migrating or homesteading,
productive new worlds await…

Designing Platform-Independent Forms with QCForms

Wirt Atmar
AICS Research, Inc.
University Park, NM 88003

Analog computer/NACODE Tracking station (1960)
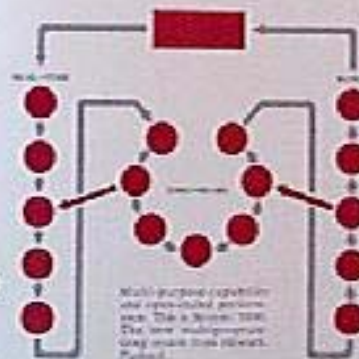
HP 2116A & ASR35 TTY (1968)

SYSTEM/3000
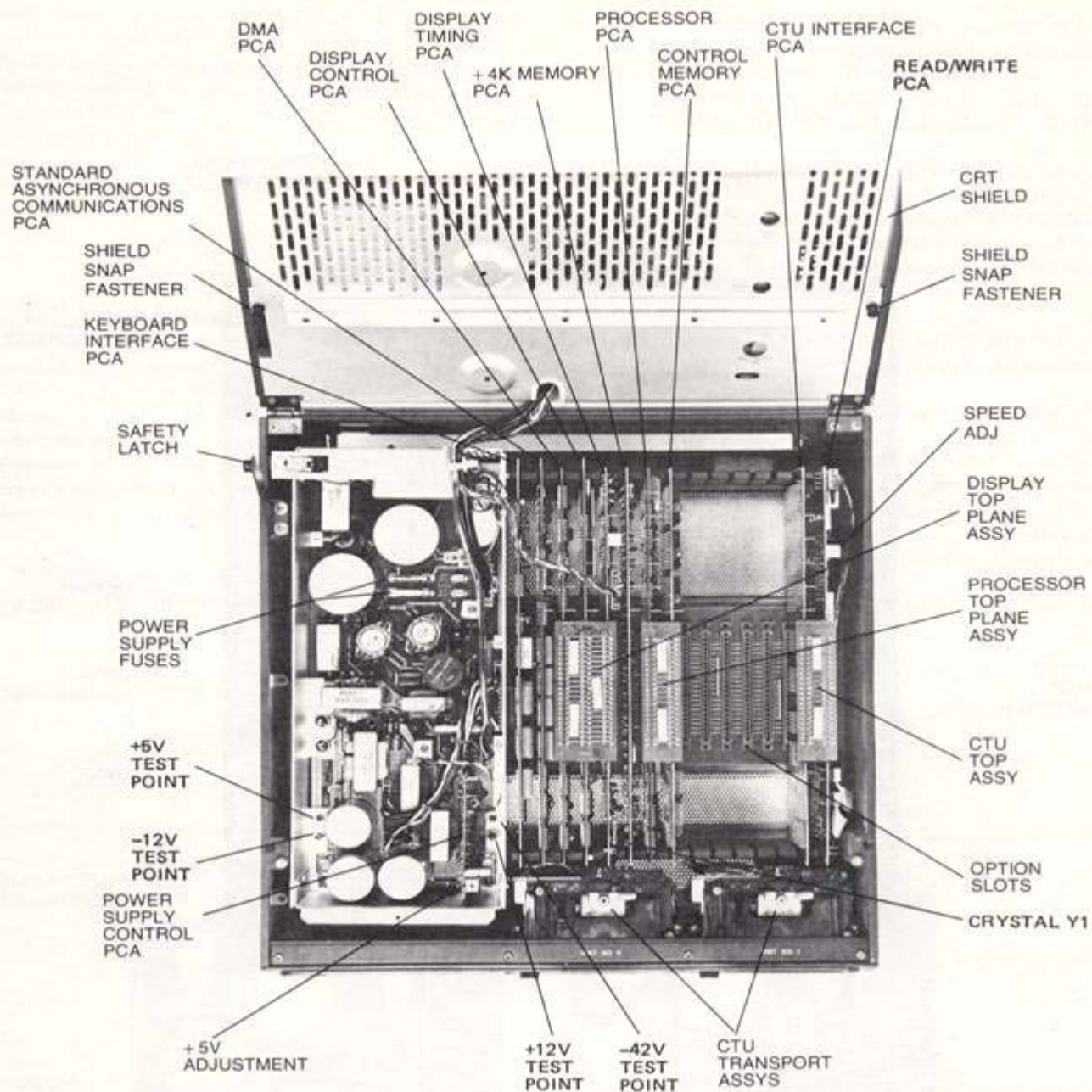the multi-purpose computer system

THE HP SYSTEM/3000 represents a new approach to multi-purpose computer systems. It combines unprecedented capabilities into one small scale system. For terminal-oriented processing the HP System/3000 can accommodate large numbers of users in both multi-lingual time sharing and data entry/retrieval modes. Or, if your application is real-time, the fast response to interrupts coupled with sophisticated real-time operating software opens a new level of solutions for process control. For day-to-day data processing the system can simultaneously handle your general-purpose batch activities. The specific combination of capabilities is up to you. The flexibility of the HP System/3000 hardware/software lets you tailor the system to your needs.

(1972)

HP 2645 Intelligent Display Terminal/
AICS System 2000 Word Processing Terminal
(1975)

DMA PCA

DISPLAY CONTROL PCA

DISPLAY TIMING PCA

+4K MEMORY PCA

PROCESSOR PCA

CONTROL MEMORY PCA

CTU INTERFACE PCA

READ/WRITE PCA

STANDARD ASYNCHRONOUS COMMUNICATIONS PCA

SHIELD SNAP FASTENER

KEYBOARD INTERFACE PCA

SAFETY LATCH

POWER SUPPLY FUSES

+5V TEST POINT

−12V TEST POINT

POWER SUPPLY CONTROL PCA

+5V ADJUSTMENT

+12V TEST POINT

−42V TEST POINT

CTU TRANSPORT ASSYS

CRT SHIELD

SHIELD SNAP FASTENER

SPEED ADJ

DISPLAY TOP PLANE ASSY

PROCESSOR TOP PLANE ASSY

CTU TOP ASSY

OPTION SLOTS

CRYSTAL Y1

```
100     ************************
101     *
102     *   AN ENHANCED TAPE REWIND AND INITIALIZATION
103     *   ROUTINE.  LINKED FROM HP CODE 'INTRWD'
104     *   ROUTINE.
105     *
106     ************************
107     TPESET  STA     FILNUM REQUIRED BY HP ROUTINE
108             LDA     CMND   GET THE LAST ISSUED COMMAND
109             ANI     020Q   WAS IT TO THE LEFT TAPE?
110             JZ      TPEST1 NO--HANDLE THE RIGHT TAPE
111             LDA     TPFLGS YES--SET UP THE LEFT (READ) TAPE
112             ORI     RDCFLG REQUEST THAT THE CATALOG BE READ
113             STA     TPFLGS IMMEDIATELY
114             MVI     A,1    RESET THE LEFT TAPE NUMBER
115             STA     LTPNUM TO 1ST SECTOR
116             LXI     H,RDOVBF AND CLEAR OUT THE READ OVERFLOW
117             MVI     M,EOBCHR BUFFER CONTENTS, IF ANY
118             MVI     A,1    SET IN THE LEFT TAPE
119             JMP     TPEST2 TO BE SELECTED
120     TPEST1  MVI     A,1    RESET THE RIGHT TAPE NUMBER
121             STA     RTPNUM TO THE 1ST SECTOR
122             LXI     H,WROVBF CLEAR OUT THE WRITE OVERFLOW
123             MVI     M,0    BUFFER CONTENTS
124             MVI     A,2    SET IN THE RIGHT TAPE TO BE SELECTED
125     TPEST2  CALL    SELACT SELECT THE PROPER DRIVE
126             RET            AND RETURN
127     ************************
```

Original HP264x Intelligent Terminal Reference Manual

(1978)

MULTICHARACTER TRANSFERS

There are certain functions that always result in multicharacter (block) data transfers.

- device input/output and control operations, including tape transfers

- special function keys

- status requests

- cursor sensing

- all transfers while in Block Mode

Once a block transfer has been enabled, it must be triggered by the computer before the block of data is actually sent. The computer triggers the transfer by sending a DC1 character when it is ready to receive the data. The terminal also assumes that it has received the trigger when it is first powered up or fully reset, or when the REMOTE key is pressed (down).

The computer software must support the handshaking process used in multiple character transfers. The DC2 character must be recognized as a request to send data and the DC1 character must then be sent to trigger the transfer after buffers have been allocated to receive the data. Additional software support may be needed depending on your need for terminal or device control. There are straps on the Keyboard Interface that can be used to modify the handshaking process. These are discussed later in this section.
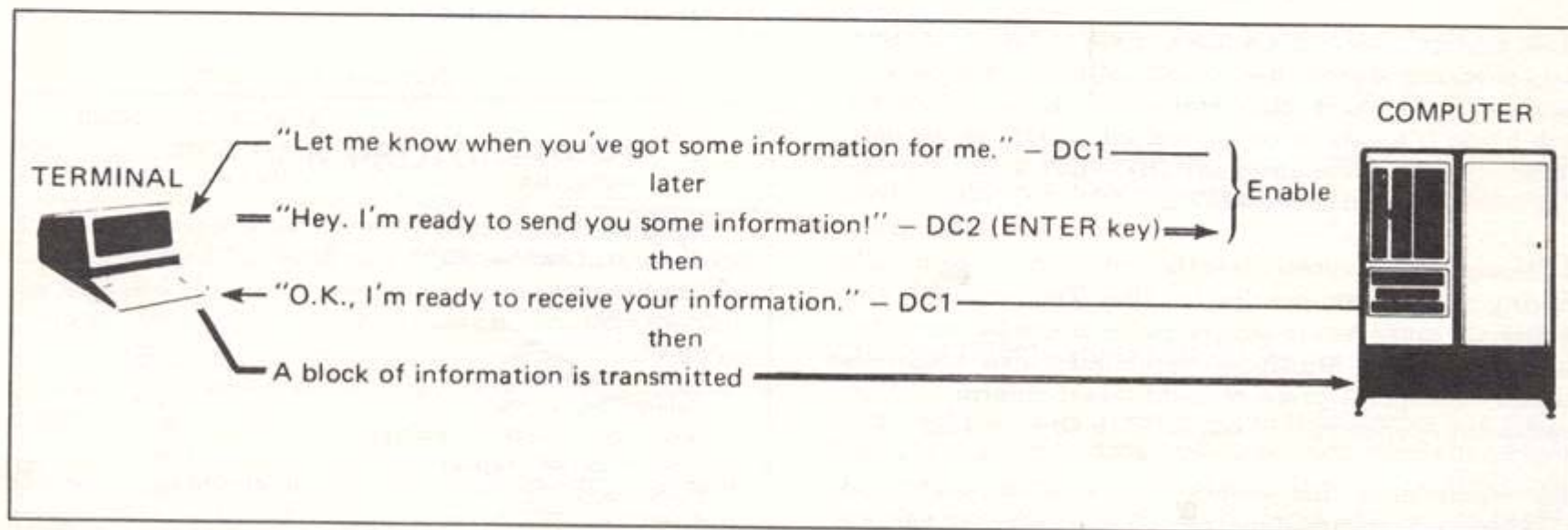

Figure 5-2. Block Transfer Enabled By The ENTER Key

The complete form would appear as follows:


```
ORDER #     COMPANY NAME          SHIPPING ADDRESS:  STREET
01-2345     HEWLETT-PACKARD       11000 WOLFE ROAD
DATE        BILLING #             CITY                    STATE  ZIP
03/11/79    01-88-458-789012      CUPERTINO               CA     95014

ITEM #      PRODUCT NAME          PRICE      QNTY   TOTAL          CODE
0123AB456   SCREW DRIVER          $508.88  *  *11  ==  $          ABCDE
7890CD123   SOCKET WRENCH           $8.00  *  **5  ==       $40.00 ABCDE
4567EF890   PRECISION COMPASS      $12.95  *  *10  ==      $129.50 FGHIJ
                                         *          ==
```

STEP 3. After filling out the form and correcting any noticed errors, the [ENTER] key is pressed once. The following sequence of events would then occur:

- Having received a DC1 from the computer, the terminal transmits a DC2.

- Computer software recognizes the DC2 and responds with a second DC1.

- The terminal receives the DC1 and transmits all data as one Block, fields separated by US's and the Block terminated by an RS:

STEP 4. The form full of data has been transmitted to the computer. The user could then Home the cursor, hit [CLEAR DISPLAY], to clear only the data from the form in FORMAT MODE, and enter a second set of data inputs — repeating the sequence and re-using the form.

Figure 5-5. Example of Format Mode with Page Strapping

(1997)

File   Edit   Screen   Terminal   Connection   Help

```
NMMGR/3000 (B.06.00) #1   Open Configuration/Directory File
Enter a file or directory name and press the corresponding function key.
Command:
```

Configuration file name   [NMCONFIG.PUB.SYS   ]

Backup configuration file name   [NMCBACK.PUB.SYS   ]

Network directory file name   [NSDIR.NET.SYS   ]

        If a write access password has been assigned, you must
        enter the password to modify the configuration file.

        Write access password   [   ]

| Open Config | Open Directry | | | | | | Help | Exit Program | Extended Char | User | System | Enter |

| 9, 34 | Telnet (advanced) | | | size | | color | | pause | ◄ | | ► |

Start   Exploring - ...   AICS Rese...   America O...   qcforms.ppt   192.168....   4:49 PM

Federal Information Worksheet

1998

► Keep for your records

QuickZoom to Form 1040 . . . . ► [QuickZoom]

Taxpayer:

Last name	Stein
First name	Frank
Middle initial	N Suffix . . . . . . Jr.
Social Security No. . .	666-55-4321
Occupation	Reanimator
Date of birth	_____ (mm/dd/yyyy),
or Age as of 1-1-99 . . . . ____
Work phone . . . . _____ * [ ]
Extension . . . . _____
Home phone . . . . _____ * [ ]

Spouse:

Last name (if different) . _____
First name . . . . _____
Middle initial . . . . ___   Suffix . . . . . . ___
Social Security No. . . . . . _____
Occupation . . . . _____
Date of birth . . . . _____ (mm/dd/yyyy),
or Age as of 1-1-99 . . . . ____
Work phone . . . . _____ * [ ]
Extension . . . . _____

Address . . . . _____ Apt no. . . . . . . _____

City . . . . _____ State . . . . ____   ZIP Code . . . . _____

Foreign country . . . _____

Fax number . . . . . . _____   E-mail address . . . . _____

Check one of these boxes to print optional daytime phone number on Form 1040, page 2

Federal Filing Status

A Brief History of Telecommunications

HP3000 ADCC (1970's)
HP3000 ATP   (late 1970's, 1980's)

With ADCC's, every inputted character bothered the CPU

full duplex

Worked very well with HP3000's buffered input design

Development of microprocessor-based ATP took load off of CPU

Input buffer was satisfied when:

- terminating character (CR) appeared
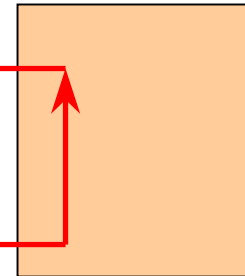- buffer was filled
- preset time-out occurred

A Brief History of Telecommunications

HP3000 DTC (late 1980's; mid 1990's)

Distributed Terminal Controller (DTC)

tiny non-IP-based LAN using AFCP

full duplex

The ATP processor cards were moved out into the DTC
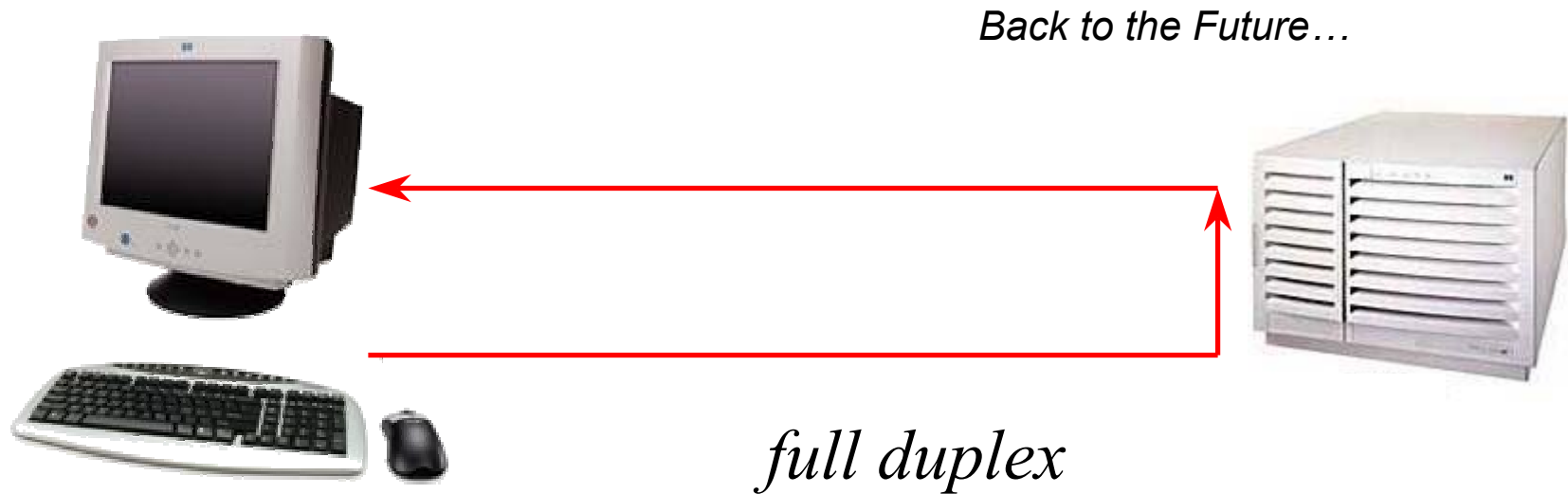
origins of NS/VT

Input buffer was satisfied when:

- terminating character (CR) appeared
- buffer was filled
- preset time-out occurred

A Brief History of Telecommunications

HP3000 telnet (mid 1990's)

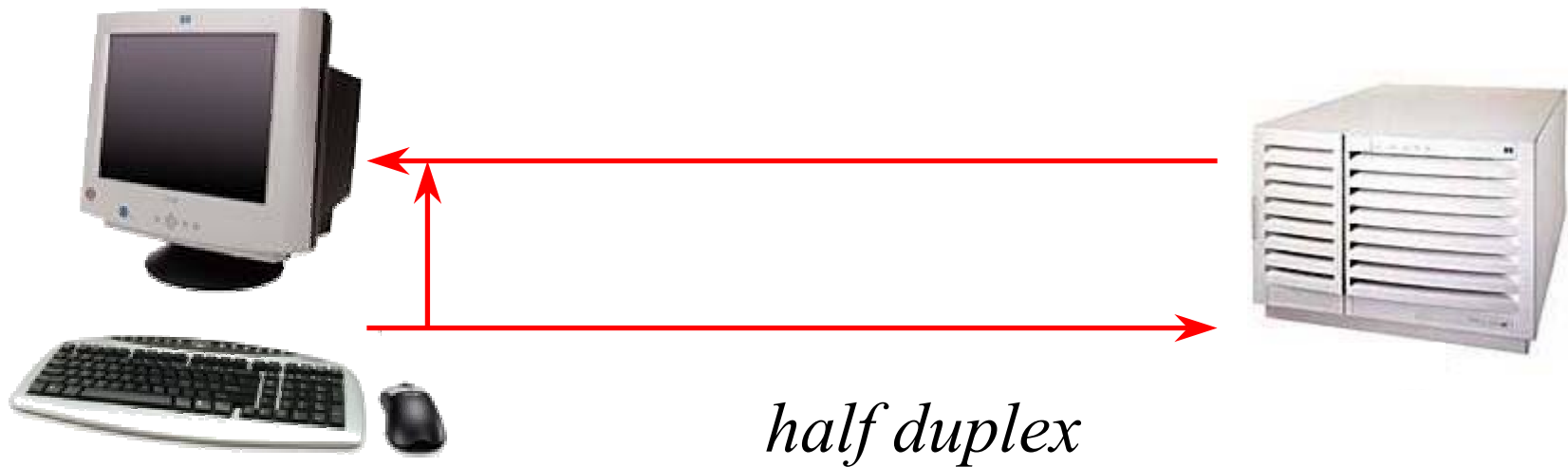*Back to the Future…*

full duplex

Every inputted character
bothers the CPU

A Brief History of Telecommunications

HP3000 advanced telnet (late 1990's)

half duplex

Eliminates world-wide propagation delays. Advanced telnet has same psychological feel as NS/VT

Every inputted character still bothers the CPU

► Keep for your records

QuickZoom to Form 1040 . . . . ► [QuickZoom]

Taxpayer:

		Spouse:	
Last name	Stein	Last name (if different) .	_____
First name	Frank	First name	_____
Middle initial	N Suffix . . . . . . Jr.	Middle initial . . . . __ Suffix . . . . . . __	
Social Security No. . .	666-55-4321	Social Security No. . . . . . _____	
Occupation	Reanimator	Occupation . . . . _____	
Date of birth . . . . _____ *(mm/dd/yyyy),*		Date of birth . . . . _____ *(mm/dd/yyyy),*	
or Age as of 1-1-99 . . . . ____		or Age as of 1-1-99 . . . . ____	
Work phone . . . . _____ * ☐		Work phone . . . . _____ * ☐	
Extension . . . . _____		Extension . . . . _____	
Home phone . . . . _____ * ☐			

Address . . . . _____ Apt no. . . . . . . _____

City . . . . _____ State . . . . ____   ZIP Code . . . . _____
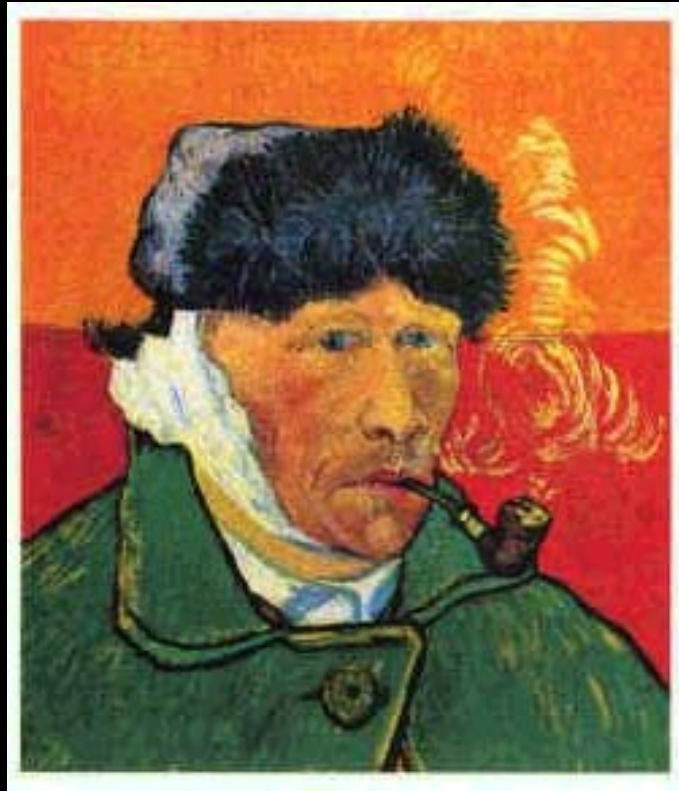
Foreign country . . . _____

Fax number . . . . . . _____ E-mail address . . . . _____

* Check one of these boxes to print optional daytime phone number on Form 1040, page 2

Federal Filing Status

Van Gogh

"Software that won't cost you an arm and leg"

Van Gogh Language

Designed to be much like PostScript, but with these differences:

- PostScript is fragile, Van Gogh is robust.

- All Van Gogh commands are completed in a single line. PostScript-like multiline commands are not allowed.

- Van Gogh is screen oriented, PostScript is paper oriented.

- Van Gogh's point of origin (0,0) is in the upper-left corner of the screen. Positive Y values proceed downwards. PostScript is the other way around.

- Van Gogh operates on a 600 x 800 pixel palette regardless of screen resolution setting.

Van Gogh Language

Sample Graphics Layer Van Gogh commands:

- /box {100 200 180 300 fill 100 100 80 blend 0 0 0}

- /line {80 10 80 450 pencolor 100 0 0 penwidth 2}

- /font {face Arial size 36 bold color 0 0 0 italics}

- /text {500 150 rj Now is the time for all good men}

Van Gogh Language

Sample Active Layer Van Gogh commands:

- /button {100 200 150 230 submit}

- /entrybox {80 100 20 firstname}

- /multipick {80 100 12 state}

- /radio {80 100 married 2}

- /f8 {previousscreen}

Van Gogh Language

Sample Special Van Gogh commands:

- /caption {Form 1040EZ}

- /taborder {lastname | firstname | middle | city | state}

- /goto {lastname}

- /onerror {Incorrect area code for Canada}

File Edit Screen Terminal Connection Help

AT&T

Wirt Atmar

Citizen name

1313 East Mockingbird Lane

Address

Chief Executive Officer

Position applied for

Ultimate disposal

SUBMIT

Telnet (advanced)   size   pause

Start | America O... | Exploring - ... | AICS Rese... | QCShow S... | 192.168....   8:54 PM

QCForms works in a "Field Mode" format

Four bitmaps compose a form in QCForms

Van Gogh Language

Van Gogh escape sequences:

|	
Esc%k0F	Begins specification of a form, enter VG mode
Esc%kC	Form is now fully defined, render it
Esc%kR	Return to terminal mode
Esc%kE	Shut down QCForms & QCTerm
Esc%k0U	User can exit with menu or unload box
Esc%k1U	Only application can cause exit
Esc%kX	Put QCForms in interactive mode

Van Gogh Language

Form definition & data preload:

Esc%k0F
/background {fill 100 100 90 height 1200 width 800}
/box {0 0 100 1200 fill 100 0 0 blend 0 0 0 penwidth 0}
/entrybox {200 100 30 lastname}
/entrybox {200 130 30 firstname}
Esc%kC

lastname:Stein
firstname:Frank
middle:N

QCForms is much like Advanced Telnet

- **Data transmissions are composed of a fieldname:fieldvalue**
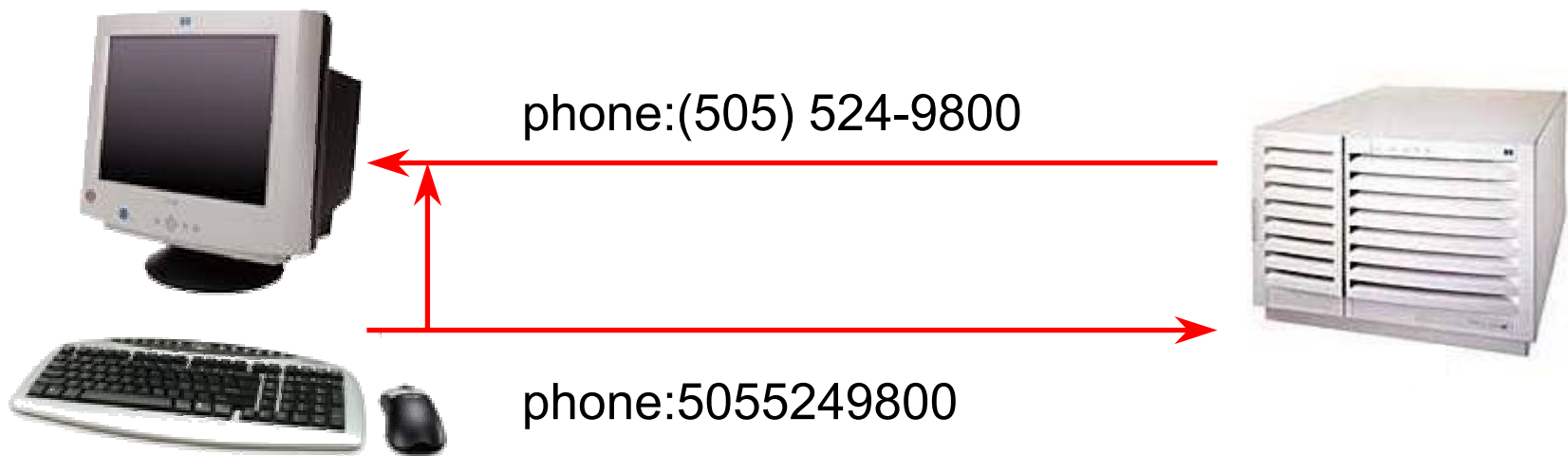
- **All data flow is symmetric**

phone:5055249800
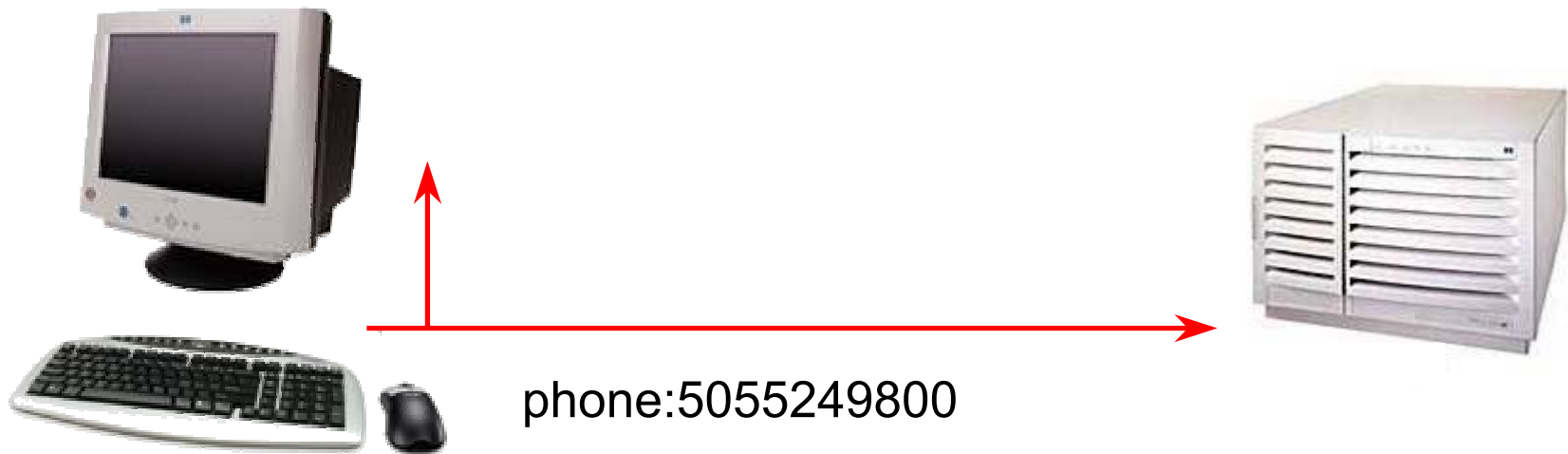
This design works with echo either on or off, but it is clearly more efficient with host echo suppressed.

QCForms is much like Advanced Telnet

Reformatting Data

phone:(505) 524-9800

phone:5055249800

All data processing
requirements are put
onto the host

This design allows for easy:

• data reformatting
• immediate error checking
• currency conversions

QCForms is much like Advanced Telnet

Error Checking

goto phone
onerror {Incorrect area code}

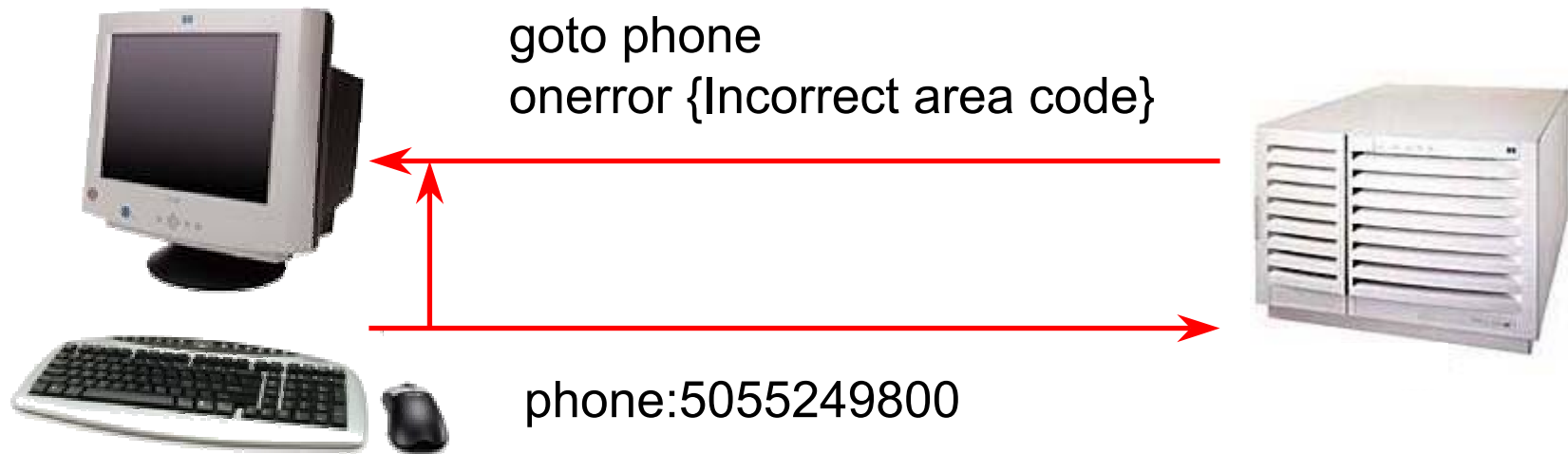phone:5055249800

All data processing
requirements are put
onto the host
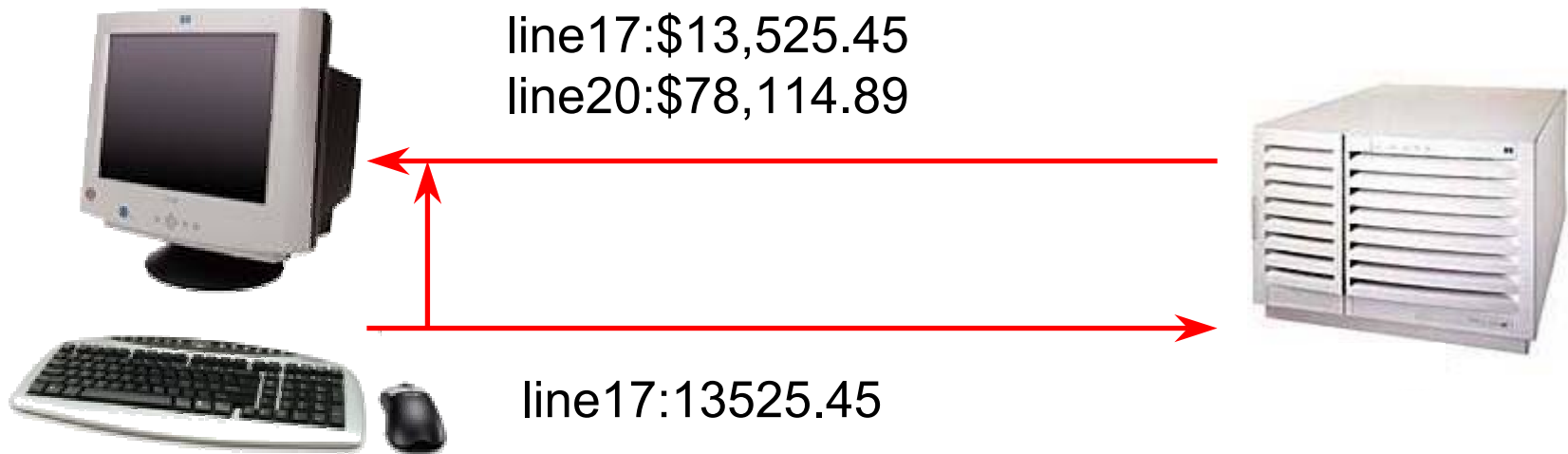
This design allows for easy:

- data reformatting
- immediate error checking
- currency conversions

QCForms is much like Advanced Telnet

Fancier Stuff

line17:$13,525.45
line20:$78,114.89

line17:13525.45

All data processing
requirements are put
onto the host

This design allows for easy:

- data reformatting
- immediate error checking
- currency conversions

Sample Host Code

```
WaitLoop:
    Line Input #1, receivedtext
    i = InStr(receivedtext, ":")
    If i Then
        fieldname = LCase(Left(receivedtext, 1, i - 1))
        fieldvalue = Mid(receivedtext, i + 1)
        Select Case fieldname
        Case lastname
            CustLName = fieldvalue
        Case firstname
            CustFName = fieldvalue
        Case address
            CustAddress = fieldvalue
        Case city
            CustCity = fieldvalue
        Case submit
            'Code to enter data into database
        Case clearscreen
            'Code to reset form
        End Select
    End If
    GoTo WaitLoop
```

```
WaitLoop:
    Line Input #1, receivedtext
    i = InStr(receivedtext, ":")
    If i Then
        fieldname = LCase(Left(receivedtext, 1, i - 1))
        fieldvalue = Mid(receivedtext, i + 1)
        Select Case fieldname
        Case lastname
            CustLName = fieldvalue
        Case firstname
            CustFName = fieldvalue
        Case address
            CustAddress = fieldvalu
        Case city
            CustCity = fieldvalue
        Case submit
            'Code to enter data int
        Case clearscreen
            'Code to reset form
        End Select
    End If
    GoTo WaitLoop
```

It's important to note that this design structure is **fully stated**. *It's a reversion back to the programming techniques of the 1960's and 1970's, but it's quite simple and reliable.*
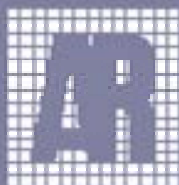
NMMGR/3000 (B.07.00) #1   Open Configuration/Directory File

Enter a file or a directory name and press the corresponding function key.

Command:

Alden
Research
Inc.

Configuration file name   NMCONFIG.PUB.SYS

Backup configuration file name   NMCBACK.PUB.SYS

Network directory file name   Test entry ...

enter

If a write access password has been assigned, you must
enter the password to modify the configuration file.

Write access password

Open Config	Open Directry					Help	Exit Program

form name:
CONFIG_OPEN

Form **940-EZ**

Department of the Treasury
Internal Revenue Service (99)

Employer's Annual Federal Unemployment (FUTA) Tax Return

OMB No. 1545-1110

2003

► See separate Instructions for Form 940-EZ for information on completing this form.

T	
FF	
FD	
FP	
I	
T	

You must complete this section. ►

Name (as distinguished from trade name)

Trade name, if any

Address (number and street)

Calendar year

Employer identification number (EIN)
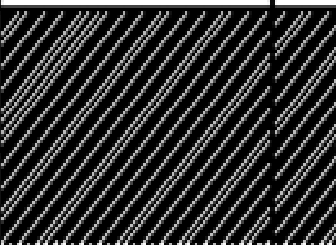
City, state, and ZIP code

Answer the questions under **Who May Use Form 940-EZ** *on page 2. If you cannot use Form 940-EZ, you must use Form 940.*

A   Enter the amount of contributions paid to your state unemployment fund (see separate instructions) . . . ► $ ....

B   (1) Enter the name of the state where you have to pay contributions . . . . ► ....
     (2) Enter your state reporting number as shown on your state unemployment tax return ►

If you will not have to file returns in the future, check here (see **Who Must File** in separate instructions) and complete and sign the return. ► ☐

If this is an Amended Return, check here (see **Amended Returns** in the separate instructions) . . . . ► ☐

Part I   Taxable Wages and FUTA Tax

1	Total payments (including payments shown on lines 2 and 3) during the calendar year for services of employees	1	
2	Exempt payments. (Explain all exempt payments, attaching additional sheets if necessary.) ►	2	
3	Payments of more than $7,000 for services. Enter only amounts over the first $7,000 paid to each employee (see separate instructions)	3	
4	Add lines 2 and 3	4	
5	Total taxable wages (subtract line 4 from line 1) . . . . ►	5	
6	FUTA tax. Multiply the wages on line 5 by .008 and enter here. (If the result is over $100, also complete Part II.)	6	
7	Total FUTA tax deposited for the year, including any overpayment applied from a prior year	7	
8	Balance due (subtract line 7 from line 6). Pay to the "United States Treasury." . . . . . ►	8	

Pricing & Support

For Developers:

Support is unlimited & free
"Never be confused for more than 10 minutes"
Five free copies of QCForms

For End-Users:

1-24	$50/seat	(meal-ticket plan)
25-99	$45/seat	
100-249	$40/seat	
250-499	$35/seat	
500-1000	$30/seat	

migrating or homesteading, productive new worlds await…

Acknowledgements

Vickie Kurtz

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John Burke

Frank Smith

Neil Harvey & Associates

Jeff Bandle