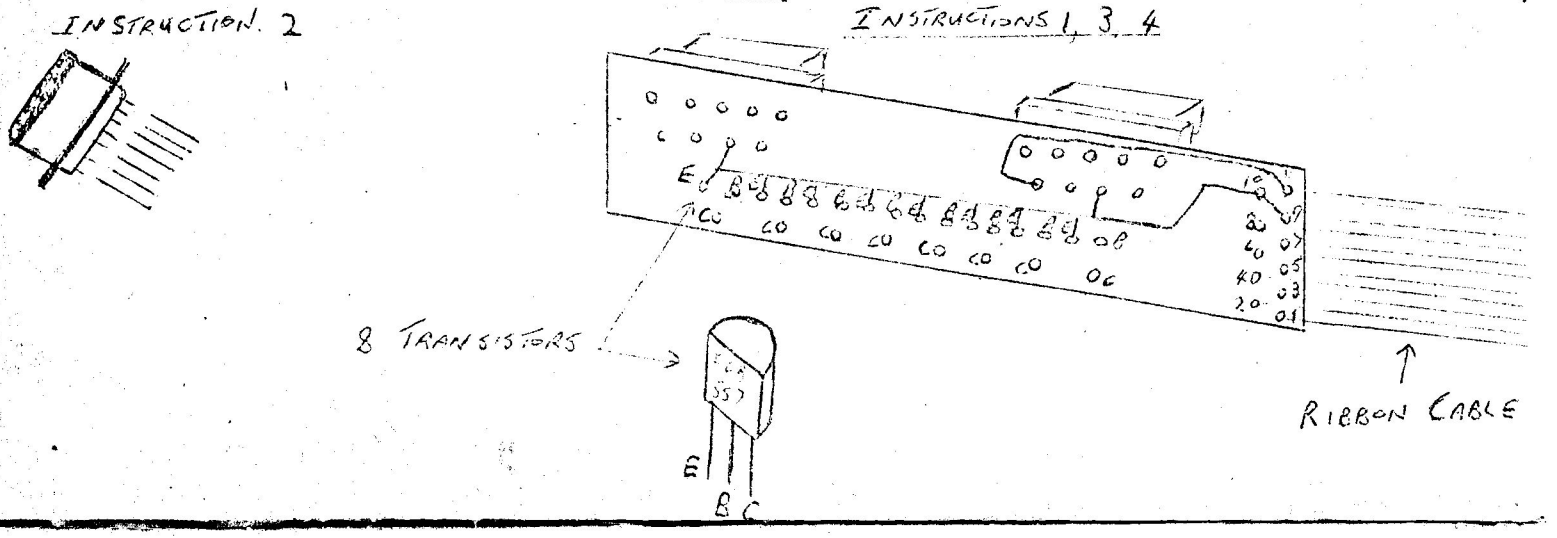
ASSEMBLY INSTRUCTIONS

1. SOLDER TRANSISTORS TO P.C. BOARD AS SHOWN IN DIAG.
2. SOLDER 9 WIRES TO EACH PLUG. (THE 2 NINE PIN D CONNECTORS)
3. SOLDER THE 2 PLUGS TO CIRCUIT BOARD, LEAVING APPROX. $\frac{1}{4}$ INCH SPACE BETWEEN BOARD AND PLUG.
4. CONNECT 10 WIRE RIBBON CABLE TO P.C.BOARD AND OTHER END TO CENTRONICS 36 PIN D CONNECTIR NOTE: MAKE SURE YOU CONNECT PINS 19 to 29 TO GROUND (PIN 9 ON SAME PLUG)
5. INSERT THE TWO 9 PIN D CONNECTORS INTO PORT 3 AND 4 OF YOUR ATARI (YOU MAY HAVE TO BEND THE TWO PLUGS TOGETHER TO MATCH UP TO THE SOCKETS ON YOUR COMPUTER.
6. INSERT THE CENTRONICS PLUG INTO YOUR PRINTER.



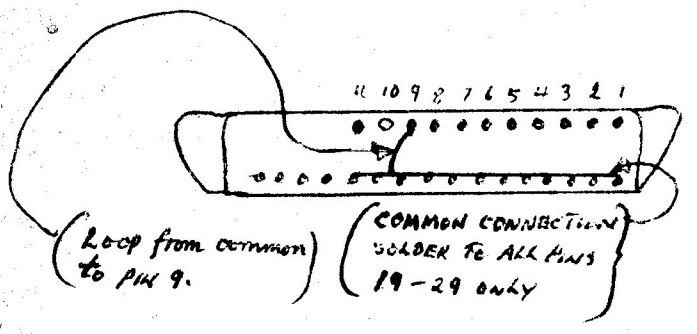
OPERATING INSTRUCTIONS

AFTER INSERTING THE PLUGS INTO THE ATARI GAME PORTS 3 AND 4 AND THE PLUG INTO THE PRINTER INSERT THE CASSETTE INTO RECORDER, REWIND AND PRESS PLAY, IF USING A DISK DRIVE SWITCH ON THE DISK DRIVE.

HOLD DOWN THE START BUTTON AND SWITCH ON YOUR COMPUTER, YOU WILL HEAR A BEEP, PRESS RETURN. AFTER A SHORT WHILE READY WILL APPEAR, IF YOU ARE USING A DISK DRIVE THE DRIVE WILL START UP AND STOP AFTER A SHORT WHILE.

YOU MAY NOW LOAD OR WRITE AND PROGRAM INTO YOUR COMPUTER. TO PRINT OUT A LISTING SIMPLY TYPE L."P, TO PRINT THE CONTENTS OF THE T.V. SCREEN, TYPE SCREENPRINT = USR(1670)

TO CHANGE THE LINE LENGHT TYPE POKE 1770,xxx (xxx BEING A NUMBER WHICH WILL DETERMINE THE LINE LENGTH YOU WANT).



P.S. Miss out Pin 10, connect wire 10 to Pin 11 on Centronics 36 D Pin connector.

Printer Interface

Screen to Printer Interface for the ATARI 400/800

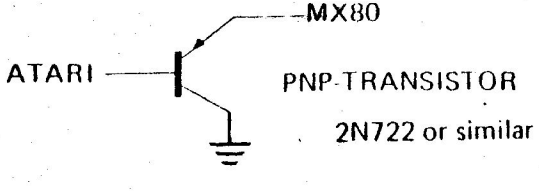
Many ATARI users would like to connect a parallel interface to the computer. For many people buying an interface is too expensive. On the other hand, they may not have the experience to build one by their own. Also a lot of software is needed.

The following instructions make it easy, to hook up an EPSON, Centronics or an Okidata printer to the ATARI.
Only seven of the eight bits of the data link are used for a printout. The eight bit creates a strobe impulse. Also the trigger input of port 4 is used for the BUSY-request of the printer.
There is a formfeed every 66 print lines. So it is necessary to adjust the paper before starting the printing. You may need to make several trials to find the best position of the paper. After each system reset the line counter is set to zero, so you have to privide your own formfeed for a correct paper position.

You can control the length of a line by a POKE 1770, xxx. After doing so, press system reset and enter LPRINT.

The program SCREENPRINT is called by BASIC thru an USR (1670) and by the assembler with a GOTO $0687.

You may install pnp transistors between the game output and the printer, as it is shown in this small figure.



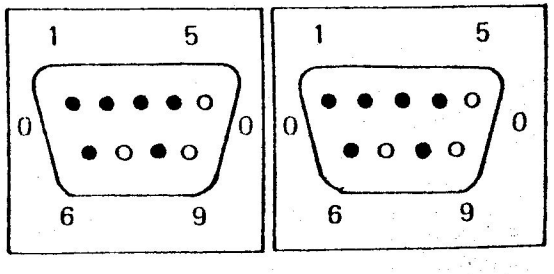
The next figure shows the connection of the ATARI game outlets and the connector for the MX-80 printer. This is a so-called Centronics interface and the program can be used with each printer and this interface.

EPSON MX80 – ATARI 400/800
Interconnection-Scheme

MX80-Connector	ATARI-Connectors	
	Port3	Port 4
Pin#	Pin#	Pin#
1 (19) STROBE		4
2 (20) DATA 1	1	
3 (21) DATA 2	2	
4 (22) DATA 3	3	
5 (23) DATA 4	4	
6 (24) DATA 5		1
7 (25) DATA 6		2
8 (26) DATA 7		3
9 (27) DATA 8		8
11 (29) BUSY		6
(GND)	8	8

(19)--(29) = Ground (GND)

Plugs seen from the rear view.
Front view of the computer outlets.



PORT 3 PORT 4

he next figure shows the program.

```
**********************************
*  UNIVERSAL PRINT FOR ATARI     *
*                                *
*  400/800 VERSION               *
*                                *
*                                *
*                                *
*                                *
*                                *
**********************************

            BASIS   EPZ $58
            PT      EPZ $FE
            PST     EQU $600

                    ORG PST

0600: 00            DFB 0
0601: 02            DFB 2
0602: 0006          DFW PST
0604: 6E06          DFW INIT
0606: A93C          LDA #$3C
0608: 8D02D3        STA $D302
060B: A9EB          LDA #PND
060D: 8DE702        STA $02E7
0610: A906          LDA #PND/256
0612: 8DE802        STA $02E8
0615: A96E          LDA #INIT
0617: 850A          STA $0A
0619: A906          LDA #INIT/256
061B: 850B          STA $0B
061D: 18            CLC
061E: 60            RTS

061F: 2B0642
0622: 063F06
0625: 42063F
0628: 063F06 HANDLTAB DFW DUMMY,
      WRITE-1,RTS1-1,WRITE-1,RTS1-1,
      RTS1-1
062B: 01     DUMMY  DFB 1

062C: A930   OPEN   LDA #$30
062E: 8D03D3        STA $D303
0631: A9FF          LDA #$FF
0633: 8D01D3        STA $D301
0636: A934          LDA #$34
0638: 8D03D3        STA $D303
063B: A980          LDA #$80
063D: 8D01D3        STA $D301
0640: A001   RTS1   LDY #1
0642: 60            RTS
0643: C99B   WRITE  CMP #$9B
0645: D01D          BNE PRINT
0647: ADEA06 CARR   LDA LINLEN
064A: 8DE906        STA LCOUNT
064D: CEE806        DEC COUNT
0650: 100D          BPL NOFF
0652: A90C          LDA #12
0654: 206406        JSR PRINT
0657: EEE906        INC LCOUNT
065A: A941          LDA #65
065C: 8DE806        STA COUNT
065F: EEE906 NOFF   INC LCOUNT
0662: A90D          LDA #13
0664: 20D106 PRINT  JSR OUTCHAR
0667: CEE906        DEC LCOUNT
066A: F0DB          BEQ CARR
066C: D0D2          BNE RTS1
066E: A91F   INIT   LDA #HANDLTAB
0670: 8D1B03        STA $031B
0673: A906          LDA #HANDLTAB/256
0675: 8D1C03        STA $031C
0678: A941          LDA #65
067A: 8DE806        STA COUNT
067D: ADEA06        LDA LINLEN
0680: 8DE906        STA LCOUNT
0683: 4C2C06        JMP OPEN

0686: 68     BASIC  PLA
0687: A558   NORMAL LDA BASIS
0689: 85FE          STA PT
068B: A559          LDA BASIS+1
068D: 85FF          STA PT+1
068F: A917          LDA #23
```

```
0691: 8DE606            STA ROW
0694: A927    ROWLOOP   LDA #39
0696: 8DE706            STA COLUMN
0699: A200              LDX #0
069B: A1FE    LOOP      LDA (PT,X)
069D: 297F              AND #$7F
069F: C960              CMP #$60
06A1: B002              BCS LOOP1
06A3: 6920              ADC #$20
06A5: 20D106  LOOP1     JSR OUTCHAR
06A8: E6FE              INC PT
06AA: D002              BNE *+4
06AC: E6FF              INC PT+1
06AE: CEE706            DEC COLUMN
06B1: 10E8              BPL LOOP
06B3: A90D              LDA #13
06B5: 20D106            JSR OUTCHAR
06B8: CEE606            DEC ROW
06BB: 10D7              BPL ROWLOOP
06BD: 60                RTS

06BE: 48414E
06C1: 532057
06C4: 41474E
06C7: 455220
06CA: 32372E
06CD: 372E38


06D1: AC13D0  OUTCHAR   LDY $D013
06D4: D0FB              BNE OUTCHAR
06D6: A080              LDY #$80
06D8: 0980              ORA #$80
06DA: 8D01D3            STA $D301
06DD: 297F              AND #$7F
06DF: 8D01D3            STA $D301
06E2: 8C01D3            STY $D301
06E5: 60                RTS

06E6: 17      ROW       DFB 23
06E7: 27      COLUMN    DFB 39
06E8: 41      COUNT     DFB 65
06E9: FF      LCOUNT    DFB 255
```

```
06EA: FF      LINLEN    DFB 255
              PND       EQU *

BASIS         $58
PT            $FE
PST           $0600
HANDLTAB      $061F
DUMMY         $062B
OPEN          $062C
RTS1          $0640
WRITE         $0643
CARR          $0647
NOFF          $065F
PRINT         $0664
INIT          $066E
BASIC         $0686       UNUSED
NORMAL        $0687       UNUSED
ROWLOOP       $0694
LOOP          $069B
LOOP1         $06A5
AUTHOR        $06BE       UNUSED
OUTCHAR       $06D1
ROW           $06E6
COLUMN        $06E7
COUNT         $06E8
LCOUNT        $06E9
LINLEN        $06EA
PND           $06EB
```

Program description:

Address	
0600 – 061E	end of the booting part
0610 – 062B	HANTAB for the ATARI OS
062C – 0642	opens the ports for output
0643 – 066D	printer driver
066E – 0685	Initialize. Now LPRINT and PRINT "P" uses the printer driver
0686 – 068D	label BASIC starting address for a call by BASIC Label NORMAL starting address for a call by assembler.

06DL – 06E5 Subroutine, puls one ASCII character from the accumulator to the printer

06E6 – 06EA values for the various counters
ROW sets the number of horizontal lines to 23.
COLUMN sets the number of characters of one line to 39.
COUNT sets the number of lines between two formfeeds to 65
LCOUNT, LINLEN contains the actual parameters for the number of characters and lines.

Boot-Routine

```
PST       EQU $0600
PND       EQU $0700
FLEN      EQU PND-PST+127/128*128
                ORG $6000

6000: A210    BOOTB     LDX #$10
6002: A903              LDA #3
6004: 9D4203            STA $0342,X
6007: A908              LDA #8
6009: 9D4A03            STA $034A,X
600C: A980              LDA #$80
600E: 9D4B03            STA $034B,X
6011: A94A              LDA #CFILE
6013: 9D4403            STA $0344,X
6016: A960              LDA #CFILE/256
6018: 9D4503            STA $0345,X
601B: 2056E4            JSR $E456
601E: 3029              BMI CERR
6020: A90B              LDA #$0B
6022: 9D4203            STA $0342,X
6025: A900              LDA #PST
6027: 9D4403            STA $0344,X
602A: A906              LDA #PST/256
602C: 9D4503            STA $0345,X
602F: A900              LDA #FLEN
6031: 9D4803            STA $0348,X
6034: A901              LDA #FLEN/256
6036: 9D4903            STA $0349,X
6039: 2056E4            JSR $E456
603C: 300B              BMI CERR
603E: A90C              LDA #$0C
6040: 9D4203            STA $0342,X
6043: 2056E4            JSR $E456
6046: 3001              BMI CERR
6048: 00                BRK
6049: 00      CERR      BRK
604A: 433A    CFILE     ASC "C:"
604C: 9B                DFB $9B

PST             $0600
PND             $0700
FLEN            $0100
BOOTB           $6000       UNUSED
CERR            $6049
CFILE           $604A
```

If you want to use this program, you must make it bootable.
The program in the next figure makes a bootable cassette.
You must enter both programs and start the program at address $ 6000. This will create a bootable cassette, you can use afterward in the following manner, to enter the SCREENPRINT in your computer.

Turn off the computer
Press the start key
Turn on the computer
Release the start key
Press PLAY on the recorder and
press RETURN

BASIC 00 assembler-editor cartridge must be in the computer.

FUNCTION CONTROL CODES FOR STAR DP8480 PRINTER

CARRIAGE RETURN ---------- CONTROL M
LINE FEED ---------- CONTROL J

FORM FEED ---------- CONTROL L
PAGE LENGTH FOR FORM FEED IS SET BY ESC C CONTROL n.
(control A sets 1 line, 0 lines is not legal)
EIGHTY CHARACTERS IS DEFAULT MODE
NINETY SIX CHARACTERS SET BY ESCAPE M
ONE THIRTY TWO CHARACTERS SET BY CONTROL O

DOUBLE WIDTH CHARACTERS ON ANY OF THE ABOVE IS SET BY
CONTROL N AND RESET BY CONTROL T OR LINE FEED

CONTROL R RESETS 96 AND 132 CHARACTER MODES TO 80 CHARACTER

PITCH(LINE FEED) IS SET BY ESC CONTROL , FOR 1/12 INCH
ESC CONTROL A FOR 1/8 INCH
ESC CONTROL B FOR 1/6 INCH

CONTROL G SOUNDS A HORRID LITTLE BUZZER

ESC U, ESC S, ESC F, ESC D, ESC J, ARE USED TO SET