output on pin 2. What happens if I just hook this line up to Pi?

Can use ADM or Sol to receive input?

ADM "word format codes" on front panel switches:

First bank of 6 switches:

SW2 - EVEN, SW3 - 7, SW4 - 2 or 1, SW5 - parity, SW6 - no effect

Second bank: select 110 baud

Can hard-wire hardware control lines on both sides?

The parallelizer damper board seemed stiffer than the day before. I am concerned about wear or that something has broken. It was more difficult to get it started last night.

When it's turned, what is loosening up?

9/9/2018

Back panel back on and working on from back.

Lubricated WHAT PARTS???

In the correct position (e.g. not standing on end), I'm having much more trouble with the parallelizer sticking and going into non-stop cycles. If I turn the damping board? one cycle, it frees up. It seems stuck on something. It usually enters a non-stop cycle at this point. Pushing the damper board ? again positions it at the beginning of a cycle and it usually goes into normal operation at this point. Some keypresses (such as "space") elicit more normal operation than others.

My sense of the operation right now is this: The start bit triggers the damper board to rotate. The subsequent bits are transmitted by the "hammer".

Hooked up the RS232 interface "quick test".

Green on 2, 4 and red on 20 (starts green)

green = logical 1 (-12V), red = logical 0 (+12 V)

logical 1 is a MARK and logical 0 is a SPACE

in current loop: MARK = current flowing, SPACE = no current

in punch: MARK = hole (logical 1), SPACE = no hole (logical 0), NULL = 0000000, DEL = 1111111

2 = transmit data (TD)

4 = request to send (RTS)

20=data terminal ready (DTR)

Is the Olivetti set up as a DCE device? Usually DTE is the computer and DCE is the peripheral (e.g. modem)

When not in LOCAL, turns red briefly on 2.

No change on 4

When in LOCAL there is no activity on the interface (!)

Hooked up the Tek 2445 to pin 2 and ground on pin 7. Looks like a good RS-232 signal with -12V = 1 and +12V = 0.

I used my phone to take a movie of the Tek 2445 and record some keypresses. I used negative trigger, so I missed the start bit (0). This corresponds to the first bit in the code block, which is always down. There are 9 bits total in the code block. The last is the parity bit. (Is there a stop-bit?) When the code bit lock is up, the signal is a 1, and down is a 0. In RS-232, 0 is +12V and 1 is -12V, with -12V between transmitted bytes. Each bit is about 10ms long. This would be 100 baud (which is double the parallelizer selection noted below?) 100 baud is uncommon, though, so it could be 110 baud (9.09 ms/ bit).

Be on the look-out: "If slow electromechanical teleprinters are used, one-and-one half or two stop bits are required." (from https://en.wikipedia.org/wiki/Serial_port#Stop_bits)

EVEN PARITY means there is always an even number of bits transmitted.

Other stuff:

The small gear connecting to the page counter disintegrated. I took a photo of the remaining bit. This explains some of the debris in the machine I was seeing.

Started looking at a method to remove the print carriage. It will take some serious disassembly, but I'm starting to see a way forward. The print bar

NEXT STEPS:

Hook up to Pi and see if I can receive a transmission. Expensive and loud ASCII keyboard! With a punch reader!

Are all keys transmitting properly?

Are there any stop bits on the code bit block?

Figure out parallelizer. Diagnostic guide on page 41 has troubleshooting.

Get part # of bulbs and order spares

9/8/2018

A few advances and observations.

The green knob switch below the AR is attached to the punch. It defeats the "off" position of the punch.

On the punch: I loosened the screw attached to the pin holding the reverse and forward switches. They were pretty sluggish. Lubricating and loosening restored the "one back" function and the advance function. They no longer stick.

Dysfunction of the punch appears to be related to a lack of movement or incorrect movement of the printer vanes. This is either because they are getting stuck on the print carriage or something closer to the receiver. Some of the mechanisms in the receiver appear sluggish, and so my next step will be to lubricate these.

Next steps:

Lubricate parallelizer (read, too)

X Look at movement of EM. Looks like a small amount of movement?

X Start looking at signals.

Start with cable to computer

Trace wires backwards.

Move backwards looking at signals

9/6/2018

Last night:
Verified fuse ok

On a whim, read tape through the reader. Seems to work! Code block bits moved up and down in response. Video of reader pushing the code block bits would be cool.

Still no punch or carriage movement in local. Is it not transmitting or not receiving? Is something mechanical stuck?

Did the "ON" light bulb burn out? (Never noticed, but looks like it didn't work earlier.)

Changing orientation, small black bits fell out again.

Either it isn't transmitting, it isn't receiving, or the transmitted signals are not being sent back to the unit.

Need to look at electrical signals

Not sure what these are? What does a current-loop signal look like?

The top vane seems stuck. Why? What is holding it?

What is the black switch back near the EM?

What is the green knob below the AR? (noted yesterday, too)

Need photos:

More detailed photos around punch, AR, serializer, and parallelizer

More detailed photos around carriage advance mechanism, especially connection to EM/REC bar (see 176, 178, 179)

Worked on machine for about 45 minutes tonight. I was able to get the parallelizer back up and running. LOCAL is returning signals and the punch will move, although what comes out of the punch appears to be fairly repetitive. I ran more tapes through the reader and observed good operation of the mechanics and code block bits.

I examined the EM/REC bar. It is the lower-most (towards the print carriage) black vane. It seemed stuck, and the sticking point appeared to be on the left of the machine, just above the parallelizer. I broke a small tab off of the EM/REC bar - photo taken of the tab and its location. It doesn't look important, but made me worried about the brittleness of the plastic. I will have to watch the connection on the right.

***I need to check that any connections on the left of the bar are not broken.

In local mode, I could see some movement of the metal clips of the unlocking mechanism on the damper board (?). Illustrated in 279 and 278 in diagnostic guide. I manually rotated the parallelizer damper board a few times after releasing the unlocking mechanism. This seemed to move it through a cycle (deploying the parallelizer clutch and other parts moving.) After this, the parallelizer worked a few times, then seized again. Repeated working the damper board and the parallelizer moved into an "abusive" pattern of running continuously, but eventually settled down. The mechanics of the parallelizer appear to be sticky, and I should examine these carefully.

I observed the operation of the EM/REC bar. After a keypress, it flips to REC mode, then back to EM. Video from August 19 shows it in operation. It is initially pointing upwards, towards the keyboard. After a keypress, it moves in a downward orientation. The August 19 videos of the code block show it stuck. None of the bits are moving.

I took a closer look at the green-knob lever below the autoreply mechanism. It is to the right of the red lever that adjusts the strike strength. It looks like it is associated with the punch, but I can't tell what it's doing.

I suspect that the EM/REC bar vane pushes the print carriage into red/ black for send / receive. Therefore the damage to the vane probably won't affect printing, but it will prevent two-color printing. (INCORRECT! EM/REC bar is lower-most bar, closest to back of unit. The damaged vane is the top-most.)

"if current is flowing, it's called a mark (corresponding to a hole in the paper tape), and if current is interrupted, it's called a space"

9/5/2018

Last night:
Took notes on wiring of wiring blocks M1-M5. Replaced plastic cover.

Cursory look gave this info:

Electromagnet is wired in parallel (no idea what implications this has, though)
Kuke plug carries the main telegraphic signals - there are 8 lines

Looking down printing carriage, the top vane does not seem to be engaged with the carriage.
Is the top vane the EM/REC bar (SEND/RECEIVE)? No - bars are connected to serializer and are distinct from print vanes.

If so, it is stuck (positioned towards the keyboard), which could explain lack of local mode now.
What is causing it to stick?

Other things I am worried about:

- Insulation on bodge wires for the circuit board
- Fuses ok? (YES)
- Electronic parts on the circuit board ok?

- How does it select reader, punch, or keyboard? Or are all of these receiving and sending the same signals?
 - keyboard - sends
 - reader - sends
 - punch - receives
 - print - receives

- What is the green-knob lever on the top, below the autoreply mechanism?

- Are the Telegraphic Circuit checks on 3.07 ok?

- On the T01 circuit diagram, EM is connected to M3 10 and 7 by violet and white, respectively. Violet lines (10) should be jumpered to 2 by a violet wire. Block 10 seems to be a common connection for the parallel electromagnet terminals, with the jumper to 2 connecting it to pin 2 of the Kuke Plug. (In fact, the eight numbers of the bottom terminal correspond to the Kuke Plug pin out.)

Interesting pages in section 4:

***Check locking of serializer clutch closing, page 115-117
Bunch of EM/REC bar tests 179
Entry bail is ID'd on page 12-13
Deviator contacts and working position, 69; friction, page 77;
Modulator unit page 81+/-

Missing 139?

Pages out of order after 164, ok after 197/198 - fixed in PDF

9/4/2018

With respect to wiring:

Section 3 of the diagnostic guide contains the relevant wiring diagrams and checks for the motor and telegraphic circuit.
Multiple configurations are shown.
The Motor configuration for this unit is M02.
The Telegraphic configuration is T01.

The Cannon Plug in stand only seems to have four wires attached, despite having a number of pins wired on the cable.

Section 6 contains modifications that occurred after serial number 555XXX. These may not apply to my unit.

What is the EM/REC bar? Is it the top-most print vane? The one that is damaged?
Checks 63-66 serial slides and knife positioner (think these are ok, since block sliders are moving correctly)
Checks 68+ are deviator

Purpose and function of deviator?
Also known as "line switch". Selects between reception and emission.
EM - emission
RIC - reception

9/3/2018

On the computer DB cable - should be able to determine what are signals and grounds.

Need to trace the wiring.

Lubricated the code block bits some more. I believe the real sticking point was under the bits, where the slider is held in the frame. Getting NyOil in there and working the bits up and down a lot improved their function. There seems to be very little sticking left and key presses produce the correct bit pattern. Where it took 10-20 presses to get the code block bits extended or retracted all the way, at most it takes 2-3 presses (but the extension seems sufficient.)

Now, however, there is no response of the punch or printing carriage in LOCAL mode. WHY? (Maybe the reader is stuck enabled?)

- Break a circuit somewhere?
- Lubricant on the serializer knife / bits?
- Burn out in electronics? 100mA fuse blown or lost continuity?
- Is there a signal coming out now?

PUNCH

Button "D" (lower right) is "single back space" but this gets stuck due to sticky grease and the reader constantly backs up.

Need to lubricate / fix

Button "E" (upper right) is "continuous tape feed-out with punching". This feeds out with the last signal "set up". Currently, it is punching 00 (all holes!) This is the "null" character.

KEYBOARD

The "O" and "P" key often result in keyboard blocking. Pushing and holding them in seems to work.

Set up right now to trace wiring, so that should be my next step.

9/2/2018

Exercised code bit blocks. Tried to lubricate. They seem to be moving a little better. After 10-20 keypresses, the right block bits come up / down.

Tried punching tape in local mode, numbers 1-9 (1 first, 9 last) 10 presses each. Only 9 looked good. Verified the code bit block same as punch. Others? Not sure.

code block bits	hex	ascii	punch	
9 = DDUU UDDU	39	0011 1001	0011 1001	correct!
8 =	38	0011 1000	0010 1000	
			0010 1011	
7 =	37	0011 0111	0010 1001	
6 =	36	0011 0110	0110 1101	
5 =	35	0011 0101	0010 1101	repetition of 4
4 =	34	0011 0100	0010 1101	repetition of 3
3 =	33	0011 0011	0010 1101	
			0011 1101	3D "="
2 =	32	0011 0010	0010 1111	2F "/"
1 =	31	0011 0001	0010 1011	2B
			0010 1001	29

punch hole = 0

Feed direction is top of tape. Bit 7 is left-most. Bit 0 is right-most.

Bit 7 always punches "0" (with key presses).

Bit 0 never punches - always "1"

Problem with punch is - could be transmission or reception. Need to separate the two.

9/1/2018

Took some photos of the serializer / serializer entry sliders with key presses "C", "space", and "V". Do the codes make sense?

The code bit blocks don't always respond. Just as the serializer entry sliders engage, rocking back and forth a bit seems to help engage the code bit blocks. Something must be sticky?

When the serializer entry bars go down, the code bit block goes up.

If it's the serializer causing problems, the punch may work with input from an external source.

serializer entry bars: ascii (hex)

space = DUDU UUUU	20	0010 0000	P=1
C = DDUU UDD	43	0100 0011	P=1
V = UDUD UDDU	56	0101 0110	P=0

It looks like the 8th bit is a parity bit. So this is 7 bit _even_ parity

8/31/2018

I found another loose set screw in the machine. It was trapped behind the vertical bars (name?) on the left side and resting on one of the code bars (correct name?)

I think some of the issues with incorrect punching have to do with the serializer. The parts connected to the reader are very sticky and not moving smoothly. This affects the serializer. The code bit blocks are not very free to move up and down. I oiled the parts associated with the reader assembly and the serializer, but it is still sticky and not moving freely.

Serializer checks are 59 through about 79.

8/29/2018

Pages sorted into a single document without duplicates (497 pages):

Olivetti Te 315 Diagnostic Guide.pdf

Duplicate pages - these are physical duplicates. They could be an indication of previous troubleshooting. (Currently unsorted)

Olivetti Te 315 Duplicates.pdf

Missing pages from the Diagnostic Guide:

5-9	5
15-30	16
32, 33	2
35, 36	2
40	1
43	1
46-49	4
54	1
58	1
60	1
63-65	3
72	1
77	1

40 pages total in first section

Pages corresponding to P4-P16

Next to Scan: Te 318 Adjustments - DONE

8/27/2018

Spent two minutes with the machine.

Verified that the printing shaft and the main shaft are synchronized. The printing shaft goniometer reads "200 degrees" when the notch is lined up on the main shaft, as illustrated in on page 2.19 (section 7) "timing between the main shaft and the printing head shaft".

Sorting PDF files:

First scan is loose pages. These are extras or missing from book.

Split the second scan between obvious pages that were removed and pages that were not removed.

Start to merge the documents. Note extra pages.

8/26/2018

Yesterday I obtained three manuals from Chris C., a paper roll, the missing paper roll end, and the chad box. The manuals are:

1. Te 318 Real-time Communications Terminal, Operators Manual, Cod. 100598 B (GB/15)

2. Communication Terminals Te 318 - Adjustments, No. 1639
3. A service manual of several hundred pages for the Te315, Re315, and Se315. Some pages were loose and the order is unknown.

Te315 has transmitter function. Re315 is receive only.

I also picked up miscellaneous early literature on microcomputer systems (SWTPC, Altair, IMSAI, Cromemco), "The Catalog of Public Domain Software for CP/M" published by New York Amateur Computer Club - April 25, 1981, Sol Libes Microsystems CP/M Programmer's Reference card, a few early issues of Kilobyte, and the following hardware:

1. MPI 5.25" disk drive (may go with power supply I received earlier)
2. Serial ? keyboard with a few missing keys
3. Computalker CT-1 card
4. Speechlab card (voice recognition)
5. Digital Research Computers 16K SRAM card

I paid \$160 for the lot. Probably overpaid.

\$80 for Computalker (\$100?)

\$25 for ram (\$40-60?)

\$25 for speech lab (\$60-80?)

\$10 for drive (\$10-20?)

\$10 for keyboard (\$10-20?)

\$10 Docs - (no value?)

Scanned the thick manual today. "Diagnostic guide?"

First file was 84 loose pages:

Scan Aug 26, 2018 at 10.02 AM

Remaining files were bound, scanned in order of binding. Some were clearly out of order:

Scan Aug 26, 2018 at 1.16 PM.pdf

Scan Aug 26, 2018 at 5.06 PM.pdf

Scan Aug 26, 2018 at 5.28 PM.pdf

Scan Aug 26, 2018 at 5.30 PM.pdf

Scan Aug 26, 2018 at 5.33 PM.pdf

Scan Aug 26, 2018 at 5.35 PM.pdf

Scan Aug 26, 2018 at 5.53 PM.pdf

Scan Aug 26, 2018 at 5.51 PM.pdf

I pattered around for a few minutes with the machine.

I identified the "goniometer" on the middle gear on the left side, looking at the back.

The top vane is the "strike bar". Manually rotating the printing shaft and the printing head "coupler" with the strike bar pushed down engaged the print head mechanism. Not sure if the strike bar will work near where it was damaged. I think the printing head damaged the strike bar. I observed the right-most print wheel lift up towards the roller. It was pretty tough to rotate it through the whole cycle, especially as the striker (?) deployed, but I made it through all the way.

I ran the machine for a bit. Tape was easily fed through the punch and punched with consistent advances, although the actual codes seemed nonsensical.

Tried sequence of R and Y, but I don't think I saw this:

0101 0010 - R

0101 1001 - Y

R and Y are selected because they are opposite bits in Baudot.

Better sequence is ASCII might be:

0101 0101 - U

0010 1010 - *

The machine started performing multiple outputs with each keypress, but perhaps I accidentally executed some control code?

- Scan remaining book
- Organize literature
 - What is there? What looks like it's missing?
- Check output on keypress
- What is process after a key is pressed? What happens?
- What is electrically going on with signals? Where to monitor?

8/19/2018

I removed the fluorescent light and the bell to gain better access to the carriage. In general, I can get some function, although the key selection (based on the punch actuators) does not seem 100%. There is no function in the print carriage other than it translates. It does not automatically return. Carriage return and line feed do not work. I'm not sure if "shift" works, and I'm not sure if this is actually "shift" or more "control" to actuate the control characters. Today I did not observe behavior that looked like the "memory" feature. Every keypress resulted in a carriage movement except sometimes (randomly) it failed. Pushing or moving the large white gear next to the spacing tab seems to help.

Sometimes the "unlock" key (short key to the right of space bar) pops up. This key "unlocks the keyboard when it has been blocked by memory saturation or by the simultaneous pressing of two keys." Press down the unlock key for the keyboard to function.

There are two main problems, currently:

1. The top-most vane (closest to the operator) has been chipped away. I believe that this damage is new. Some pieces had been broken off previously, but the damage is more extensive now. I'm not sure what is causing the damage or how to fix it or what this vane does.

2. I believe that I've found the cause of the lack of action in the print head. The coupler had two pins sheared off of it. These appear to have been attached by weld or, more likely, brazing. I am missing one of the pins. This could be in the vacuum cleaner. I may open the bag and sift through it.

I can also try to machine a replacement part. It would be a flat plate with two pins coming from the side.

In the short-term, it may be possible to get the punch working, which would be pretty cool. I would also like to study the machine's construction and the signals. Eventually I will work to get it printing. The other thing to work on is its modular construction. How does it come apart?

8/18/2018

Translated some of the Te315 manual.

Had it running today. Carriage was advancing, although not perfectly. The punch also seemed to start working. Pieces are loosening up, although significantly more lubrication is probably necessary. The carriage advances to the end but carriage return does not work. Why?

The "memory function" does seem to be present. Not every keypress results in the decoding or carriage advance. Up to four keypresses typically before it executes several at a time. I think this is the memory function and related to how the striker works (with four independent "knobs". The Te315 manual says something about a "memory" of up to ten characters to decouple typing speed from the transmission speed.

All function above was observed in "LOCAL" mode. Out of "LOCAL" there was no carriage advance. E.g. is not working in echo.

Next:

- Clean and lubricate vanes with lubricant and toothbrush.
- Try to inspect the carriage. Why does it advance haphazardly?
- video!

8/17/2018

Vacuumed out the bottom aluminum baseplate and reattached.

Rebuilt the control box.

Attached all cabling.

Powered up on variac. Control lights begin to glow. Snap heard.

Snap was thermal (?) breaker (red, labeled 0.4) on back of electronics breakout box. With power on and through variac, pressing this engaged power to the motor, but quickly shut off.

Some play was noted in the belts / gear. Things seemed to loosen up a bit. I proceeded to rock the belts / gears to work things free. Each time I restarted the motor (which shut off by the breaker) it seemed to advance and speed up a little further. Since Variac was limiting to 110V, I plugged directly into a (breakered) power switch. The motor ran a bit faster. Eventually it came up to speed.

The puncher was running. I seemed to get this off. The punch mechanism does not advance. The reader mechanism appears to be frozen, too.

Key press function on the keyboard eventually came up, but the carriage does not advance. Every once in a while the carriage moves right. Manually tapping the vanes below will advance the carriage. No action is observed on the printer. Carriage return and paper advance switch on the right works.

Worrisome is a metal knob I found that seems to have been broken or cleaved off somewhere.

Some keypresses put it into a "chatter" which seems to be the receiver. I'm guessing that the transmitter and receiver are decoupled. Putting the control in "local" mode does not have any effect.

- Read about normal operation from Te315 manual
- Could simply be corroded signal contacts - clean

8/15/2018

Cleaned fuse contacts and replaced 100mA fuse.

Pulled the paper tray off. This mounts with two rubber gaskets towards the back that just pull off and hooks in the metal that attach to a bar close to the print head. Pulling the paper tray off provided better access to the motor, main gearbox, and some red control knobs on the right.

Blew out foam bits with compressed air and vacuumed.

A small "S-hook" was loosely dangling / attached

- Check other fuse values before starting
- Vacuum out aluminum base and reattach
- Fix connector shield in control box

8/15/2018

Removed the aluminum frame under the base plate. This is held on by six attachments: four flat-head bolts with two in the upper left and upper right, which attach to a support bar, and two about mid-way down attaching to another support bar. One bolt was missing (lower left). The bottom stand-off screws bolt the lower part of the aluminum frame onto a bar.

This revealed the main gearbox out of the motor and other parts. It looks clean and the grease is pliable.

Next steps: I want to blow out the foam bits, which populate mostly the top part of the assembly, along the vanes and carriage. There are a few minor oiling points in areas that have accumulated dust, but I think this is ready to try to power up.

- I need a fuse in the control box.
- clean / blow out foam bits, dirt, and dust
- one or two oil points?
- Need to verify the wiring.
- Power up slow or just on?

NEED:

- FUSE
- cleaning solution like Simple Green

8/14/2018

Base plate should come off of main teleprinter body. This would provide access to bottom. Is it the four screws with the rubber gaskets?

- Clean stand
- document cable attachments

Concerns:

- sticky grease
- durability of plastic gears (especially) and parts

About 40 minutes of work and documentation tonight

I took photos of the different cables.

I was able to remove the bottom plate. There are two "landing gear" legs that come down on the back, which allows the teletype to stand up. The bottom plate is removed by the four screws and washers on the rubber attachments.

There were two set screws in the bottom plate. These seemed to be embedded in the felt, and so likely did not move or rattle around. I can't easily identify where they came from.

All keys seem to actuate fine. The grease appears to be in good condition. This makes me think that cleaning out the foam bits by vacuum and compressed air may be the way to go. After that, I could try a power-up.

NOTE

***Looking at photos of the cables, it appears that some pins have broken the cables. I need to document the wiring and continuity on the cables. The output of the 25 pin cable to the computer is not clear, but it should contain signals for the punch and the sender / receiver.

Two cables go from stand to the computer interface box (what is this part called?)

1. 50-pin female D-sub in 3 rows (DD-50). 17-16-17. On the top and bottom rows there appears to be a pin stuck in the sixth hole from the left. This could be a reflection. ***VERIFY*** (The corresponding male connector does not appear to be missing pins in those locations)

FOLLOW UP - cables look OK

2. 7-pin DIN connector that carries power and ???

8/12/2018

Unit moved to the basement. Outer case attaches by four locking mechanisms that are turned by a screw driver. Two in back, one on each side. Top slides off, upwards. The keyboard case is held by four swinging latches, two on the lower forward side, two on the sides. Top case must be off to remove the keyboard case.

Keyboard is dirty. Some mouse droppings, and, presumably dust and grime. Began cleaning.

Foam had degraded and spread throughout. Mechanicals seem to work, although grease has gummed up significantly.

Ribbon holder comes off using central friction slide. Rotate it counter-clockwise and it will release the ribbon assembly.

Back of the unit had a plastic envelope, sealed shut with tape, that contained two schematics:

T01, Teleprinter telegraph circuit, 3868031 X, dated 12/15/1969

M02, Teleprinters [sic] motor circuit, 3868030 W, dated 12/15/1969

Paper mechanism:

Need to document which switches do what. On right: engage roller to motor (or disengage for manual adjustment). Enable tractor versus friction, set... paper thickness? On left: tractor setting, load paper, and

"Sharp User's Club" newsletter has a short section on the TE 300. One key tip: use LOCAL mode to type directly.

8/11/2018

Picked up today from Chris C.

His brother was the original owner. Purchased in the late 1970's. Brother bought an IMSAI. Went to college in Boston with a degree in public administration. Ended up working as a programmer for 10 years. Brother attended the Atlantic City Computer show. Bought an IMSAI 8080 shortly thereafter. Purchased the Olivetti. Drove with father to Boston to buy it - no one in NYC area had them. Met Stan Veit at some point. Chris gave me a copy of the program from the 1978 Philadelphia Computer Show that his brother attended. His brother programmed BASIC for about 10 years at various companies and public agencies.

Also involved in amateur radio?

Chris had disassembled into the base unit, stand, and commutations unit. They are in reasonably good shape, with some corrosion on the stand, especially. Wheels work well.

Communication unit. Disassembled. Main cover pulls off. Two screws to take the front panel switches off and four more screws to disassemble this unit. The switches are in good condition. There is a capacitor of unknown state in the unit, and presumably five lamps that illuminate the switch panel. One for "CD" (must be carrier detect), one for "LOCAL", one each under "MR" and "RS", and one under "ON". (How do you turn the unit on, by the way?!) The lamps are of unknown state.

I pulled the circuit board. The traces are in good condition. There are part date codes 1970 and 1971 (transistors). There are four capacitors of unknown state and four 500 ohm inductors? No idea what these are, but they are in excellent condition. One fuse, the right-most, is Westin 100mA type "T"

Questions:

- How to connect to RS-232? or is it current loop operation?
Baud rate?
- What is power? Plugs available? Transformer settings OK?
- Manuals? Documents?
- Maintenance?

- Are all of the parts there?
- How does it go back together?
- What are the signals coming out of the SC plug?

8/8/2018

Interesting, this popped up on 8/6:
<http://terminals-wiki.org/wiki/index.php/Category:Olivetti>
These are the photos from ebay

Resources and literature

New:

Basic teleprinter operation / theory
<https://www.youtube.com/watch?v=HcMHam54EOI>

Interesting: separation of transmitter and receiver

Thread here on VCFED:
<http://www.vcfed.org/forum/showthread.php?58938-Creed-teleprinter-T-1>

***Archivi Digitali Olivetti
<http://archividigitaliolivetti.archivistoricolivetti.it/en/collections/object/detail/68242/>

Has the manuals in archive. Not available online.

"TE 300. OLIVETTI TE 300 – PRINCIPLES OF OPERATIONS. COMMUNICATION TERMINAL. GENERAL MANUAL.; [OLD UA:CE-2-2-8-6]"

QRZ.COM
<https://www.qrz.com/db/hs0zhk>

HAM / RTTY site. Mentions having / using the TE 300 at some point

Byte Magazine May 1980
Page 44 has a story that shows the author's TE300
"GT -6144 graphics board, an ACT -IA terminal with Leedex monitor, an Olivetti TE -300."

Other interesting articles in this issue: interfacing a Shugart 400, comparing floppy disks systems

BAUDOT.NET
<http://www.baudot.net/tty-links.htm>

Some Olivetti info and documentation at Old-Computers.com
Mainly computers
<http://www.old-computers.com/museum/docs.asp?c=847&st=1>
<http://www.old-computers.com/museum/company.asp?st=1&m=96>

telescrivente olivetti TE300

Fun video:
"La telescrivente Olivetti. Principi di funzionamento ed usi"
<https://www.youtube.com/watch?v=v-9-yfpeV5M&list=PL15B-32H5GIL2MaHAbSzq5p802TPj46ql&index=16>

<http://www.storiaolivetti.it/percorso.asp?idPercorso=597>

innovative character of the Te 300 (eg it can transmit both with the old 5-bit code, and with a more advanced

8-bit code that allows an alphabet richer than the telegraphic one and more suited to the needs of the electronic data processing)

Usenet group:

it.comp.retrocomputing may be of some help...

<https://groups.google.com/forum/#!forum/it.comp.retrocomputing>

Museum in Brazil with the TE315:

https://www.ccuec.unicamp.br/museu/?page_id=1400

***Looks like TE315 manuals here...

<https://forum.johanneskok.com/index.php/en/2-uncategorised/86-manuals-schematics-all>

Trying to register:

You are free to use any Username, Password must be at least 6 characters and must have minimum of 2 uppercase and minimum 2 figures. Email addresses must be new and not used previously to register. ...

Username: ef1j

Password: Jm6-GDY-eUz-ns4

Was able to download cable diagrams (in Italian) for the TE300 and an operator manual for the TE315.

Some information, mostly Creed:

<http://www.samhallas.co.uk/repository/telegraphy.htm>

Teletypewriter information

<https://mysite.du.edu/~jcalvert/tel/teletype.htm>

Cites:

Department of the Army Technical Manual TM11-665, Fundamentals of Telegraphy (Teletypewriter) (Washington, DC: Dept. of the Army, 1954). A good explanation of the mechanism and circuits. The illustration of the teletypewriter is from page 31, Figure 31.

ASR-33 with PiDP

<https://oldfellowstoys.net/category/teletype/>

Banner program:

<https://oldfellowstoys.net/code/>

Notes

Full text of "Electronics Today International, Australia 1980" on archive.org gives baud rate and other characteristics:

OLIVETTI TE300 Computer Terminal, 150 Baud, RS232, 120 character thirteen inch tractor feed paper, ASCII keyboard and numeric keypad, solid unit, \$350. (03) 418-6337 b.h., (03) 288-2191 a.h.

On PubMed:

Clin Radiol. 1975 Oct;26(4):555-60.

Initial experience with a small dedicated computer system in a diagnostic x-ray department.

James WB, Fulton A, Reekie D.

Abstract

The operation of a small computer system involved in day to day management in an X-ray department is described. The system consists of the following equipment: PDP 8/F central processor with 8K core storage, 32K magnetic disc storage, High-speed paper tape reader (300 characters/s) and punch (50 characters/s), 3 Olivetti TE318 terminals with sprocket feed, paper tape reader and punch (10 characters/s). The system stores patient data relating to name, address, age, ward, referring physician, examination(s) requested, date of request, date of examination, date of report. From this data a large volume of relevant statistics is made available to the department and to the health authority. Labels for identifying record card, film envelope and X-ray films are automatically typed. During reporting coded phrases can be used by the radiologist. Interesting films can be recorded and recalled for library or consultation purposes as can research items. At report typing stage, the report heading is automatically recalled from the computer store. Coded phrases are typed automatically as is the radiologist's name and the date of the report. A 'DAYBOOK' IS TYPED AUTOMATICALLY at the end of each working day. Problems encountered in running the system and future developments are described.