GTTY - A Glass TTY + Load paper tape software into a PDP-8

Version 0.96, 8/29/2006

----------------------------------------------------------

by Lyle Bickley, Bickley Consulting West Inc.

Changes since release 0.92

1) Added ability to output a CR, wait for echo, etc. before

uploading. Aids in handling paper tape uploads and BUILD.

2) Tabbing is now supported. Option to specify tab size.

3) Proper handling of CR on "Enter" (bug fix).

4) Option to support CF/LF on "Enter" for DOS.

5) Minor bug fixes.

6) Documentation improvements

Changes since release 0.91

1) F6 is now "Clear Screen".

2) F8 is now "Exit" (was F6).

3) Help updated appropirately.

4) Minor code and documentation cleanup.

Changes since release 0.8 include:

1) Ability to "pace" using hardware CTS based on Reader Run.

Helpful in dealing with slow software reads from "paper

tape" by FOCAL, etc.

2) New function to allow escaping from a "hung" load from

CTS drop (Reader Run off). Useful when the BIN loader halts on

completion of a load - and there is still "paper tape"

trailer in a file.

3) Now supports up to 38400 baud.

4) There is a new function key and a new parameter (see below).

Acknowledgemets

---------------

This software was inspired by K. McQuiggin's "RIM Client, Version 0.2"

(July, 1998), AKA "send.c":

http://highgate.comm.sfu.ca/pdp8/software/send.c

The hardware modifications recommended below are directly or indirectly

from Aaron Nabil's site: http://pdp-8.org/flow.html.

Also helpful are Douglas Jones "Notes" on the

KL8E and KL8JA asynchronous Interfaces:

http://www.cs.uiowa.edu/~jones/pdp8/hard8e/kl8e.html

http://www.cs.uiowa.edu/~jones/pdp8/hard8e/kl8ja.html

Software - "Glass TTY - GTTY"

-----------------------------

I decided to write a complete "Glass" TTY that could be used as a console,

paper tape "reader" and "punch" for my PDP-8/F. I also wanted it to be

capable of "pacing", so it could be functional with programs such as FOCAL

and multi-segement tapes.

Starting up, it is a full duplex glass TTY - and sends the characters

you type to the PDP-8 and displays the characters received from the

PDP-8 on the screen/monitor.

Hitting the "F2" key - will upload PT (paper tape) images based on

filename and lets you specify whether you want it to strip

"garbage" characters from the tape before uploading it to the PDP8.

(Also, see note #4 below).

After the upload, GTTY automatically switches back to "glass" TTY mode.

If GTTY get's "hung" while uploading (typically the BIN loader halting

after completion of a load with trailer remaining in the "reader") hit F3.

This will escape the pacing wait from CTS dropping (RDR RUN off).

Hitting the "F4" key allows you to create a "Capture" file. After entering

a filename and hitting "Enter", all data received from the PDP-8 will be

captured to the file. Note that the display is turned off - as typically

the data to be "captured" is a binary punch file.

Hitting the "F5" key closes the capture file and GTTY switches back

to "glass" TTY mode.

"F6" Clears the screen

The other two active function keys are "F1" - Help, and "F8" - Exit.

Notes:

1. No function keys get passed to the PDP-8 (even those that are

not "progamatically active".

2. Filenames are limited to DOS's 8.3 filename format.

3. The GTTY startup parameters (upper or lower case) are:

-B baud [Baud rate=110,300,600,1200,2400,4800,9600 or 19200]

Default "9600"

-C Use this flag for "Enter" to produce CR/LF for DOS

(default is CR only on "Enter")

-H help

-N No CTS hardware flag (Turns OFF pacing for those who haven't

made the appropriate hardware changes to their KL8E or

KL8-JA boards. NOTE: The default assumes "pacing ON")

-P port [COM port=1,2,3 or 4] Default "1"

-S stop bits [Number of stop bits=1 or 2] Default "1"

-T tabsize [Default is "8"]

4. A new (as of 0.96) feature to issue a CR before an upload

is very handy for BUILDing from PT and reading PT images. For

instance, if you want to do a "PIP" paper tape image to

OS/8 file, you can do this easily in OS/8 by:

.R PIP

\*file=PTR: [do NOT hit CR here]

Now Hit "F2" to load PT file to PDP8. Enter the filename, etc.

and say "Y" to the option "Output CR before upload?". When

the file is opened and before it it uploaded, GTTY does a

CR, waits for the echo, "up-arrow" character, etc. and then

starts uploading the file.

I have found this very useful as it eliminates timeout issues, etc.

and makes for clean PT image reads into running OS/8 programs.

5. I've successfully uploaded virtually every paper tape diagnostic available

for my system (and it's I/O). In addition, I've uploaded FOCAL and

other software without error at 9600 baud. I've tried it using both

the M8550-YA and the M8655 "TTY" console boards with equal success.

6. I've tested GTTY with 38400 baud and slow reading - and pacing works!

7. The keyboard backspace and delete keys both generate a TTY rubout

(Octal 377) character.

Hardware changes to implement "Pacing"

--------------------------------------

When running programs like the RIM or BIN loaders, the PDP-8/E is easily able to "keep up" reading a paper tape file from GTTY. However, some programs as FOCAL, read the paper tape reader slowly. Without hardware modifications, GTTY will attempt to "cram" characters to the PDP-8 when it isn't capable of reading them - hence missed data.

To fix this problem, your M8550 or M8655 TTY console board needs to be modified. The modification essentially ties RTS/DTR (CTS after a full handshake null modem)to the Reader Run flip flop on the console board. GTTY is able to sense CTS and wait until Reader Run is set (CTS O.K.) before sending a character to the PDP-8.

The hardware changes for the KL8-JA are written up nicely by Aaron Nabil at his website: http://pdp-8.org/flow.html. I suggest that you use the "UNTESTED BUT SHOULD WORK" procedure described after steps 1-5. I've tested it - and it works perfectly. The big advantage of this procedure is that current loop remains functional. Please NOTE: There is a "bug" in Aaron's writeup - Step 5 says "Jumper from pin 7 of E39..." it should say "Jumper from pin 6 of E39...".

I also wanted GTTY to work with the older KL8E async controller (M8650). It turns out that the hardware modifications are much easier on the older board!

On E32 (MC1488) remove the solder from pins 4 and 5. Gently bend the pins away from the board so they no longer make contact. Solder both pins 4 and 5 to a jumper wire. Connect the other end of the jumper to E48 (7474 - Rdr Run) pin 9. That's it! The older board works great with both current and EIA modes without any other changes.

---------------------------------------

Programming Notes:

1. I'm a \*NIX buff and haven't written DOS code for years, but I wrote

GTTY as a DOS program because I know there are a lot of collectors

that use "imagedisk", "Teledisk", "PUTR", etc. which only operate

on DOS - and many folks who don't have \*NIX systems. I've successfully

tested GTTY on DOS 6.22, Windows 98 SE in a DOS window, and Windows XT

[Home Edition] in a DOS window.

2. I'm including the source code, for anyone who would like to "hack"

the program, add feature, etc. My only request is that if you release

it back to the community that you change it's name, and maintain

my copyright notice in the code and startup. Note that it is totally

"free" when used for non-commercial use. Please contact me at

lbickley at bickleywest.com for commercial use.

3. I wrote GTTY in "C" - and wanted to use a freely available DOS compiler

and libraries. I selected Dave Dunfield's "Micro-C". Dave's compiler

and libraries let you get close enough to the "metal" to make a

program such as GTTY responsive and effective - easily handling

communications, screen and keyboard control simultaneously. His

compiler can be downloaded from: www.dunfield.com, either "free" or if

you want all the examples and library source (I did) for the modest

cost of $25.

Have fun!

Cheers,

Lyle