WANG LABORATORIES, INC.

TO: DICK MANN

FROM: DAVE MERRICK

SUBJECT: PURCHASE SPECIFICATION - EPSON MX-80

DATE   FEBRUARY 12, 1981

This memo forms REVISON 0 of the specification for the purchase of EPSON MX-80
printers to meet the requirements of the 2245; VERY LOW COST MATRIX PRINTER
PROGRAM. Actually two specifications are provided. The first is to satisfy the
requirements for the first 10 development printers. It <u>excludes</u> the industrial
design considerations necessary for printers intended for reshipment by Wang
Laboratories. The second is to satisfy the requirements of "production"
printers intended for reshipment to Wang customers.

DEVELOPMENT PRINTERS

EPSON MODEL MX-80

    Printer includes: Epson model MD-90H print head (100 million characters)

                               Black inked cartridge ribbon.

                               Wire rack forms seperator and roller.

                               Printer operation manual (Epson version).

                               115 VAC, 60 Hz power cord.

                               Two 2 amp fuses.

  The printer is to be configured for 115 VAC, 60 Hz

  The printer functionality is to be modified as identified in appendix A

  The printer is to be made available to Wang Laboratories, capable of
  supporting three different languages as identified in appendices B, C,
  and D.This may be accomplished by supplying three different models.
  For the purpose of expediency these three language capapilities are
  differentiated by the designation MX-80US to support the language
  and font described in appendix B, MX-80AZ to support the language
  and font described in appendix C, and MX-80CA to support the language
  and font described in appendix D.

EPSON MODEL MX-80

Production printers must be made available to Wang Laboratories in two versions. One version must be cabable of operating in a 115 VAC, 60 Hz environment. The other version must be capable of operating in a 220/240 VAC, 50 Hz environment. Each version must be capable of supporting multiple languages. Three of those languages are identified in appendices B, C, and D. Additional languages will be addended to this specification at a later date. As many as thirty different languages may be identified. for the purpose of expediency, Wang will differentiate these product requirements by the use of suffix identifiers. as an example:

MX-80US60Hz defines a printer with the US character set capable of operating in a 115 VAC, 60Hz environment.

MX-80AZ50Hz defines a printer with the AZ character set capable of operating in a 220/240 VAC, 50Hz environment.

Printer includes: Epson model MD-90H print head (100 million characters)

Black inked cartridge ribbon

Wire rack forms seperator and roller

Printer operation manual as specified by Wang Laboratories at a later date.

115 VAC, 60 Hz power cord for all printer orders where the identification of the printer ordered ends in the suffix; 60 Hz.

European power cord for all printer orders where the identification of the printer ordered ends in the suffix; 50 Hz.

Two 2 amp fuses

The printer functionality is to be modified as identified in appendix A

The printer appearance is to be modified as identified in appendix E. Epson is to install the Wang logo.

Ref.Wang drawing number 0661-0396
Ref. Wang unumbered drawing which identifies color, bronze lexan, and logo placement
A sample of the lexan material is provided with this specification.

The printer is to be shipped to Wang Laboratories in a packing container specified by Wang Laboratories at a later date.

This specification is approved by _____ _____

R. K. T. Chen   Date

-End of specification-

(WANG) LABORATORIES, INC.

TO: LIST

FROM: DAVID MERRICK

SUBJECT: PROGRAM PLAN -2245 - VERY LOW COST MATRIX PRINTER

DATE: MARCH 13, 1981

Attached to this memo is the program plan to be pursued in making the 2245,
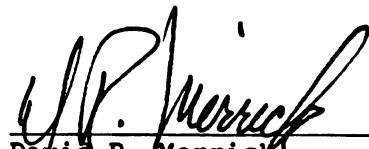Very Low Cost Matrix Printer, available for use with 2200 systems.

This plan identifies the key organizations, individuals and milestones as well
as product forecast and program support requirements necessary to integrate
this subsystem into the WANG 2200 product line. It is published to provide
guidelines for engineering planning, product support planning,   product
acquisition, and more detailed scheduling on the part of the individual
organizations involved in this effort.

Program team meetings will be held periodically to monitor and coordinate
these efforts. Select members of the identified program team will be asked to
participate, dependant upon how far into   the   development/manufacturing
integration cycle the program has progressed.

The specifics of this program plan are subject to changes and a revised
version will be published upon any significant change in program detail or
direction.

This version of the plan contains significant changes over the preliminary
plan that was circulated for review on February 10, 1981.   As a result,
individual organizational plans should be altered accordingly.

The forecast section of this plan contains estimates of the volume of printers
required to satisfy internal use requirements. To ensure   that   each
organization's specific requirements for printers needed during the product
introduction cycle are covered, the cognizant manager should send me a list of
requirements, stating power supply requirements (50/60 Hz), language
option(s), quantity of printers and date needed.

David R. Merrick
Product Manager
Printers

DRM:ls:0664T

SEE ATTACHED DISTRIBUTION

WANG LABORATORIES, INC.

DISTRIBUTION:

George Barrus
Mike Britt
John Busch
Bob Chen
Jim Cocks
Susan Dawson
Tony DePietro
Winston Eaton
Sam Gagliano
Chris Garrahan
Mark Gildersleeve
Warren Hayes
Dave Heasty
Marty Kenney
Bob Keohane
Bob Langlais
Mike Lembo
John Lynch
Dick Mann
Art Nelson
Paul Phaneuf
Wally Porier
Paul Porter
Gian Raffo
Paul Ricker
Hugo Rodriques
Richard Ross
Joe Sapienza
Richard Schulman
Peter Seymour
Dennis Shepard
Fred Swanson
Eileen Shepardson
Harry Viens
Frederick Wang
Ted Wurzburg

-PROGRAM PLAN-

VERY LOW COST MATRIX PRINTER FOR USE WITH 2200 SYSTEMS
MODEL 2245

03/13/81

INTRODUCTION

Corporate management has approved a program to proceed with the introduction of an OEM printer to satisfy requirements for an highly competitive printer on 2200 systems. The printer will be supplied by Epson America (their model MX-80), to Wang specifications. The only manufacturing effort required to reship the printer to Wang customers will be to configure it to the appropriate language as ordered by the Wang customer, supply the connecting cable, and test it's operation in conjunction with a 2200 system. Development effort will be limited to specifying, testing and documenting the product.

Because of the relatively low product and maintenance revenue structure of this printer, it is an objective to minimize the cost of handling this product in the process of making it available to Wang customers. It is also a goal to minimize customer engineering costs by placing the responsibility for printer installation and more of the responsibility for preventative and corrective maintenance on the customer than has been previously asked. Therefore it will be necessary to pay particular attention to the quality of the documentation provided with the printer.

PRODUCT DESCRIPTION

This product is very small (14.7" x 12.0" x 4.2") matrix printer capable of operating in a bi-directional mode at a print rate of 80 CPS. It is supplied with a low cost, operator replaceable print head guaranteed for one hundred million characters. Summary specifications of the Epson standard product are provided as an appendix to this document.

Wang Laboratories will offer this product in two models with language options as identified below. Two model numbers are provided to satisfy the power supply requirements of the Wang international marketplace. Additional language options may be added at a later time as international MP&D defines other country requirements.

MODEL	INPUT POWER REQUIREMENT
2245	115 VAC, 60 Hz
2245A	220/240 VAC, 50 Hz

LANGUAGE OPTIONS	COUNTRY/LANGUAGE SUPPORTED
LO2245AZ	FRENCH
LO2245UK	UNITED KINGDOM
LO2245SP	SPAIN/LATIN AMERICA
LO2245SF	SWEDEN/FINLAND
LO2245ND	NORWAY/DENMARK
LO2245GE	GERMANY
LO2245CA	CANADIAN FRENCH
LO2245SW	SWITZERLAND
LO2245NL	NETHERLANDS
LO2245GR	GREECE

PRINTER CONGIGURATION

Language configuration is satisfied by the replacement of the character generating prom. It is the plan to take delivery of all 60HZ printers from Epson with U.S. language proms installed. All 50HZ printers will be delivered with French language (Azerty) proms installed because it is anticipated that these languages will represent the largest volume of printers sold in those power supply configuration. This should result in minimizing the handling of printers in Distribution. It will be necessary to purchase from Epson, or elsewhere, sufficient proms to maintain a stock level that will allow printers to be configured by DISTRIBUTION for the remaining languages. It will be necessary to determine if it is economical and feasible to program proms, within Wang Laboratory facilities, to support this product. Considering the long lead times in ordering from Epson, it will be necessary to maintain unusually high levels of printer and prom inventories as well as print ribbons.

PROGRAM TEAM

This section identifies the key organizations, organizational responsibilities and individuals who will be responsible for the successful integration of the product into the Wang 2200 product line.

ORGANIZATION/FUNCTION INDIVIDUAL/TELEPHONE	ORGANIZATIONAL RESPONSIBILITY
PRODUCT/PROGRAM MANAGER D.R. MERRICK - 2184	Guide product development, manufacturing integration and product introduction.
DEVELOPMENT PROJECT LEADER HUGO RODRIGUEZ - 4950	Specify, test, and release to manufacturing the printer subsystem.
2200 SOFTWARE DEVELOPMENT PETER SEYMOUR - 4874	Develop appropriate 2200 system software support and qualify the subsystem

2200 PRODUCT LINE MANAGEMENT SAM GAGLIANO - 4205	Identify 2200 market and product strategies and guidelines to ensure the successful coupling of the printing device to 2200 systems.
MP&D INTERNATIONAL JIM COCKS - 2053	Identify international requirements and provide the necessary inputs and guidance to ensure successful introduction into the international marketplace.
PRODUCT SUPPORT WALLY PORIER - 6132	Prepare the product support strategies, plans and maintenance manuals for Customer Engineering.
BUSINESS ANALYSIS SUSAN DAWSON - 4235	Provide business analysis assistance and product forecasts to be used in the production planning and purchasing phases of this program.
TECHNICAL WRITING TONY DIPIETRO - 3545	Prepare the manuals and technical data sheets necessary for support of this product.
MARKETING COMMUNICATIONS HARRY VIENS - 2516	Prepare the marketing support literature necessary for this product.
SYSTEM SUPPORT(TECH CENTER) T. WURZBURG - 5733	Become sufficiently familiar with the subsystem to provide adequate support and response to field marketing and customers.
DISTRIBUTION RICHARD ROSS - 7701 FRED SWANSON - 7311	Prepare product configuration, language option stocking levels and, printer test and quality assurance procedures.
AUTOMATIC ENCLOSURES E. SHEPARDSON - 2653	Ensure that automatic enclosures are identified.
MANUFACTURING ENGINEERING JOHN LYNCH - 2885 P.M. PHANEUF - 2390	Coordinate and otherwise assist and advise on the introduction of this product into the Wang product line. Little if any actual manufacturing effort is anticipated.
INDUSTRIAL DESIGN PAUL PORTER - 2260	Identify industrial design requirements for the purchase specification and shipment package design in conjunction with shipment packaging.
PRICING MIKE LEMBO - 4236	Revise 2200 price sheets.

R&D PLANNING BOB KEOHANE - 3473	Ensure the smooth release of this product from engineering into distribution.
PURCHASING DICK MANN - 7352	Administer the purchase contract and provide the interface between MP&D, Engineering, Master Planning and the vendor.
COMPETITIVE ANALYSIS CHRIS GARRAHAN	Provide competitive pricing information to assist in the establishment of price levels.
SHIPMENT PACKAGING DAVE HEASTY	Analyze the supplied shipping container to determine the ability to reship the printer in the original container. If unacceptable, it will be necessary to design and implement an appropriate container.
SUPPLIES & FONTS MARTY KENNEY - 4303	Ensure the cataloging and availability of consumables. Coordinate the identification and design of character sets.
MARKETING SUPPORT W.W. EATON - 4479	Provide introduction support, continuing marketing support and and write marketing introduction material.

PROGRAM SCENARIO

Twenty four development printers have been ordered from Epson America to Wang specifications. In addition, the appropriate space has been reserved in the Epson production cycle to ensure delivery of production printers in July. The twenty four development printers are scheduled for delivery in mid April when they will be distributed to development groups for specification confirmation, subsystem qualification, design maturity testing and product support planning.

Pending the above qualification plan and completion of design maturity testing, an order to release the "production" run will be placed on Epson at the end of April. The first lot of printers to arrive by the first week in July will be destined for internal use requirements and customer shipment. Internal use printers are required for Customer Engineering product support activities, service back-up units, sales and demo units, and Alpha/Beta test units.

Internal use printers will be distributed immediately upon receipt of "production" printers. All further test, qualification and training activities should be scheduled for completion by the first week in August, at which time a product and marketing readiness review will be held. Pending a successful review, the product will be announced during the second week of August for delivery to Wang customers worldwide.

MILESTONES

This section sets the stage for the development, manufacturing integration, and marketing introduction of this product. It is established to provide guidelines for engineering planning, product support planning, product acquisition, marketing planning, and more detailed scheduling on the part of the individual organizations involved in this effort.

MILESTONE	RESPONSIBLE ORGANIZATION	PLAN DATE (Week of)	ACTUAL DATE
COMPLETE PURCHASE SPECIFICATION	MP&D	FEB 9	FEB 26
PURCHASE ORDER FOR DEVELOPMENT UNITS & APPROPRIATE CONSUMABLES	MP&D/PURCHASING	FEB 9	MAR 4
PURCHASE ORDER (TENTATIVE) FOR OTHER INTERNAL USE AND PRODUCTION PRINTERS.	MSTR PLANNING/ PURCHASING	FEB 9	
SUBSYSTEM SPECIFICATION.	ENGINEERING	APR 6	
DEVELOP PRODUCT TEST CRITERIA & PLANS.	ENGINEERING/ DISTRIBUTION QA/ CUSTOMER ENG	APR 6	
RECEIVE 24 DEVELOPMENT PRINTERS.		APR 13	
COMPLETE TEST ACTIVITIES AND IDENTIFY ANY CHANGES TO PURCHASE SPEC.	ENGINEERING	APR 27	
SHIPMENT PACKAGE DESIGN.		APR 27	
RELEASE ORDER FOR OTHER INTERNAL USE AND PRODUCTION PRINTERS AND CONSUMABLES.	ENGINEERING/ MASTER PLANNING MP&D	APR 27	
COMPLETE CUSTOMER ENGINEERING PRODUCT SUPPORT PLANS.	CUSTOMER ENGINEERING	JUN 29	
COMPLETE MANUFACTURING/ DISTRIBUTION INTEGRATION PLANS.	MANUFACTURING ENG. & DISTRIBUTION	JUN 29	
RECEIVE OTHER INTERNAL USE AND PRODUCTION PRINTERS.		JUL 6	
VERIFY ACCEPTABILITY AND COMPLETE C.E. AND MARKETING TRAINING.	ENGINEERING	AUG 3	
COMPLETE ALPHA/BETA TESTING.	ENGINEERING	AUG 3	

MILESTONE	RESPONSIBLE ORGANIZATION	PLAN DATE (Week of)	ACTUAL DATE
COMPLETE MANUALS & DATASHEETS	TECH WRITING	AUG 3	
COMPLETE MARKETING PLAN/POSITION PAPER	MP&D/MARKETING SUPPORT	AUG 3	
COMPLETE PRODUCT/MARKETING READINESS REVIEW	MP&D/ENG.	AUG 10	
ANNOUNCE PRODUCT	MP&D/MKTING SUPPORT	AUG 10	
U.S. CUSTOMER DELIVERIES	DISTRIBUTION	ARO AUG 10	
OFF-SHORE CUSTOMER DELIVERIES	DISTRIBUTION	ARO AUG 10	

FORECAST

IN SUPPORT OF PRODUCT DEVELOPMENT ACTIVITY:

24 60 Hz printers delivered to Lowell on or before April 17, 1981.

IN SUPPORT OF INTERNAL USE REQUIREMENTS:

A number of printers, as indicated below, delivered to Tewksbury on or before the first of each of the fiscal quarters listed:

	Q1F82	Q2F82	Q3F82
Internal Support - 60 Hz	20	-	-
CE SPARES - 60 Hz	100	75	75
CE SPARES - 50 Hz	75	75	50
Sales Demos - 60 Hz	60	100	-
Sales Demos - 50 Hz	44	-	-

IN SUPPORT OF CUSTOMER SHIPMENTS:

The following forecast represents anticipated bookings and is not a shipment (date) forecast. Deliveries should be scheduled to Tewksbury by Master Planning, according to anticipated shipment dates assuming an August 10 availability.

	Q1F82	Q2F82	Q3F82	TOTAL
60 Hz	377	529	606	1512
50 Hz	84	337	377	798

APPENDIX

EPSON MX-80 SUMMARY SPECIFICATIONS

The Epson MX-80

80-Column Dot Matrix Printer.

Specifications

Print method .... Serial impact dot matrix
Print Rate .... 80 CPS
Print Direction .... Bidirectional
Number of Pins in
  Head 9
Matrix 9x9
Line Spacings .... 1/8", 1/6", 7/72", plus programmable
Throughput at 10 CPI . Logical seeking function—
  105 LPM, 20 character line;
  73 LPM, 40 character line;
  46 LPM, 80 character line.

PRINTING CHARACTERISTICS
Character Set .... Full 96-character ASCII with descenders
Graphics Characters .. 64 block characters
Printing Modes ...... Standard.
  Double (advance paper 1/206th and repeat line).
  Emphasized (shift right and double strike).
  Double Emphasized (combination of above).

PRINTING SIZES

	Characters per inch	Max. Characters per line
Normal	10	80
Normal Expanded	5	40
Compressed	16.5	132
Compressed Expanded .	8.25	66

FORMS HANDLING
Line Feed .... Programmable length 1 to 85/72nds
Form Feed .... Programmable length to 66 lines
Horizontal Tab .... To 112 positions
Vertical Tab .... To 64 positions

MEDIA HANDLING
Paper Feed .... Adjustable tractor-type pin feed
Paper Width Range ... 4" to 10"
Number of Parts 3
Paper Path .... Rear

INTERFACES
Standard .... Centronics-style 8-bit Parallel
Optional RS232, IEEE488
Buffer Size .... 1 line

SWITCHES/LIGHTS/DETECTORS
Indicators .... Power Light; Printer Ready; Paper Out; On Line
Switches .... Power On/Off; On Line; Form Feed; Line Feed
Detectors .... Internal buzzer (bell) responds to Paper Out and error conditions with a periodic 3-second tone for 30 seconds.

RELIABILITY
Print Head Life
  Expectancy .... 50 to 100 x 10^6 characters
MCBF (Excluding Print
  Head) .... 5 million lines

INKED RIBBON
Color .... Black
Type .... Cartridge
Life Expectancy ...... 3 Million characters

ENVIRONMENTAL CONDITIONS
Operating Temperature
  Range .... 41°F to 95°F
Operating Humidity .. 10 to 80% non-condensing

POWER REQUIREMENT
Voltage 115V, 60Hz
Current .... <1 amp
Power Consumption.. 100 VA maximum

SELF TEST MODE
Depressing Line Feed Switch while turning power ON engages self-test which prints all characters in ROM.

PHYSICAL CHARACTERISTICS
Height .... 4.2"
Width .... 14.7"
Depth .... 12.0"
Weight .... 12 lbs.

Specifications subject to change without notice.

WANG LABORATORIES, INC.

MEMORANDUM

TO: Dave Merrick

    cc: Bob Kolk, Dave Angel, Peggy Brown, Dick Buttlar, Bob Chen,
          Bill Chittenden, Roger Droz, Larry Ehlinger, Sam Gagliano, Ken
          Pappaconstantino, Bruce Patterson, Joe Sapienza, John Thibault,
          George Tsetsilas, Hugo Rodriguez, Dick Mann

FROM: Peter Seymour

DATE: Revised in Matsumoto 05/25/81

SUBJECT: Escape Code Sequences for the Epson-80 Printer

GENERAL INFORMATION

This memo is an adaptation of my memo entitled "Escape Code Sequences for
Printer/Display Devices" dated November 25, 1980 and revised on February 11,
1981. It is written specifically for the Epson-80 Printer. This memo is an
attempt to summarize, in a single document, the HEX(02) escape code sequence
currently defined for the 2200 Epson-80 printer. The last section of this
document is a detailed description of how each code sequence has been
implemented on the 2200 Epson-80 Printer.

GENERAL ESCAPE CODE SEQUENCES

> NOTE: The abbreviation N.A. indicates that the sequence is not
> supported by the Epson-80 printer.

> NOTE: 'cc' =   a byte count, excluding the final 0E/0F
>   'dd' =   an unspecified byte

1.   02 02 dd ... 0F
     Select character font. Used on 2236DE, and intelligent printers
     with multiple fonts.

2.   02 03 0F (N.A.)
     Clear platten. Used on 2281W/WC Daisy printers

3.   02 04 dd ... 0E (or 0F)
     Define meaning of isolated HEX(0E). Used on 2236DE, and
     intelligent printers.

4.   02 05 0F (N.A.)
     Blink cursor. Used on 2236DE

5. 02 06 dd OF (N.A.)
    Select paper tray. Used on 2281W/WC Daisy printers.

6. 02 07 OF (N.A.)
    Deselect printer. Used on 2281W/WC Daisy printers

7. 02 08 09 OF (N.A.)
    Send self identification message. Used on 2236DE.

8. 02 09 01 02 dd ee OF
    Set Pitch -- dd ee = a hexadecimal value giving the integral and
    fractional value of the desired pitch.

9. 02 09 08 OE (or OF) (N.A.)
    Reserved for possible future use with Hebrew or Arabic terminals.

10. 02 0A OE
    Set auto line feed after carriage return. Used with Intelligent
    printers.

11. 02 0A OF
    Disable auto line feed after carriage return.   Used with
    Intelligent printers.

12. 02 0A 01 cc dd ... dd OE
    Set line feed size and set auto line feed after carriage return.
    Used with Intelligent printers.

13. 02 0A 01 cc dd ... dd OF
    Set line feed size and suppress auto line feed after carriage
    return. Used with Intelligent printers.

14. 02 0A dd OF (N.A.)
    Execute partial line feed (1/4", 1/2", 3/4"). Used with new
    matrix printers and possibly daisy printers in the future.

15. 02 0B dd ... dd OF (N.A.)
    Box graphics. Used on 2236DE.

16. 02 0C 01 dd ... dd OF (N.A.)
    Set form length. Used on 2281W/WC Daisy printers

17. 02 0D 0C 03 OF
    Restore power on defaults. Used with all intelligent printers and
    displays.

18. 02 1D dd ... dd OF) (N.A.)
    Load DAVFU code. Used with all printers having a DAVFU.

2

SPECIAL ESCAPE CODE SEQUENCES

02 01 cc dd ... dd 0E (or 0F)
Code sequences of this format may be used to invoke device dependent
functions. The only ones which have so far been implemented are listed below.

19.   02 01 02 1F 0d 0F (N.A.)
      Skip on DAVFU channel #d

20.   02 01 02 1F 1d 0F (N.A.)
      Skip 'd' lines on DAVFU

21.   02 01 02 01 dd 0F
      Start built in diagnostics (used on Intelligent printer).

22.   02 01 01 04 0F (N.A.)
      Adjust TSF line on 2281W/WC daisies.

23.   02 01 01 08 0F (N.A.)
      Select 1/2" TSF option on 2281W/WC daisies.

IMPLEMENTATION OF ESCAPE CODE SEQUENCES

This section is an attempt to present a detailed account of how the HEX(02) escape code sequences have been implemented on the various 2200 print/display devices. In general, the philosophy has been that a given device will accept and act on those sequences that have meaning for the device, and will ignore those sequences that have no meaning for it. Under no circumstances should a code sequence be allowed to cause undesired or unexpected results on any print/display device. Any sequence which is not recognized on a given peripheral should cause no action.

1. Select Font

    02 02 dd ... 0F

    dd = 00 for font zero (i.e., default)
       = 02 for alternate font # 1
       = 04 for alternate font # 2 (box graphics)

    Although fonts are generally device dependent, we have adopted the following philosophy regarding their structure. A font is to be regarded by the programmer as consisting of 240 bytes; that is, 256 bytes minus 16 control codes. In a given implementation, a font may contain fewer than 240 characters. This is the case with the Wang 2281W daisy printer, for example, when the daisy wheel has only 96 petals, and more than 16 control codes are defined. It is also the case in the 2236DE terminal where codes above HEX(90) are defined to be underscored characters. The default font on any 2200 printer or display device should be defined as identical to the 2236DE character set as possible. This includes defining the 80-bit to produce the underscored characters from HEX(10) to HEX(7F). The design of alternate fonts could interpret the 80-bit in the same fashion or as non-underscored characters that are different from those at HEX(10) to HEX(7F). The Epson-80 Printer should implement the select font sequence in the following manner:

    a. Upon receipt of a valid code sequence, select the correct font. This sequence should not cause data already in the buffer to be printed.

    b. Continue accepting data until a HEX(0D) is received or the buffer becomes full and then print the buffer from the selected font.

    c. The new font should remain selected until the receipt of a new font select sequence; or the receipt of the reset default sequence (HEX(02 0D 0C 03 0F)), or the printer is powered off and then back on.

    Example: 10 REM SELECT FIRST ALTERNATE FONT
              20 PRINT HEX(0202010F)

4

2. Clear Platten (N.A.)

02 03 0F

This sequence was designed for the Twin Sheet Feeder option and the Envelope Feeder option on the 2281W daisy printers. On these devices, it causes the single sheet or envelope to be cleared from the platten to the receiving bin, without feeding a new sheet or envelope into the platten. On other devices, this sequence should be ignored.

Example: 10 PRINT HEX(02030F)

3. Define Meaning of Isolated HEX(0E) Code

02 04 xx yy zz ... 0E or 0F

Most 2200 printer/display devices have some ability to enhance or highlight output. This is most often done by underscoring, expanding, blinking, reversing the video, intensifying the video, or changing color. The usual method of activating highlighted output is by sending an isolated HEX(0E) code to the device (an isolated code is one which is not part of a predefined code sequence). The techniques used to highlight output are all device dependent. The code sequence given above allows the user to specify which techniques he wishes to use on a given device. The defined values for the parameters xx, yy, and zz are as follows:

xx =
      02 for bright intensity (CRT only)/Emphasized or overstrike
         printing (see note at end of section)
      04 for blink (CRT only)
      00 for neither (CRT only)
      0B for both (CRT only)

yy =
      02 for reverse video (CRT only)
      04 for underscore (CRT and printer)(see note at end of section)
      00 for neither
      0B for both

zz =
      02 for horizontal expand print (future CRT and printer)
      04 for vertical expand print (not for Epson-80)
      00 for neither
      0B for both

This sequence may be terminated with either a HEX(0E) code or a HEX(0F) code. These codes are used to specify when the desired attribute will be activated and when and how it will be deactivated. If the sequence terminates with a HEX(0E) code then the attribute should be turned on immediately upon receipt of the HEX(02) sequence. In the case of buffered printers, this means the data currently in the buffer should be printed first and then the attribute should be turned on. The attribute should remain on until the occurrence of any of the following events (regardless of intervening carriage returns (HEX(0D)) or isolated HEX(0E) codes):

5

a.   an isolated HEX(0F) code.

b.   another HEX(02 04 xx yy zz 0E or 0F) sequence

c.   a HEX(02 0D 0C 03 0F) sequence (i.e., reset defaults)

d.   printer powered OFF and then ON.

If the HEX(02 04 xx yy zz 0E or 0F) sequence is terminated by a HEX(0F) code, then the attribute should be turned on only upon receipt of an isolated HEX(0E) code. It should be turned off upon receipt of an isolated HEX(0F) code or a carriage return (HEX(0D)) code, whichever occurs first. The specified meaning of HEX(0E) should remain in effect until the occurrence of either of the following events:

a.   another HEX(02 04 xx yy zz 0E or 0F) sequence

c.   a HEX(02 0D 0C 03 0F) sequence (i.e., reset defaults)

d.   printer powered OFF and then ON.

NOTE: The occurrence of a HEX(00) value for xx, yy, or zz turns off the attribute while the HEX(020D0C030F) sequence causes all attributes to be reset to their power on default values.

The power on default implementation of the attribute triggered by an isolated HEX(0E) should be expanded print (refer to the above description of 02 04 XX YY ZZ 0F).

Examples:

1.   Define enhanced print as underscore. Turn on the attributes with HEX(0E) and turn off with HEX(0F) or carriage return:

```
10 PRINT HEX(02040004000F)
20 PRINT "ABC"; HEX(0E); "XYZ": HEX(0F); "123"
30 PRINT "ABC"; HEX(0E); "XYZ123"
40 PRINT HEX(0E); "ABCXYZ123"
```

OUTPUT

ABCXYZ123
ABCXYZ123
ABCXYZ123

2.   Define enhanced print as expanded print. Turn on with HEX(0E) and turn off with HEX(0F).

```
10 PRINT HEX(02040000020E)
20 PRINT "ABC"
30 PRINT HEX(0E); "XYZ"
40 PRINT "123"; HEX(0F)
50 PRINT "END OF TEST"
```

```
OUTPUT

ABC (expanded)
XYZ (expanded)
123 (expanded)
END OF TEST
```

NOTE: The Epson-80 Printer has the following restrictions regarding underscore
and emphasized print:
* Underscoring is not continuous; it is broken between consecutive
  characters.
* Emphasized print may not be combined with non-emphasized print
  on a single line. The last attribute selected for that line will
  take precedence.
* Emphasized print may not be used with 16.5 pitch. 16.5 pitch
  will take precedence.

4. Blink Cursor (N.A.)

    02 05 0F

    This sequence causes the terminal CRT cursor to blink; an isolated
    HEX(05) code stops the blinking.

5. Select Paper Tray (N.A.)

    02 06 dd 0F

    dd = 01 for rear tray
       = 02 for front tray

    This sequence is defined only for the Twin Sheet Feeder option used on
    some Wang printers.

6. Printer Deselect (N.A.)

    02 07 0F

    This sequence has been defined only for the Wang daisy printer. It
    causes the printer to extinguish its SELECT lamp and go into an OFF LINE
    state.

7. Send Self Identification Message (N.A.)

    02 08 09 0F

    This sequence is defined only for the 2236DE type terminals.

7

8.   Select Pitch

     02 09 01 02 dd ee 0F

     dd ee =   a hexadecimal value giving the integral and fractional pitch.

     This sequence should be implemented on any device that is capable of
     offering more than one pitch. The specified pitch remains selected
     until:

     a.   The occurrence of another select pitch sequence.
     b.   A HEX (020D0C030F) Sequence (i.e. reset defaults).
     c.   The device is powered off and on.

     The Epson-80 will support both 10-pitch and 16.5-pitch; the power up
     default is 10-pitch. 16.5 pitch can not be printed in emphasized mode.
     If both are selected, the default will be 16.5 pitch. Pitches may not
     be changed within a line. If more than one pitch change is attempted
     within a line, then the last one has priority.

Examples:

     10 PRINT HEX(020901020A000F) select 10-pitch
     10 PRINT HEX(0209010210100F) select 16.5-pitch
     10 PRINT HEX(0209010200000F) select default (i.e. 10-pitch)

9.   Reserved for future use with Hebrew or Arabic terminals (N.A.)

     02 09 08 0E (or 0F)

10. Set Auto Line Feed following a carriage return.

     02 0A 0E

     This sequence causes the device to provide an automatic line feed
     following the execution of a carriage return (HEX(0D)). This sequence
     should be executed before printing the current contents of the line
     buffer. All 2200 printers should default to this state on power up.
     (See NOTE below).

11. Disable Auto Line Feed following a carriage return.

     02 0A 0F

     This sequence causes the device not to automatically perform a line feed
     following the execution of a carriage return (HEX(0D)). This sequence
     should be executed before printing the current contents of the line
     buffer. All 2200 CRT display terminals should default to this state on
     power up. (See NOTE below).

                                      8

12. Set Line Feed Size and Set Auto Line Feed following a carriage return

   02 0A 01 cc dd ... dd 0E

   cc = a count of the codes from cc to 0E exclusively.
   dd ... dd = the hexadecimal value of the line feed spacing in lines per
            inch.

   All current 2200 printers that are capable of implementing this sequence
   do so for either 6 or 8 lines per inch. In this instance, cc = 01 and
   dd = 06 or 08.

Examples:

   10 PRINT HEX(020A0101060E) set 6 lines per inch
   10 PRINT HEX(020A0101080E) set 8 lines per inch

13. Set Line Feed Size and Disable Auto Line Feed following a carriage return

   02 0A 01 cc dd ... dd 0F

   Set #11 above.

NOTE: The meaning of a 'carriage return' is defined as follows:

   a.   Reception of a HEX(0D) code from the host computer. This code
        should immediately cause the current content of the line buffer to
        be printed or displayed.

   b.   Buffer overflow. If the device has a line buffer or similar means
        of determining when the end of line has been reached, it should
        print what is in the buffer as though it had received a HEX(0D)
        code from the host computer. In the case of a buffer overflow, if
        the code that caused the overflow where a HEX(0D), the printer
        should ignore it. This would prevent double line feeds from
        occurring. Whether or not the printer's carriage is physically
        returned to a margin upon completion of the line is irrelevant to
        the defined meaning of carriage return.

14. Execute Partial Line Feed (N.A.)

02 0A dd 0F

This sequence is used to generate partial line feeds in increments of 1/4, 1/2, and 3/4 of the currently selected full line feed increment. The exact implementation may be somewhat device dependent. In general, the device should come as near as possible to these partial increments. Implementation should follow these rules:

a. The partial line feed should be performed immediately. It should not cause the line buffer to be printed.

b. Execution of a normal line feed should cause the platten to be advanced to the start of the next normal line position. This would be the case if a line feed code (HEX(0A)) were received, or a carriage return code (HEX(0D)) were received with auto line feed activated.
    The host computer should normally suppress the auto line feed (see #11) before. Using the Partial Line Feed command output would then consist of normal printout interspersed with partial line feed commands. The auto line feed mode should then be re-activated (see #10).

Example:

```
0010  SELECT PRINT 204
0020  PRINT "THE EQUATION FOR Z IS:"
0030  REM SUPPRESS AUTO LINE FEED
    :  PRINT HEX (020A0F)
0040  REM PRINT SUPER SCRIPTS
    :  PRINT "    2    2"
0050  REM ADVANCE THREE QUARTERS OF A LINE
    :  PRINT HEX (020A040F)
0060  REM PRINT BASE LINE
    :  PRINT "Z = X + Y - 2*(X+Y)"
0070  REM ADVANCE THREE QUARTERS OF A LINE
    :  PRINT HEX (020A040F)
0080  REM PRINT SUBSCRIPTS
    :  PRINT "      3"
0090  REM REACTIVATE AUTO LINE FEED
    :  PRINT HEX (020A0E)
0100  REM MOVE TO NEXT FULL LINE POSITION
    :  PRINT
0110  REM PRINT NEXT LINE
    :  PRINT "TO CONTINUE WITH THIS LINE OF THOUGHT,"
```

THE EQUATION FOR Z IS:

Z = X + Y - 2*(X+Y)

TO CONTINUE WITH THIS LINE OF THOUGHT,

15. Box Graphics (N.A.)

    02 OB dd ... dd OF

    This sequence is used only on the 2236DE and similar display terminals and is not treated in detail in this memo.

16. Set Form Length (N.A.)

    02 OC 01 cc dd ... dd OF

    cc = hexadecimal count of the bytes between cc and OF exclusively.
    dd = hexadecimal value of the form length in printer increments.

    This sequence is defined for devices not utilizing a loadable VFU to control vertical formatting. Any implementation of this sequence should assume that it would not be sent from the host computer unless directly preceded by one of the following:

    a.   Printer power turned off and then on.
    b.   Execution of a power on reset sequence.
    c.   Execution of a form feed code (HEX(OC)).

Example   (for the 2281W daisy printer):

    10 PRINT HEX(020C010202100F)

17. Restore Defaults

    02 OD OC 03 OF

    This sequence is applicable to all printers and display devices. Its purpose is to reset to their power on default values every feature of the devices that may be altered by the host computer. Although its exact implementation is device dependent, its execution must conform to the following:

    a.   Before executing the sequence, the current contents of the line buffer must be printed.
    b.   Display terminals should return the cursor to home and clear their screens.
    c.   Printers should execute a form feed if and only if not already at top of form.
    d.   The printers/display devices should remain in a selected, ready state.

    The exact implementation of this sequence for the Epson-80 is given in section IV of the memo entitled "Control Codes for the Epson-80 Printer".

18. Load DAVFU Code (N.A.)

    02 1D dd ... dd OF

    The exact specifications for the values of dd ... dd may be found in the respective printer manuals. In general, before attempting to change the DAVFU loading, the host computer should execute a form feed (HEX(OC)) and a set line feed size sequence (see # 12-13) if the new DAVFU data is intended for a different line feed size than the previous DAVFU loading.

11

19. Skip to Next Tab on DAVFU (N.A.)

    02 01 02 1F 0d 0F

    d =   a single hexadecimal digit from 0 to C representing the channel
          number.

    This sequence causes the printer platten to advance to the next tab stop
    in channel d of the DAVFU. This sequence should be executed before the
    current content of the line buffer is printed.

20. Skip Lines Using DAVFU (N.A.)

    02 01 02 1F 1d 0F

    d =   a single hex digit from 0 to F.

    This sequence causes the printer to skip d lines using the currently
    selected line feed size. It should be executed before the current
    content of the line buffer is printed.

21. Execute Built-in Diagnostics

    02 01 02 01 dd 0F

    dd = 00 for all diagnostics

    This sequence is defined for all devices having diagnostic routines
    included in the printer microcode.— The current content of the line
    buffer should be printed before this sequence is executed.

22. Adjust Twin Sheet Feeder Line (N.A.)

    02 01 01 04 0F

    This is a special sequence for the 2281W daisy printer line.

23. Select Top Margin Option for the Twin Sheet Feeder (N.A.)

    02 01 01 08 0F

    This is a special sequence defined for the 2281W daisy printer line.

5326A

MEMORANDUM

TO: Dave Merrick
     cc: Bob Kolk, Sam Gagliano, Bob Chen, Hugo Rodriguez, Ken Pappas
           Bruce Patterson, Dave Angel, Roger Droz, Dick Buttlar
           John Thibault, Dick Mann, Joe Sapienza, George Tsitsilas,
           Peggy Brown, Bill Chittinden, Larry Ehlinger

FROM: Peter Seymour

DATE: Revised in Matsumoto 5/25/81

SUBJECT: Control Codes for the EPSON-80 Printer

I.   GENERAL INFORMATION

     The purpose of this memo is to present a functional specification of
     the control codes and printable character codes to be used on the
     EPSON-80 printer. It is not intended as a design specification; the
     exact implementation should be left to the EPSON personnel. Section IV
     of the memo concerns the printable character codes. A separate
     enclosure has been provided by Mary McIntosh, to describe the detailed
     structure of the characters in each font. I have restricted my
     comments to the codes that require special attention in the range of
     printable characters. Sections II and III deal with a detailed account
     of the function of each control code and the control code sequences.
     At the end of this memo, I have attached a copy of the general
     specification concerning the control code sequences of all the printer
     and display peripherals used on the 2200 product line. This
     specification is the basis for much of the material in Section III of
     this memo.

II. ISOLATED CONTROL CODES

This section defines the functional specification for the isolated hexadecimal control codes from HEX(00) to HEX(0F). The interpretation of codes from HEX(10) to HEX(FF) is font dependent and is discussed in Section IV.

1. HEX(00)-HEX(01) NULL. These codes should cause no action; they
   HEX(03)-HEX(06)   should be ignored.

2. HEX(07) BEL. This code should generate a 1/2 second audio alarm. It should be executed immediately, regardless of current data in the line buffer.

3. HEX(08)-HEX(09) NULL. See #1.

4. HEX(0A) LINE FEED. This code should advance the paper one line. The size of the line feed increment is the currently selected size. This code should be executed immediately, regardless of the content of the line buffer.

5. HEX(0B) VERTICAL TAB. Vertical tabs are assumed to be located every six lines from the top of form position. When a HEX(0B) code is received by the printer, the paper must immediately be advanced to the next tab position regardless of the content of the line buffer.

6. HEX(0C) FORM FEED. When this code is received, the paper must immediately be advanced to the top of the next form regardless of the content of the line buffer.

   The printer must be capable of providing for 11" or 12" form lengths. This should be done using an internal switch (i.e. dip switch #2-1) which could be set by Wang to either form length. All printers shipped to Wang should have this switch set to the off position. The off position indicates 11" forms; the on position indicates 12" forms.

7. HEX(0D) CARRIAGE RETURN. This code should cause the printer to immediately print the contents of the line buffer and then advance the paper one line. The printer should print the content of the line buffer and advance the paper one line under the following circumstances:

2

a. a HEX(0D) is received.

b. the line buffer becomes full.

If the buffer becomes full, and the next code received from the host computer is a HEX(0D), only one line feed should be performed.

NOTE: If the auto line feed feature has been suppressed (see sections 11 and 13) then the line feed mentioned above should not occur.

8. HEX(0E)-HEX(0F)   The function of an isolated HEX(0E) code and an isolated HEX(0F) code is defined in detail in the attached memo ('Escape Code Sequences for Printer/Display Devices'; page 5, #3: 'Define Meaning of Isolated HEX(0E) Code'). The power on default interpretation of these codes should coincide exactly with the sequence HEX(020400000020F).

9. HEX(10)-HEX(7F)   These codes are all part of a font. See the attached font description in section IV and the enclosed non-us font layouts. Undefined codes should be treated as ASCII spaces (i.e., HEX(20)).

10. HEX(80)-HEX(FF)   See section IV of this memo.

III. ESCAPE CODE SEQUENCES

There are many features of the EPSON-80 printer which must be implemented using multi-byte code sequences that begin with a HEX(02) code. The attached memo describes all the sequences currently used on our 2200 product line. The rest of this section presents the details necessary to implement the sequences we want on the EPSON-80.

1. Font Selection

The description of the 'SELECT FONT' sequence given on page 4 of the attached memo is the method that must be used to select a font on the EPSON-80 printer. The EPSON-80 will offer only three distinct fonts at a time, the default font, one 'alternate' font (i.e., Font #1), and a 'Box Graphics' font. The default font in the U.S. should be the standard ASCII font whose structure is detailed in section IV. The 'alternate' font and the 'Box Graphics' font should be the graphics font described in Section IV of this memo.

The default font should be defined to interpret the 80-bit (i.e., high order bit) as underscore. That is a HEX(41) should print an 'A', while a HEX(C1) should produce an underscored 'A'. That is, the codes from HEX(90) - HEX(FF) should produce the underscored characters from HEX(10) - HEX(7F). (See attached font description in section IV).

The definition of the alternate font should assume printable character codes which do not have the 80-bit set would print characters from the default font. Printable character codes which have the 80-bit set should print characters from the graphics font discussed in section IV.

2. Defining the Meaning of HEX(0E)

The discussion of this code sequence is given in explicit detail on pages 5-6 of the attached memo. This sequence will control the use of the underscore, horizontally expanded print, and emphasized print.

3. Select Pitch

This sequence should be implemented exactly as described on page 8 of the attached memo. The default pitch should be 10-pitch for the EPSON-80.

4. Set and Disable Auto Line Feed

These two sequences should be implemented as described in sections 10 and 11 (page 8) of the attached memo.

4

5. Set Line Feed Size

These sequences should work as described in sections 12 and 13 (page 9) of the attached memo.

6. Restoring Defaults

Thi sequence should be implemented exactly as described in section 17 (page 11) of the attached memo.

IV.   PRINTABLE CHARACTER CODES AND FONT DEFINITIONS

Enclosed with this memo is a package of character font layouts prepared by Mary McIntosh. These layouts describe the standard default fonts that would be used worldwide on the 2200 version of the EPSON-80 printer. The 'Alternate Font-High Order' and the 'Box Graphics' Font described later in this section are common for all non U.S.A. Fonts. Since the last meeting with the EPSON representatives, there has developed a very strong desire on the part of the 2200 product marketing and development groups to have the EPSON-80 printer support screen dumps from our 2236DE and 2236DW CRT terminals. The purpose of this section is to present what we believe to be the requirements of this task.

Printer Identification

The 2200 product line currently supports a wide range of printers. Many of these printers are able to support only a limited version of the screen dump. We would like to provide our terminal with the ability to identify the type of printer which is attached to it and determine whether to output the limited or the more complete dump. The most convenient method for the terminal to identify the printer type is for us to send a specific code sequence and examine the response time on the ready/busy line from the printer (this sequence will be the reset default sequence HEX(020D0C030F) described in section 17, page 11 of the attached memo).
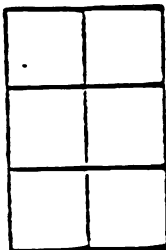
The Epson printer should execute this sequence in the following manner:

1. The X'0D' should be executed when it is received as described. on page 2.
2. The X'0C' should cause a form feed if and only if the printer is not already at the top of the form.
3. The X'03' should initiate the 'restore' defaults sequence (see page 4, section 17).
4. The X'0F' should be received, but not acknowledged; The ready/buzy line should be set to busy. The printer should initiate a 50 millisec delay and then acknowledge and set ready/busy to ready.

Character Graphics

The 2236DE terminal supports two types of graphic output, character graphics and box graphics. Character graphics may be defined by two charactertistics.

1. The actual characters are defined to exist only in the alternate font. (This font is accessed using the code sequence described in section 1 of the attached memo). The characters occupy positions HEX(C0)-HEX(FF). When displayed, graphics characters are extrapolated to fill the entire character position, enabling continuous lines (bars) to be displayed. The standard character graphics set consists of characters representing all the combinations of sixths of a character space where the character space is divided as follows:

F.3 STANDARD USA 2236DE UPPER CHARACTER SET

High
Order

2. When printed, the characters must be 'smeard' so as to fill in the spaces between adjacent blobs on all four sides. In this way, large solid areas of varied shape which are displayed on the screen may be reproduced on the printer. From observing the EPSON-80 printout and from the specifications, we believe this may be done, but we require confirmation from EPSON.

BOX GRAPHICS

The 2236DE can display continuous horizontal or vertical lines, enabling forms to be drawn or information to be separated by lines or boxes. Horizontal lines are displayed between character lines. Vertical lines are drawn through the middle of a character space; the line coexists with the character at that location. The vertical line unit has the height of a character space.

By defining the eight new characters shown on the next page, to exist within the printer's fonts, any box graphics display can be dumped on the printer. We would send a sequence of codes to instruct the printer to reproduce the graphics in a series of multi-passes of the print head. In the figure below, the character 'A' is included to show the positions of the graphic segments relative to the adjacent characters on all four sides.

The eight box graphics characters should appear in locations HEX(A0) - HEX(A7) as shown on the attached font description. They should be accessed according to the following rules.
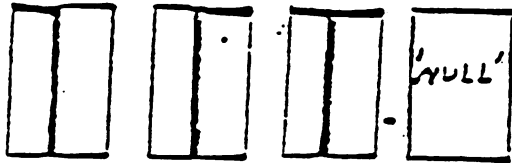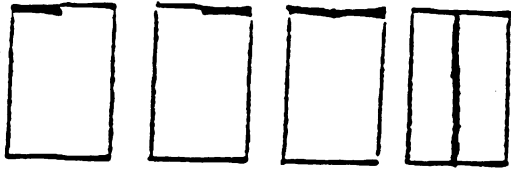
a. Default Font: HEX(A0) - HEX(A7) must produce the underscored characters from HEX(20) - HEX(27).

1. Alternate Font: (Font #1. This font is selected by HEX(02 02 02 0F)): HEX(A0) - HEX(A7) must produce spaces (ASCII HEX(20) codes).

2. Box Graphics Font: (This font is selected by HEX(02 02 04 0F)): HEX(A0) - HEX(A7) must produce the eight special codes shown on the attached layout. NOTE: The rest of the codes from HEX(10) - HEX(9F) and HEX(A8) - HEX(FF) must be identical to font #1.

8

	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	à	Space	0	@	P	·	p	·	à̲	_	0̲	@̲	P̲	·̲	p̲
1	è	!	1	A	Q	a	q	♦	è̲	!̲	1̲	A̲	Q̲	a̲	q̲
2	ì	"	2	B	R	b	r	▸	ì̲	"̲	2̲	B̲	R̲	b̲	r̲
3	ô	#	3	C	S	c	s	◀	ô̲	#̲	3̲	C̲	S̲	c̲	s̲
4	û	$	4	D	T	d	t	—	û̲	$̲	4̲	D̲	T̲	d̲	t̲
5	ã	%	5	E	U	e	u	⌐	ã̲	%̲	5̲	E̲	U̲	e̲	u̲
6	ë	&	6	F	V	f	v	|	ë̲	&̲	6̲	F̲	V̲	f̲	v̲
7	ï	'	7	G	W	g	w	··	ï̲	'̲	7̲	G̲	W̲	g̲	w̲
8	ö	(	8	H	X	h	x	·	ö̲	(̲	8̲	H̲	X̲	h̲	x̲
9	ü	)	9	I	Y	i	y	·	ü̲	)̲	9̲	I̲	Y̲	i̲	y̲
A	à	*	:	J	Z	j	z	▲	à̲	*̲	:̲	J̲	Z̲	j̲	z̲
B	è	←	;	K	[	k	δ	■	è̲	±	;̲	K̲	[̲	k̲	§̲
C	ù	.	<	L	\	l	£	"	ù̲	._	≤	L̲	\̲	‖̲	¢̲
D	Ã	.	=	M	]	m	è	↕	Ã̲	.̲	=̲	M̲	]̲	m̲	è̲
E	Ö	.	>	N	↑	n	ç	ß	Ö̲	.̲	≥	N̲	↑̲	n̲	c̲
F	Û	/	?	O	_	o	€	¶	Û̲	/̲	?̲	O̲	_	o̲	c̲

Low-order HEX Digit

Default Font: HEX(90) – HEX(FF) = underscored characters from
HEX(10) – HEX(7F)

9

'NULL'

Low-order
HEX Digit

	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	â	Space	0	⊂	P	·	p	·	·			▯	▯	▯	▯
1	ê	!	1	A	Q	a	q	♦	ç			▯	▯	▯	▯
2	î	-	2	B	R	b	r	►	▲			▯	▯	▯	▯
3	ô	#	3	C	S	c	s	◄	▼			▯	▯	▯	▯
4	û	$	4	D	T	d	t	—	↓			▯	▯	▯	▯
5	à	%	5	E	U	e	u	↵	⌐			▯	▯	▯	▯
6	ë	&	6	F	V	f	v	¦	·			▯	▯	▯	▯
7	ï	'	7	G	W	g	w	¨	·	full key		▯	▯	▯	▯
8	ö	(	8	H	X	h	x	·	↑			▯	▯	▯	▯
9	ü	)	9	I	Y	i	y	·	↓			▯	▯	▯	▯
A	à	·	:	J	Z	j	z	·	∆			▯	▯	▯	▯
B	ê	+	;	K	[	k	§	■	□			▯	▯	▯	▯
C	ù	,	<	L	\	l	£	"				▯	▯	▯	▯
D	Ä	-	=	M	]	m	è	¡				▯	▯	▯	▯
E	Ö	·	>	N	↑	n	ç	ß				▯	▯	▯	▯
F	Ü	/	?	O	_	o	c	‹				▯	▯	▯	▯

Alternate Font (Font #1)
    HEX(A0) – HEX(A7) = spaces

and

'Box Graphics' Font
    HEX(A0) – HEX(A7) = as defined above.

WANG LABORATORIES. INC

26920

PURCHASE SPECIFICATION

WANG MODEL 2245 MATRIX PRINTER

1.0 INTRODUCTION

1.1 SCOPE

This document describes the differerces between the Epson America standard model MX-80 matrix printer and that product required to meet Wang Laboratories unique product requirements. It is the MX-80 with the differences described herein that will be purchased to meet the requirements of a program to provide a very low cost matrix printer for the Wang 2200 product line. This product will be marketed by Wang Laboratories as the 2245.

1.2 CORPORATE GOAL

It is a goal to receive delivery of this product in such a fashion as to allow reshipment to Wang Laboratories' customers without ever opening the original shipping containers.

To satisfy this goal the printer must meet the appearance, operational, quality, and safety requirements of Wang Laboratories. In addition, each model purchased must meet the configuration requirements of the majority of Wang Laboratories customers.

2.0 BASIC PRINTER

2.1 The basic printer is the EPSON MODEL MX-80, configured with an EPSON MODEL MD-90H print head. Each printer is shipped with one black inked cartridge ribbon, one wire forms separator with roller, one printer operations manual, one power cord, and two 2 ampere fuses.

3.0 MODELS

3.1 Wang Laboratories will purchase three different versions of the MX-80 printer. Two versions will be to satisfy the United States market and will be configured for 115 VAC, 60 Hz operation. The other version will be to, primarily, satisfy the "off shore" market and will be configured for 220/240 VAC, 50 Hz operation.

3.1.1 One 115VAC version will be purchased in the early stages of this program and will be initially limited to, approximately, 200 total quantity. They will be assembled using E-PROMS. This is being done to accommodate the timing of Wang Laboratories near term product/market requirements (masking of PROMS requires approximately three months).

3.1.2 Once the masking process has been completed Wang will purchase one 115 VAC version and one 220/240 VAC version assembled with MASKED ROMS to reduce the cost of the product and accommodate the world-wide market.

3.2.0 WANG PART NUMBERS

3.2.1 The Wang OEM part number for the 115VAC, 60 Hz, Masked ROM version is 725-0109

3.2.2 The Wang OEM part number for the 220/240VAC, 50Hz, Masked ROM version is 725-0109-01

3.2.3 The Wang OEM part number for the 115VAC, 60HZ, E-PROM version is 725-0109-E.

3.3.0 POWER CABLE REQUIREMENTS

3.3.1 The 725-0109 and 725-0109-E will be shipped to Wang Laboratories with the standard AC power cable provided by Epson.

3.3.2 The 725-0109-01 will be shipped to Wang Laboratories with a power cable having a right angle female connector; brown, blue, and green with yellow striped wires and no connector affixed to the opposite end of the cable.

4.0 Industry Standards & Third Party Certification

It is required that Epson gain and maintain certification of compliance with standards established by U.L. (Underwriters Laboratories) CSA (Canadian Standard's Association) F.C.C. (Federal Communications Commission) and VDE (Verband Deutscher Electrokechnicker) for this class of equipment. Printers shipped to Wang Laboratories should be marked as required by those agencies to indicate compliance. Wang Laboratories will not seek independent certification under the Wang Laboratories label.

5.0 Device Cable Connector

5.1 The standard MX-80 comes equipped with 36 pin female device cable connector with wire form cable retaining clamps.

Wang Laboratories requires that the 36 pin device cable connector be modified to allow retention of the device cable with U.S. number 4 machine screws having 40 threads per inch — Reference Wang drawing numbers 6636-262, 06815-0267, and 6815-0275.

6.0 CONNECTOR GROUNDING

6.0.1 The inboard mounting screw of the 36 pin device cable connector shall be connected to electrical ground in the printer. Reference Wang drawing number 6815-0275.

7.0 SHIPPING CONTAINER

7.1 Printers should be shipped to Wang Laboratories in a shipping container of the same mechanical and basic box color specifications as that currently used by Epson but marked (printed) as per Wang drawing number 00685-0476. Artwork is provided.

7.1.2 Each individual shipping container should be marked to indicate the specific Wang Laboratories OEM part number (i.e. 725-XXXX) and Wang Laboratories serial number of the printer contained in that container. The appropriate block on the shipping container should be marked to indicate whether the printer is a 115VAC, 60Hz version or a 220/240VAC, 50 Hz version.

8.0 LABELS

8.1 Model Number Label

8.1.1 A Wang model number label shall be affixed to each printer in the location identified in Wang drawing number C00725-0109.

8.1.2 A Wang serial number label shall be affixed to each printer in the location identified in Wang drawing number C00725-0109

9.0 WANG LOGO

9.1 A Wang Logo(Wang drawing number 06611-0396, revision 2) shall be affixed to each printer in the location normally reserved for the Epson logo (upper, left, front of printer). This location is specified in an unnumbered drawing entitled "LOW COST PRINTER" and provided to Epson in Feb. 1981. Epson should use the charcoal color for the printing of the logo letters that was provided as a sample with a letter to David Merrick on May 14 1981. The material used in the manufacture of the WANG logo shall be the same as that used for the manufacture of the Epson logo.

10.0 LANGUAGE CONFIGURATION

10.1   Each printer, Wang OEM part number 725-0109 and 725-0109-E, shall be configured so as to print the <u>US ASCII</u> character set without requiring any specific action, e.g. the resetting of DIP switch(es) on the part of the operator.

10.2   Each printer, Wang OEM part number 725-0109-01 shall be configured so as to print the <u>German</u> character set without requiring the replacement of; or the installation of a different semiconductor memory or requiring any specific action on the part of the operator.

The printer will be configured with one masked 8049 CPU and two 2716s and jumper J-1 will be cut. The German character set will be installed.

11.0 LANGUAGE OPTIONS

11.1   Each printer must allow reconfiguration to allow the printing of any one of the subsequent languages by the replacement of; or the installation of one or more semiconductor memory chips.

11.1.1 List of required language (character set) options.

A)   German
B)   Iclandic
C)   Greek
D)   Spanish
E)   French (Azerty)
F)   Danish
G)   Dutch
H)   Swedish
I)   Swiss/French
J)   Canadian

Character set details are provided in appendix A.

12.1 Wang Laboratories requires that all printers be shipped with the dip switches set as follows:

Functions and Conditions of DIP Switch 1

PIN #	FUNCTION		ON	OFF	FACTORY SET CONDITION
1	Not applicable		-	-	off
2	CR	Print & Line Feed Print only	Print only	Print & line feed	off
3	Buffer full	Print & Line Feed Print only	Print only	Print & line feed	off
4	Cancel Code	Valid Invalid	Invalid	Valid	off
5	Delete Code	Valid Invalid	Invalid	Valid	off
6	Error	Buzzer	Sounds	Doesn't sound	off
7	Character generator Graphic patterns select Japanese syllabary select		Japanese syllabary select	Graphic patterns select	off
8	SLCT IN signal Fixed internally Not Fixed internally		Fixed	Not Fixed	on

Functions and Conditions of DIP Switch 2

PIN #	FUNCTION ON WANG PRINTER	ON	OFF	FACTORY SET CONDITION
1	Selection of form length	12 in.	11 in.	off
2	Not used by Wang microcode	-	-	off
3	Not used by Wang microcode	-	-	off
4	Not used by Wang microcode	-	-	off

13.0 PRINTER OPERATIONS MANUAL

13.1   It is the intent of Wang Laboratories to provide Epson America with camera ready copy of a Wang unique Printer Operations Manual. Epson will print and package a copy of this manual with each printer shipped to Wang Laboratories in lieu of the manual normally provided by Epson. If Wang Laboratories is not prepared to provide the Wang unique Manual at time of shipment of the first printer shipment, Epson should include the Epson Standard manual.

14.0 LANGUAGE PROM MASTERS

14.1   Epson shall provide master proms of each of the required foreign language sets listed in section 11 of this specification. These will be used to create copies to satisfy Wang customer orders for language options.

15.0 PRINTER MICROCODE

15.1   All printers shipped to Wang Laboratories shall be modified with microcode to operate in conformance with the specifications set forth in appendix B of this specification.

16.0 ROUTING SLIP ATTACHMENT

16.1   Each set of Wang serial number lables and model number lables are provided in a clear plastic pouch containing a multipart routing slip. One side of this pouch is faced with a peel off covering over an adhesive. Epson shall attach this pouch, with the multipart routing slip inside, to a convenient location on the outside of the printer's shipping container, taking care to ensure that the serial number on the printer and the serial number on the routing slip correspond with each other.

This specification is approved.

_____   _____
R.K.T. CHEN   DATE

_____   _____
PETER SEYMOUR   DATE

APPENDIX A

FOREIGN LANGUAGE CHARACTER SETS

German

HEX(11) =	é		HEX(48) =	H
HEX(12) =	í		HEX(49) =	I
HEX(13) =	ì		HEX(4A) =	J
HEX(14) =	ü		HEX(4B) =	K
HEX(15) =	ä		HEX(4C) =	L
HEX(16) =	ê		HEX(4D) =	M
HEX(17) =	ï		HEX(4E) =	N
HEX(18) =	à		HEX(4F) =	O
HEX(19) =	è		HEX(50) =	P
HEX(1A) =	ù		HEX(51) =	Q
HEX(1B) =	[		HEX(52) =	R
HEX(1C) =	\		HEX(53) =	S
HEX(1D) =	]		HEX(54) =	T
HEX(1E) =	é		HEX(55) =	U
HEX(1F) =	ß		HEX(56) =	V
HEX(20) =			HEX(57) =	W
HEX(21) =	!		HEX(58) =	X
HEX(22) =	"		HEX(59) =	Y
HEX(23) =	#		HEX(5A) =	Z
HEX(24) =	$		HEX(5B) =	Ä
HEX(25) =	%		HEX(5C) =	Ö
HEX(26) =	&		HEX(5D) =	Ü
HEX(27) =	'		HEX(5E) =	↑
HEX(28) =	(		HEX(5F) =	←
HEX(29) =	)		HEX(60) =	
HEX(2A) =	*		HEX(61) =	a
HEX(2B) =	+		HEX(62) =	b
HEX(2C) =	,		HEX(63) =	c
HEX(2D) =	-		HEX(64) =	d
HEX(2E) =	.		HEX(65) =	e
HEX(2F) =	/		HEX(66) =	f
HEX(30) =	0		HEX(67) =	g
HEX(31) =	1		HEX(68) =	h
HEX(32) =	2		HEX(69) =	i
HEX(33) =	3		HEX(6A) =	j
HEX(34) =	4		HEX(6B) =	k
HEX(35) =	5		HEX(6C) =	l
HEX(36) =	6		HEX(6D) =	m
HEX(37) =	7		HEX(6E) =	n
HEX(38) =	8		HEX(6F) =	o
HEX(39) =	9		HEX(70) =	p
HEX(3A) =	:		HEX(71) =	q
HEX(3B) =	;		HEX(72) =	r
HEX(3C) =	<		HEX(73) =	s
HEX(3D) =	=		HEX(74) =	t
HEX(3E) =	>		HEX(75) =	u
HEX(3F) =	?		HEX(76) =	v
HEX(40) =	@		HEX(77) =	w
HEX(41) =	A		HEX(78) =	x
HEX(42) =	B		HEX(79) =	y
HEX(43) =	C		HEX(7A) =	z
HEX(44) =	D		HEX(7B) =	ä
HEX(45) =	E		HEX(7C) =	ö
HEX(46) =	F		HEX(7D) =	ü
HEX(47) =	G		HEX(7E) =	ß
			HEX(7F) =	£

HEX(10) =	à	HEX(48) =	H
HEX(11) =	é	HEX(49) =	I
HEX(12) =	i	HEX(4A) =	J
HEX(13) =	o	HEX(4B) =	K
HEX(14) =	u	HEX(4C) =	L
HEX(15) =	à	HEX(4D) =	M
HEX(16) =	è	HEX(4E) =	N
HEX(17) =	i	HEX(4F) =	O
HEX(18) =	o	HEX(50) =	P
HEX(19) =	u	HEX(51) =	Q
HEX(1A) =	à	HEX(52) =	R
HEX(1B) =	è	HEX(53) =	S
HEX(1C) =	u	HEX(54) =	T
HEX(1D) =	A	HEX(55) =	U
HEX(1E) =	O	HEX(56) =	V
HEX(1F) =	U	HEX(57) =	W
HEX(20) =		HEX(58) =	X
HEX(21) =	!	HEX(59) =	Y
HEX(22) =	"	HEX(5A) =	Z
HEX(23) =	#	HEX(5B) =	[
HEX(24) =	$	HEX(5C) =	\
HEX(25) =	%	HEX(5D) =	]
HEX(26) =	&	HEX(5E) =	↑
HEX(27) =	'	HEX(5F) =	_
HEX(28) =	(	HEX(60) =	`
HEX(29) =	)	HEX(61) =	a
HEX(2A) =	*	HEX(62) =	b
HEX(2B) =	+	HEX(63) =	c
HEX(2C) =	,	HEX(64) =	d
HEX(2D) =	-	HEX(65) =	e
HEX(2E) =	.	HEX(66) =	f
HEX(2F) =	/	HEX(67) =	g
HEX(30) =	0	HEX(68) =	h
HEX(31) =	1	HEX(69) =	i
HEX(32) =	2	HEX(6A) =	j
HEX(33) =	3	HEX(6B) =	k
HEX(34) =	4	HEX(6C) =	l
HEX(35) =	5	HEX(6D) =	m
HEX(36) =	6	HEX(6E) =	n
HEX(37) =	7	HEX(6F) =	o
HEX(38) =	8	HEX(70) =	p
HEX(39) =	9	HEX(71) =	q
HEX(3A) =	:	HEX(72) =	r
HEX(3B) =	;	HEX(73) =	s
HEX(3C) =	<	HEX(74) =	t
HEX(3D) =	=	HEX(75) =	u
HEX(3E) =	>	HEX(76) =	v
HEX(3F) =	?	HEX(77) =	w
HEX(40) =	@	HEX(78) =	x
HEX(41) =	A	HEX(79) =	y
HEX(42) =	B	HEX(7A) =	z
HEX(43) =	C	HEX(7B) =	§
HEX(44) =	D	HEX(7C) =	£
HEX(45) =	E	HEX(7D) =	é
HEX(46) =	F	HEX(7E) =	ç
HEX(47) =	G	HEX(7F) =	è

French
(AZERTY)

SWISS/GERMAN

HEX(15) =	ä	HEX(4C) =	L
HEX(16) =	e	HEX(4D) =	M
HEX(17) =	i	HEX(4E) =	N
HEX(18) =	o	HEX(4F) =	O
HEX(19) =	ö	HEX(50) =	P
HEX(1A) =	à	HEX(51) =	Q
HEX(1B) =	è	HEX(52) =	R
HEX(1C) =	ù	HEX(53) =	S
HEX(1D) =	Ä	HEX(54) =	T
HEX(1E) =	é	HEX(55) =	U
HEX(1F) =	Ü	HEX(56) =	V
HEX(20) =		HEX(57) =	W
HEX(21) =	!	HEX(58) =	X
HEX(22) =	"	HEX(59) =	Y
HEX(23) =	#	HEX(5A) =	Z
HEX(24) =	$	HEX(5B) =	[
HEX(25) =	%	HEX(5C) =	\
HEX(26) =	&	HEX(5D) =	]
HEX(27) =	'	HEX(5E) =	↑
HEX(28) =	(	HEX(5F) =	←
HEX(29) =	)	HEX(60) =	`
HEX(2A) =	*	HEX(61) =	a
HEX(2B) =	+	HEX(62) =	b
HEX(2C) =	,	HEX(63) =	c
HEX(2D) =	-	HEX(64) =	d
HEX(2E) =	.	HEX(65) =	e
HEX(2F) =	/	HEX(66) =	f
HEX(30) =	0	HEX(67) =	g
HEX(31) =	1	HEX(68) =	h
HEX(32) =	2	HEX(69) =	i
HEX(33) =	3	HEX(6A) =	j
HEX(34) =	4	HEX(6B) =	k
HEX(35) =	5	HEX(6C) =	l
HEX(36) =	6	HEX(6D) =	m
HEX(37) =	7	HEX(6E) =	n
HEX(38) =	8	HEX(6F) =	o
HEX(39) =	9	HEX(70) =	p
HEX(3A) =	:	HEX(71) =	q
HEX(3B) =	;	HEX(72) =	r
HEX(3C) =	<	HEX(73) =	s
HEX(3D) =	=	HEX(74) =	t
HEX(3E) =	>	HEX(75) =	u
HEX(3F) =	?	HEX(76) =	v
HEX(40) =	@	HEX(77) =	w
HEX(41) =	A	HEX(78) =	x
HEX(42) =	B	HEX(79) =	y
HEX(43) =	C	HEX(7A) =	z
HEX(44) =	D	HEX(7B) =	ä
HEX(45) =	E	HEX(7C) =	ö
HEX(46) =	F	HEX(7D) =	ü
HEX(47) =	G	HEX(7E) =	ç
		HEX(7F) =	

HEX(11) =
HEX(12) =
HEX(13) =
HEX(14) =
HEX(15) =
HEX(16) =
HEX(17) =
HEX(18) =
HEX(19) =
HEX(1A) =
HEX(1B) =
HEX(1C) =
HEX(1D) =
HEX(1E) =
HEX(1F) =
HEX(20) =
HEX(21) = !
HEX(22) = "
HEX(23) = #
HEX(24) = $
HEX(25) = %
HEX(26) = &
HEX(27) = '
HEX(28) = (
HEX(29) =)
HEX(2A) = *
HEX(2B) = +
HEX(2C) = ,
HEX(2D) = -
HEX(2E) = .
HEX(2F) = /
HEX(30) = 0
HEX(31) = 1
HEX(32) = 2
HEX(33) = 3
HEX(34) = 4
HEX(35) = 5
HEX(36) = 6
HEX(37) = 7
HEX(38) = 8
HEX(39) = 9
HEX(3A) = :
HEX(3B) = ;
HEX(3C) = <
HEX(3D) = =
HEX(3E) = >
HEX(3F) = ?
HEX(40) = @
HEX(41) = A
HEX(42) = B
HEX(43) = C
HEX(44) = D
HEX(45) = E
HEX(46) = F
HEX(47) = G

HEX(48) = H
HEX(49) = I
HEX(4A) = J
HEX(4B) = K
HEX(4C) = L
HEX(4D) = M
HEX(4E) = N
HEX(4F) = O
HEX(50) = P
HEX(51) = Q
HEX(52) = R
HEX(53) = S
HEX(54) = T
HEX(55) = U
HEX(56) = V
HEX(57) = W
HEX(58) = X
HEX(59) = Y
HEX(5A) = Z
HEX(5B) = [
HEX(5C) =
HEX(5D) =]
HEX(5E) = ↑
HEX(5F) =
HEX(60) =
HEX(61) = a
HEX(62) = b
HEX(63) = c
HEX(64) = d
HEX(65) = e
HEX(66) = f
HEX(67) = g
HEX(68) = h
HEX(69) = i
HEX(6A) = j
HEX(6B) = k
HEX(6C) = l
HEX(6D) = m
HEX(6E) = n
HEX(6F) = o
HEX(70) = p
HEX(71) = q
HEX(72) = r
HEX(73) = s
HEX(74) = t
HEX(75) = u
HEX(76) = v
HEX(77) = w
HEX(78) = x
HEX(79) = y
HEX(7A) = z
HEX(7B) =
HEX(7C) =
HEX(7D) =
HEX(7E) =
HEX(7F) =

Danish

HEX(10) =
HEX(11) =
HEX(12) =
HEX(13) =
HEX(14) =
HEX(15) =
HEX(16) = e
HEX(17) = i
HEX(18) = o
HEX(19) = ü
HEX(1A) = å
HEX(1B) = (
HEX(1C) =
HEX(1D) =)
HEX(1E) = é
HEX(1F) = U
HEX(20) =
HEX(21) = !
HEX(22) = "
HEX(23) = #
HEX(24) = $
HEX(25) = %
HEX(26) = &
HEX(27) = '
HEX(28) = (
HEX(29) =)
HEX(2A) = *
HEX(2B) = +
HEX(2C) = ,
HEX(2D) = -
HEX(2E) = .
HEX(2F) = /
HEX(30) = 0
HEX(31) = 1
HEX(32) = 2
HEX(33) = 3
HEX(34) = 4
HEX(35) = 5
HEX(36) = 6
HEX(37) = 7
HEX(38) = 8
HEX(39) = 9
HEX(3A) = :
HEX(3B) = ;
HEX(3C) = <
HEX(3D) = =
HEX(3E) = >
HEX(3F) = ?
HEX(40) = @
HEX(41) = A
HEX(42) = B
HEX(43) = C
HEX(44) = D
HEX(45) = E
HEX(46) = F
HEX(47) = G

HEX(48) = H
HEX(49) = I
HEX(4A) = J
HEX(4B) = K
HEX(4C) = L
HEX(4D) = M
HEX(4E) = N
HEX(4F) = O
HEX(50) = P
HEX(51) = Q
HEX(52) = R
HEX(53) = S
HEX(54) = T
HEX(55) = U
HEX(56) = V
HEX(57) = W
HEX(58) = X
HEX(59) = Y
HEX(5A) = Z
HEX(5B) = Æ
HEX(5C) = Ø
HEX(5D) = Å
HEX(5E) = ↑
HEX(5F) = ←
HEX(60) =
HEX(61) = a
HEX(62) = b
HEX(63) = c
HEX(64) = d
HEX(65) = e
HEX(66) = f
HEX(67) = g
HEX(68) = h
HEX(69) = i
HEX(6A) = j
HEX(6B) = k
HEX(6C) = l
HEX(6D) = m
HEX(6E) = n
HEX(6F) = o
HEX(70) = p
HEX(71) = q
HEX(72) = r
HEX(73) = s
HEX(74) = t
HEX(75) = u
HEX(76) = v
HEX(77) = w
HEX(78) = x
HEX(79) = y
HEX(7A) = z
HEX(7B) = æ
HEX(7C) = ø
HEX(7D) = å
HEX(7E) =
HEX(7F) =

Swedish

HEX(10) =	ç	HEX(48) =	H
HEX(11) =	é	HEX(49) =	I
HEX(12) =	ï	HEX(4A) =	J
HEX(13) =	è	HEX(4B) =	K
HEX(14) =	û	HEX(4C) =	L
HEX(15) =	ä	HEX(4D) =	M
HEX(16) =	ë	HEX(4E) =	N
HEX(17) =	ï	HEX(4F) =	O
HEX(18) =	â	HEX(50) =	P
HEX(19) =	ê	HEX(51) =	Q
HEX(1A) =	ù	HEX(52) =	R
HEX(1B) =	[	HEX(53) =	S
HEX(1C) =	U	HEX(54) =	T
HEX(1D) =	]	HEX(55) =	U
HEX(1E) =	↑	HEX(56) =	V
HEX(1F) =	û	HEX(57) =	W
HEX(20) =		HEX(58) =	X
HEX(21) =	!	HEX(59) =	Y
HEX(22) =	"	HEX(5A) =	Z
HEX(23) =	#	HEX(5B) =	Ä
HEX(24) =	$	HEX(5C) =	Ö
HEX(25) =	%	HEX(5D) =	Å
HEX(26) =	&	HEX(5E) =	U
HEX(27) =	'	HEX(5F) =	_
HEX(28) =	(	HEX(60) =	é
HEX(29) =	)	HEX(61) =	a
HEX(2A) =	*	HEX(62) =	b
HEX(2B) =	+	HEX(63) =	c
HEX(2C) =	,	HEX(64) =	d
HEX(2D) =	-	HEX(65) =	e
HEX(2E) =	.	HEX(66) =	f
HEX(2F) =	/	HEX(67) =	g
HEX(30) =	0	HEX(68) =	h
HEX(31) =	1	HEX(69) =	i
HEX(32) =	2	HEX(6A) =	j
HEX(33) =	3	HEX(6B) =	k
HEX(34) =	4	HEX(6C) =	l
HEX(35) =	5	HEX(6D) =	m
HEX(36) =	6	HEX(6E) =	n
HEX(37) =	7	HEX(6F) =	o
HEX(38) =	8	HEX(70) =	p
HEX(39) =	9	HEX(71) =	q
HEX(3A) =	:	HEX(72) =	r
HEX(3B) =	;	HEX(73) =	s
HEX(3C) =	<	HEX(74) =	t
HEX(3D) =	=	HEX(75) =	u
HEX(3E) =	>	HEX(76) =	v
HEX(3F) =	?	HEX(77) =	w
HEX(40) =	É	HEX(78) =	x
HEX(41) =	A	HEX(79) =	y
HEX(42) =	B	HEX(7A) =	z
HEX(43) =	C	HEX(7B) =	ä
HEX(44) =	D	HEX(7C) =	ö
HEX(45) =	E	HEX(7D) =	å
HEX(46) =	F	HEX(7E) =	ü
HEX(47) =	G	HEX(7F) =	£

Dutch

HEX(11) =		HEX(48) =	H
HEX(12) =		HEX(49) =	I
HEX(13) =	ö	HEX(4A) =	J
HEX(14) =	ö	HEX(4B) =	K
HEX(15) =	a	HEX(4C) =	L
HEX(16) =	e	HEX(4D) =	M
HEX(17) =	i	HEX(4E) =	N
HEX(18) =	ä	HEX(4F) =	O
HEX(19) =	ü	HEX(50) =	P
HEX(1A) =	å	HEX(51) =	Q
HEX(1B) =	è	HEX(52) =	R
HEX(1C) =	û	HEX(53) =	S
HEX(1D) =	Å	HEX(54) =	T
HEX(1E) =	ö	HEX(55) =	U
HEX(1F) =	Ü	HEX(56) =	V
HEX(20) =		HEX(57) =	W
HEX(21) =	!	HEX(58) =	X
HEX(22) =	"	HEX(59) =	Y
HEX(23) =	#	HEX(5A) =	Z
HEX(24) =	$	HEX(5B) =	[
HEX(25) =	%	HEX(5C) =	\
HEX(26) =	&	HEX(5D) =	]
HEX(27) =	'	HEX(5E) =	↑
HEX(28) =	(	HEX(5F) =	_
HEX(29) =	)	HEX(60) =	°
HEX(2A) =	*	HEX(61) =	a
HEX(2B) =	+	HEX(62) =	b
HEX(2C) =	.	HEX(63) =	c
HEX(2D) =	-	HEX(64) =	d
HEX(2E) =	.	HEX(65) =	e
HEX(2F) =	/	HEX(66) =	f
HEX(30) =	0	HEX(67) =	g
HEX(31) =	1	HEX(68) =	h
HEX(32) =	2	HEX(69) =	i
HEX(33) =	3	HEX(6A) =	j
HEX(34) =	4	HEX(6B) =	k
HEX(35) =	5	HEX(6C) =	l
HEX(36) =	6	HEX(6D) =	m
HEX(37) =	7	HEX(6E) =	n
HEX(38) =	8	HEX(6F) =	o
HEX(39) =	9	HEX(70) =	p
HEX(3A) =	:	HEX(71) =	q
HEX(3B) =	;	HEX(72) =	r
HEX(3C) =	<	HEX(73) =	s
HEX(3D) =	=	HEX(74) =	t
HEX(3E) =	>	HEX(75) =	u
HEX(3F) =	?	HEX(76) =	v
HEX(40) =	@	HEX(77) =	w
HEX(41) =	A	HEX(78) =	x
HEX(42) =	B	HEX(79) =	y
HEX(43) =	C	HEX(7A) =	z
HEX(44) =	D	HEX(7B) =	f
HEX(45) =	E	HEX(7C) =	£
HEX(46) =	F	HEX(7D) =	é
HEX(47) =	G	HEX(7E) =	ç
		HEX(7F) =	ë

HEX(12) =			HEX(48) =	H
HEX(13) =			HEX(49) =	I
HEX(14) =			HEX(4A) =	J
HEX(15) =			HEX(4B) =	K
HEX(16) =			HEX(4C) =	L
HEX(17) =			HEX(4D) =	M
HEX(18) =			HEX(4E) =	N
HEX(19) =			HEX(4F) =	O
HEX(1A) =			HEX(50) =	P
HEX(1B) =			HEX(51) =	Q
HEX(1C) =			HEX(52) =	R
HEX(1D) =			HEX(53) =	S
HEX(1E) =			HEX(54) =	T
HEX(1F) =			HEX(55) =	U
HEX(20) =			HEX(56) =	V
HEX(21) =	!		HEX(57) =	W
HEX(22) =	"		HEX(58) =	X
HEX(23) =	#		HEX(59) =	Y
HEX(24) =	$		HEX(5A) =	Z
HEX(25) =	%		HEX(5B) =	[
HEX(26) =	&		HEX(5C) =	\
HEX(27) =	'		HEX(5D) =	]
HEX(28) =	(		HEX(5E) =	↑
HEX(29) =	)		HEX(5F) =	_
HEX(2A) =	*		HEX(60) =	°
HEX(2B) =	+		HEX(61) =	a
HEX(2C) =	,		HEX(62) =	b
HEX(2D) =	-		HEX(63) =	c
HEX(2E) =	.		HEX(64) =	d
HEX(2F) =	/		HEX(65) =	e
HEX(30) =	0		HEX(66) =	f
HEX(31) =	1		HEX(67) =	g
HEX(32) =	2		HEX(68) =	h
HEX(33) =	3		HEX(69) =	i
HEX(34) =	4		HEX(6A) =	j
HEX(35) =	5		HEX(6B) =	k
HEX(36) =	6		HEX(6C) =	l
HEX(37) =	7		HEX(6D) =	m
HEX(38) =	8		HEX(6E) =	n
HEX(39) =	9		HEX(6F) =	o
HEX(3A) =	:		HEX(70) =	p
HEX(3B) =	;		HEX(71) =	q
HEX(3C) =	<		HEX(72) =	r
HEX(3D) =	=		HEX(73) =	s
HEX(3E) =	>		HEX(74) =	t
HEX(3F) =	?		HEX(75) =	u
HEX(40) =	@		HEX(76) =	v
HEX(41) =	A		HEX(77) =	w
HEX(42) =	B		HEX(78) =	x
HEX(43) =	C		HEX(79) =	y
HEX(44) =	D		HEX(7A) =	z
HEX(45) =	E		HEX(7B) =	ç
HEX(46) =	F		HEX(7C) =	é
HEX(47) =	G		HEX(7D) =	é
			HEX(7E) =	ç
			HEX(7F) =	

Greek

		HEX(49)=	I	
		HEX(4A)=	J	
		HEX(4B)=	K	
		HEX(4C)=	L	
		HEX(4D)=	M	
		HEX(4E)=	N	
		HEX(4F)=	O	
		HEX(50)=	P	
		HEX(51)=	Q	
		HEX(52)=	R	
		HEX(53)=	S	
		HEX(54)=	T	
		HEX(55)=	U	
		HEX(56)=	V	
		HEX(57)=	W	
		HEX(58)=	X	
		HEX(59)=	Y	
		HEX(5A)=	Z	
		HEX(5B)=	[	
		HEX(5C)=	P	
		HEX(5D)=	]	
		HEX(5E)=	↑	
		HEX(5F)=	σ	
		HEX(60)=	A	
		HEX(61)=	B	
		HEX(62)=	Γ	
		HEX(63)=	Δ	
		HEX(64)=	E	
		HEX(65)=	Z	
		HEX(66)=	H	
		HEX(67)=	Θ	
		HEX(68)=	I	
		HEX(69)=	K	
		HEX(6A)=	Λ	
		HEX(6B)=	M	
		HEX(6C)=	N	
		HEX(6D)=	Ξ	
		HEX(6E)=	O	
		HEX(6F)=	Π	
		HEX(70)=	P	
		HEX(71)=	Σ	
		HEX(72)=	T	
		HEX(73)=	Y	
		HEX(74)=	Φ	
		HEX(75)=	X	
		HEX(76)=	Ψ	
		HEX(77)=	Ω	
		HEX(78)=	ς	
		HEX(79)=	τ	
		HEX(7A)=	υ	
		HEX(7B)=	φ	
		HEX(7C)=	χ	
		HEX(7D)=	ψ	
		HEX(7E)=	ω	
		HEX(7F)=	∏	

HEX(30)= 0
HEX(31)= 1
HEX(32)= 2
HEX(33)= 3
HEX(34)= 4
HEX(35)= 5
HEX(36)= 6
HEX(37)= 7
HEX(38)= 8
HEX(39)= 9
HEX(3A)= :
HEX(3B)= ;
HEX(3C)=
HEX(3D)= =
HEX(3E)= >
HEX(3F)= ?
HEX(40)= @
HEX(41)= A
HEX(42)= B
HEX(43)= C
HEX(44)= D
HEX(45)= E
HEX(46)= F
HEX(47)= G

Icelandic

HEX	char		HEX	char
HEX(10) =			HEX(48) =	H
HEX(11) =	A		HEX(49) =	I
HEX(12) =			HEX(4A) =	J
HEX(13) =	O		HEX(4B) =	K
HEX(14) =	U		HEX(4C) =	L
HEX(15) =	Y		HEX(4D) =	M
HEX(16) =	á		HEX(4E) =	N
HEX(17) =	é		HEX(4F) =	O
HEX(18) =			HEX(50) =	P
HEX(19) =			HEX(51) =	Q
HEX(1A) =			HEX(52) =	R
HEX(1B) =			HEX(53) =	S
HEX(1C) =	í		HEX(54) =	T
HEX(1D) =	ó		HEX(55) =	U
HEX(1E) =	ú		HEX(56) =	V
HEX(1F) =	ý		HEX(57) =	W
HEX(20) =			HEX(58) =	X
HEX(21) =	!		HEX(59) =	Y
HEX(22) =	"		HEX(5A) =	Z
HEX(23) =	#		HEX(5B) =	Þ
HEX(24) =	$		HEX(5C) =	\
HEX(25) =	%		HEX(5D) =	Æ
HEX(26) =	&		HEX(5E) =	Ö
HEX(27) =	'		HEX(5F) =	_
HEX(28) =	(		HEX(60) =	ð
HEX(29) =	)		HEX(61) =	a
HEX(2A) =	*		HEX(62) =	b
HEX(2B) =	+		HEX(63) =	c
HEX(2C) =	.		HEX(64) =	d
HEX(2D) =	-		HEX(65) =	e
HEX(2E) =	.		HEX(66) =	f
HEX(2F) =	/		HEX(67) =	g
HEX(30) =	0		HEX(68) =	h
HEX(31) =	1		HEX(69) =	i
HEX(32) =	2		HEX(6A) =	j
HEX(33) =	3		HEX(6B) =	k
HEX(34) =	4		HEX(6C) =	l
HEX(35) =	5		HEX(6D) =	m
HEX(36) =	6		HEX(6E) =	n
HEX(37) =	7		HEX(6F) =	o
HEX(38) =	8		HEX(70) =	p
HEX(39) =	9		HEX(71) =	q
HEX(3A) =	:		HEX(72) =	r
HEX(3B) =	;		HEX(73) =	s
HEX(3C) =	<		HEX(74) =	t
HEX(3D) =	=		HEX(75) =	u
HEX(3E) =	>		HEX(76) =	v
HEX(3F) =	?		HEX(77) =	w
HEX(40) =	@		HEX(78) =	x
HEX(41) =	A		HEX(79) =	y
HEX(42) =	B		HEX(7A) =	z
HEX(43) =	C		HEX(7B) =	þ
HEX(44) =	D		HEX(7C) =	
HEX(45) =	E		HEX(7D) =	æ
HEX(46) =	F		HEX(7E) =	ö
HEX(47) =	G		HEX(7F) =	

APPENDIX B

FUNCTIONAL SPECIFICATIONS

THIS APPENDIX CONTAINS TWO MEMORANDUMS

1.) ESCAPE CODE SEQUENCES FOR THE EPSON - 80 PRINTER

2.) CONTROL CODES FOR THE EPSON - 80 PRINTER

WANG LABORATORIES, INC.

TO: U.S. AREA DIRECTORS DISTRICT MANAGERS, BRANCH MANAGERS
       AND ALL SALES AND SUPPORT PERSONNEL
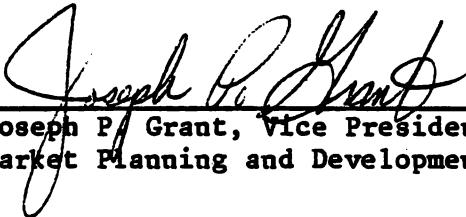
FROM: JOSEPH P. GRANT and JOHN N. MOLITOR

SUBJECT: MODEL 2245 MATRIX PRINTER ANNOUNCEMENT
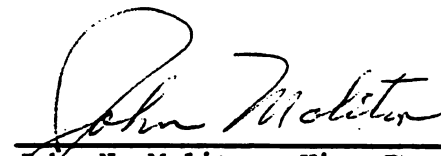
DATE: AUGUST 13, 1981

We are pleased to announce the availability of a new matrix printer for the
2200 series product line. Wang Laboratories has introduced a new family of
matrix printers commencing with the recent announcement of the 2233 and 2235
for use on the 2200 series product line and the 5533 and 5535 for use on WP
and OIS product lines. This printer becomes the fifth member of this new
product family intended to address a wide range of customer price/performance
requirements.

The model 2245 matrix printer, with a purchase price of $1000, is the most
aggressively priced small business system printer in the industry today. In
addition, it is competitive with those offered by major vendors of personal
computing systems. This printer will provide significant opportunity for
add-on business with existing accounts and will assist in gaining the sale of
2200 systems in a price sensitive market.

Joseph P. Grant, Vice President   John N. Molitor, Vice President
Market Planning and Development   Marketing Support

WANG) LABORATORIES, INC.

TO: U.S. AREA DIRECTORS DISTRICT MANAGERS, BRANCH MANAGERS
          AND ALL SALES AND SUPPORT PERSONNEL

FROM: PRODUCT LINE MANAGEMENT

SUBJECT: MODEL 2245 MATRIX PRINTER ANNOUNCEMENT

DATE: AUGUST 13, 1981
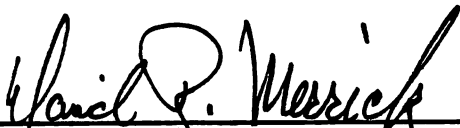
Wang Laboratories is pleased to announce the immediate availability, in the
domestic market, of another member of the new family of matrix printers. The
2245 is for use with the 2200 series product line.

This Announcement package contains:

   1. PRODUCT OVERVIEW

   2. MARKET OPPORTUNITIES and STRATEGIES

   3. PRODUCT STRATEGIES and UNIQUE CUSTOMER CONSIDERATIONS

   4. PRICING AND AVAILABILITY

   5. DATA SHEETS

This new printer, offered at a $1000 purchase price, provides the opportunity
to to recapture business lost to plug compatible vendors. This aggressive
pricing increases the opportunity to sell an incremental number of printers
into the 2200 systems customer base. The model 2245 is an ideal tool to assist
in the sale of entry level systems and will provide the opportunity for add-on
business in established accounts.

With the introduction of this printer Wang Laboratories initiates a new
concept in doing business with certain products. To meet the price objectives
for this printer, Wang Laboratories requires more customer involvement than
has been the custom with other products. This involvement is detailed in the
PRODUCT STRATEGIES AND UNIQUE CUSTOMER CONSIDERATIONS section of this
announcement. This section should be read thoroughly with the context of the
message conveyed to the prospect before signing a purchase agreement.

David R. Merrick
Product Manager, Printers
Market Planning and Development

DRM/2783G
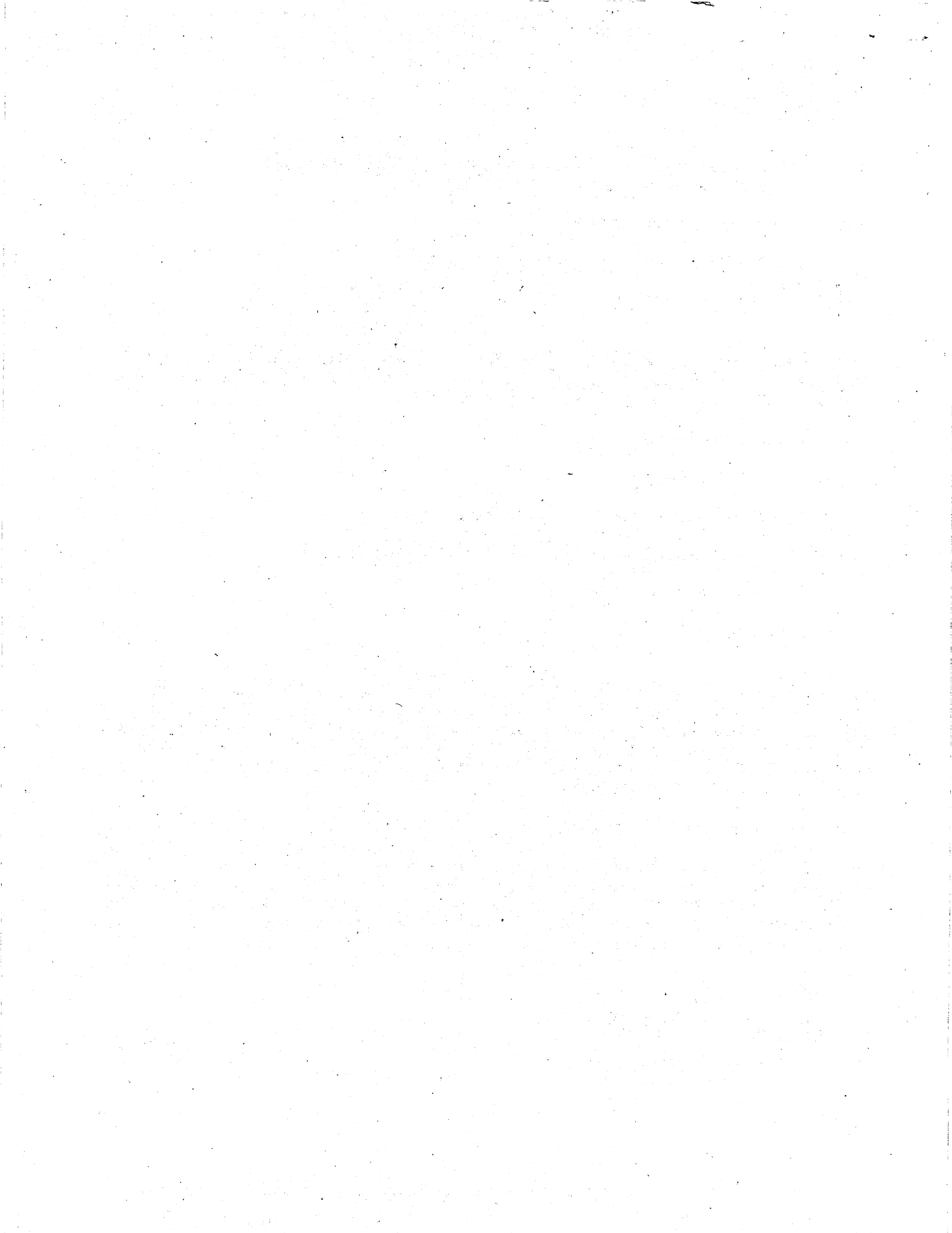
MODEL 2245 MATRIX PRINTER PRODUCT OVERVIEW

The model 2245 is a 80 CPS (Character Per Second), narrow carriage, bidirectional printer for use on the 2200 series product line. It is capable of printing eighty 10 pitch or one hundred thirty two 16.5 pitch, 9x9 dot matrix characters on 3 part continuous forms paper up to 10 inches wide. The print ribbon is contained in an easy to change plastic cartridge. Printer control and function codes are compatible with all existing 2200 series matrix printers. The ability to replicate 2236DW business graphics is provided when the printer is configured on a 2236DW workstation. Paper feed is from the rear of this compact (176 square inch, 12 lb.) device, making it convenient to place the printer on a table top adjacent to a workstation.

The model 2245 may be connected directly to a 2236DE or 2236DW workstation or to any 2200 system printer controller. It is possible to use this device as a systems printer, however it is recommended that it never be configured as the only printer on a multi-user system. The ability to print up to one hundred thirty two 10 pitch characters on paper up to 14.9 inches wide and the higher throughput rates of the models 2233 and 2235, make those matrix printers more suitable for certain applications and for use in multi-user environments.

This printer, shares the same control codes and operational logic of other Wang matrix printers on the 2200 series product line. In addition it, unlike other Wang matrix printers, is able to replicate the graphics displayed on 2236DW workstations. The user of a Wang Laboratories 2200 system is able to make full use of this printer's attributes without modifying existing applications software.

The print head On the model 2245 is operator replaceable and is a consumable to be replaced by the user in case of failure or excessive wear. Head life is estimated at one hundred million characters (forty thousand pages of typical text having 2500 characters per page).

MARKETING OPPORTUNITIES AND STRATEGIES

The model 2245 is the newest member in the family of matrix printers offered by Wang Laboratories. It is introduced to provide a high value / low end printer for the 2200 series product line. This printer provides the competitive edge that may be needed to secure the sale of 2200 systems in a price sensitive market. It presents the opportunity to recapture business lost to plug compatible printer vendors as a result of not having a price competitive printer offering for the 2200 series Systems Houses and Software Vendors. The model 2245 is an excellent solution to draft printing directly at the operator workstation and is an ideal MAILWAY printer. The potential for use in MAILWAY applications presents the opportunity for significant incremental business with both, existing 2200 users and new customers. The requirement for a low cost, medium speed, matrix printer that can be used as a workstation printer, a secondary system printer (multi-user systems), and the only printer on single user systems with low volume print requirements is now satisfied.

Offer this printer to:

SVP (single user) prospects to gain an improved entry level system price. The model 2245 is priced $1500 lower than any other Wang matrix printer currently available.

SVP prospects requiring a desk top configuration. This printer, coupled with an SVP, its intergrated workstation and mass store device, is well suited for that requirement.

LVP/MVP (multi-user) prospects and users wanting low cost local hard copy with or without business graphics capability. This printer is perfect for providing convenient draft copy for word processing applications.

LVP/MVP prospects and users operating in a telecommunications environment. The model 2245 is well suited for use as an output device on a remote workstation. It is an ideal MAILWAY printer and provides true teletype emulation when used with a 2236DE or 2236DW workstation.

To SVP/LVP/MVP prospects and users requiring a printer with a degree of portability. It's small size and light weight make it suitable for transportation between systems requiring only temporary use of a printer.

The model 2245 not designed to be the sole printing device of a computer system with a print intensive work load. It is intended to provide the occasional user with a convenient method of of retrieving hard copy of short to medium length documents in a low use environment. Higher speed and more substantial matrix line printers such as the 2233 and 2235 or band printers such as the 2273-1 and 2273-2 should be selected for more print intensive applications.

PRODUCT STRATEGIES AND UNIQUE CUSTOMER CONSIDERATIONS

To provide more attractive purchase and maintenance pricing for this printer, Wang Laboratories seeks a higher level of customer involvement than has been expected in the past. In addition, maintenance practices will differ from those of other products in the Wang Laboratories product line.

Printer installation at the customer site will be accomplished by a Wang representative if the installation is in conjunction with a new system installation, the installation of other equipment normally installed by Wang representatives, or if the printer requires the installation of a printer controller, e.g., it is the first printer installed on the system. Otherwise the customer will be provided with adequate information to accommodate installation by the customer's personnel. Telephone assistance is available through the Systems Support Center (telephone 617-459-5000, extension 3600) Or from the nearest Wang Laboratories Customer Engineering office.

The print head, with a life expectancy of approximately one hundred million characters, is operator replaceable and is treated as a consumable just as is a printwheel on a daisy printer. They may be purchased through the Wang Laboratories Supplies Division and installed by the customer when a failure occurs or when worn out.

On site printer repair is not provided. The printer will be returned to a Wang Laboratories repair depot for diagnosis and repair. A replacement printer, guaranteed to be in like new operating condition, will be provided. No attempt will be made to ensure that the printer removed from the site is returned to that customer. If the failure is caused by the print head, the customer will be charged the replacement price regardless of whether not the printer is on rental or under a service contract unless the printer is under warranty.

PRICING AND AVAILABILITY

U.S. PRICING ONLY

PRINTER

MODEL	DESCRIPTION	PURCHASE	MONTHLY MAINTENANCE	1 YR.. RENTAL
2245	80 CPS matrix printer	$1000	$15	$51

CONSUMABLES

Order from Wang Laboratories Supplies Division only.

PART NUMBER	DESCRIPTION	PURCHASE PRICE
725-0165	Cartridge print ribbon	$260 / box of 12 ribbons, 1 to 5 boxes $230 / box of 12 ribbons, 6 to 19 boxes $207 / box of 12 ribbons, 20 or more boxes
725-0166	Print head	$100 per print head

AVAILABILITY

Orders for the model 2245 may be taken immediately with delivery in approximately 30 days A.R.O.

MEMO

TO: 2200 DP System Support Group
FROM: Alan Goldman
DATE: September 29, 1981

SUBJ: Graphics on Model 2245 (EPSON) Matrix Printer

ECO #10922

USE OF MODEL 2245 MATRIX PRINTER (EPSON)

As of this time the graphics option of hte Model 2245 matrix printer will only
be supported on the Model 2236DW terminal. A PROM upgrade is necessary to
support graphics on the 2236DW.

Specifically, L17 must be upgraded from 378-4095-R2 to 378-4095-R3 on
210-7592-1A. Also, L18 must be upgraded from 378-4094-R2 to 378-4094-R3 on the
same board.

If graphics are passed to the printer without this upgrade, they will not
appear in graphic format. This symptom will also occur if graphics are passed
from a Model 2236DE terminal which does not support graphics to this printer
as yet.

CC: 2200 TC Support Group

WANG LABORATORIES, INC.

TO: INTERNATIONAL VICE PRESIDENTS, COUNTRY MANAGERS,
         REPRESENTATIVE DIRECTORS

FROM: JOSEPH P. GRANT and JOHN N. MOLITOR

SUBJ: MODEL 2245 MATRIX PRINTER ANNOUNCEMENT INTERNATIONAL
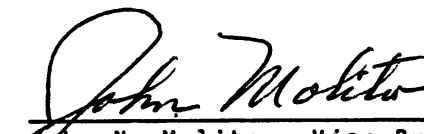
DATE: OCTOBER 30, 1981

We are pleased to announce the availability of a new matrix printer for the 2200 series product line. Wang Laboratories has introduced a new family of matrix printers commencing with the recent announcement of the 2233 and 2235 for use on the 2200 series product line and the 5533 and 5535 for use on WP and OIS product lines. This printer becomes the fifth member of this new product family intended to address a wide range of customer price/performance requirements.

The model 2245 matrix printer, with an International purchase price of $1250, is the most aggressively priced small business system printer in the industry today. In addition, it is competitive with those offered by major vendors of personal computing systems. This printer will provide significant opportunity for add-on business with existing accounts and will assist in gaining the sale of 2200 systems in a price sensitive market.

Joseph P. Grant, Vice President
Market Planning and Development

John N. Molitor, Vice President
Marketing Support

JPG:JNM:cd:0937A
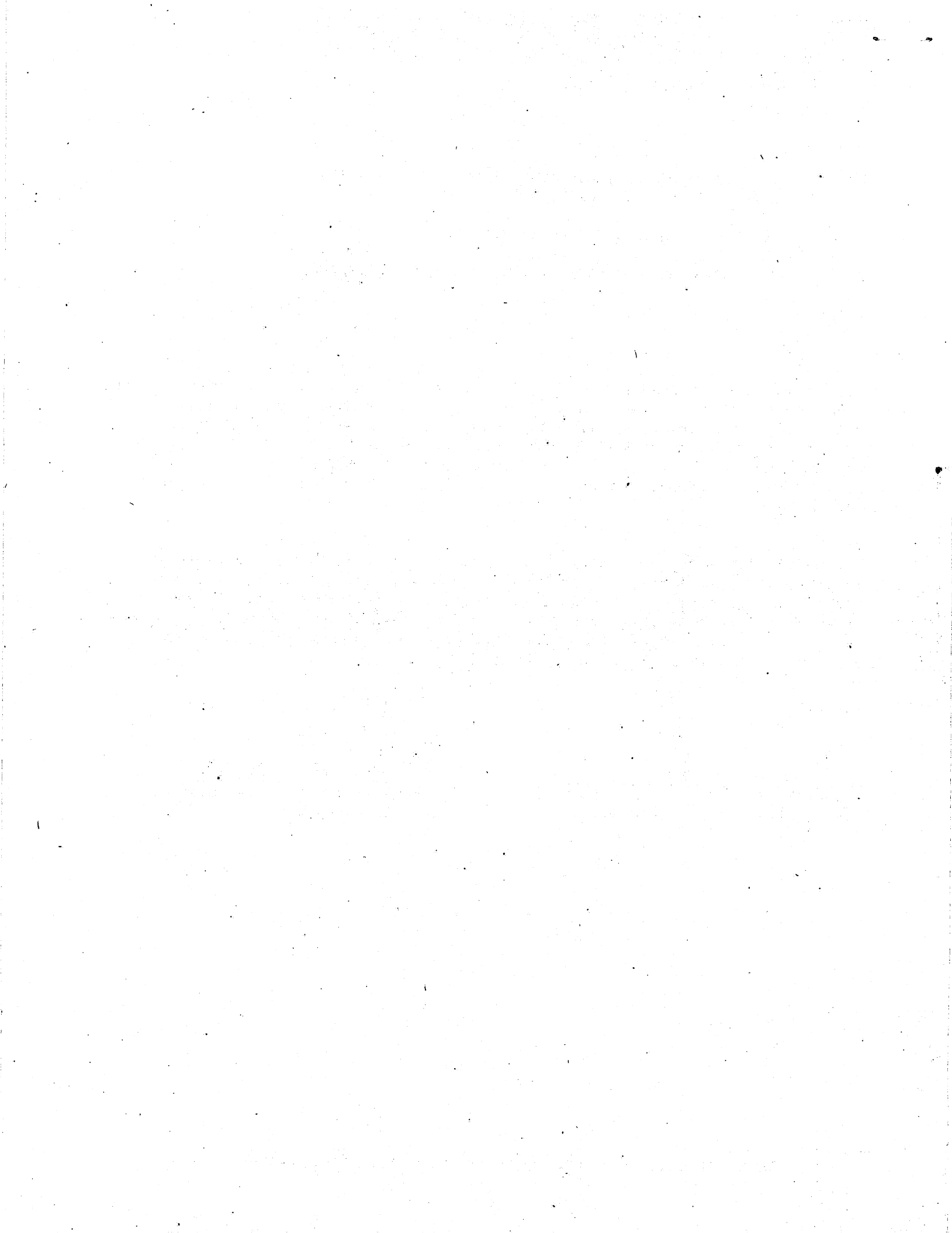
WANG LABORATORIES, INC.

INTERNATIONAL MARKETING RELEASE

TO	Country Managers, Representative General Managers	
FROM	Robert Olszewski	**DATE** October 30, 1981
SUBJECT	2245 Matrix Printer	**LANGUAGE**

Wang Laboratories is pleased to announce the availability of the International versions of the 2245 Matrix printer for the 2200 series product line. International versions of the 2245 will be available in December 1981 with a five day lead time.

PRODUCT OVERVIEW

The model 2245 is a 80 CPS (Characters Per Second), narrow carriage, bidirectional printer, capable of printing eighty 10 pitch or one hundred thirty two 16.5 pitch, 9x9 dot matrix characters on 3 part continuous forms paper up to 10 inches wide (25.4 cm). The ribbon is continuous feed contained in an easy to change plastic cartridge. Printer contol and function codes are compatible with all existing 2200 series matrix printers. The ability to replicate 2236DW business graphics is provided when the printer is configured on a 2236DW workstation.

The model 2245 may be connected directly to the 2236DE and 2236DW workstations or to any 2200 system printer controller. It is possible to use this device as a system printer, however it is recommended that the model 2245 printer never be configured as the only printer on a multi-user system. The ability to print up to one hundred thirty two 10 pitch characters on paper up to 14.9 inches (37.8 cm.) wide and the higher throughput rates of the models 2233 and 2235, make those matrix printers more suitable for certain applications and for use in a multi-user environments.

The print head on the model 2245 is operator replaceable and is a consumable to be replaced by the user in case of failure or excessive wear. Printer head life is estimated at on hundred million characters (forty thousand pages of typical text having 2500 characters per page). They may be purchased through the local Wang office and installed by the customer when a failure occurs or when worn out.

The 2245 printer provides character support for the French and United Kingdom Character sets, without ordering a language option. Language options are currently available for the following languages:

Canadian	Danish
Finnish	German
Greek/Latin	Icelandic
Netherlands	Norwegian
Spanish	Swedish
Swiss (French/German)	

Please refer to the attached printouts for the complete character sets.

MARKETING OPPORTUNITIES AND STRATEGIES

The model 2245 is the newest member in the family of matrix printers offered by Wang Laboratories. It is introduced to provide a high value / low end printer for the 2200 series product line. This printer provides the competitive edge that may be needed to secure the sale of 2200 systems in a price sensitive market. It presents the opportunity to recapture business lost to plug compatible printer vendors as a result of not having a price competitive printer offering for the 2200 series Systems Houses and Software Vendors. The model 2245 is an excellent solution to draft printing directly at the operator workstation and is an ideal MAILWAY printer. The potential for use in MAILWAY applications presents the opportunity for significant incremental business with both existing 2200 users and new customers. The requirement for a low cost, medium speed, matrix printer that can be used as a workstation printer, a secondary system printer (multi-user systems), and the only printer on single user systems with low volume print requirements is now satisfied.

Offer this printer to:

> SVP (single user) prospects to gain an improved entry level system price. The model 2245 is priced $1875 lower than any other Wang matrix printer currently available.

> SVP prospects requiring a desk top configuration. This printer, coupled with an SVP, its intergrated workstation and mass store device, is well suited for that requirement.

> LVP/MVP (multi-user) prospects and users wanting low cost local hard copy with or without business graphics capability. This printer is perfect for providing convenient draft copy for word processing applications.

> LVP/MVP prospects and users operating in a telecommunications environment. The model 2245 is well suited for use as an output device on a remote workstation. It is an ideal MAILWAY printer and provides true teletype emulation when used with a 2236DE or 2236DW workstation.

> To SVP/LVP/MVP prospects and users requiring a printer with a degree of portability. It's small size and light weight make it suitable for transportation between systems requiring only temporary use of a printer.

The model 2245 is not designed to be the sole printing device of a computer system with a print intensive work load. It is intended to provide the occasional user with a convenient method of retrieving hard copy of short to medium length documents in a low use environment. Higher speed and more substantial matrix line printers such as the 2233 and 2235 or band printers such as the 2273-1 and 2273-2 should be selected for more print intensive applications.

PRODUCT STRATEGIES AND UNIQUE CUSTOMER CONSIDERATIONS

To provide more attractive purchase and maintenance pricing for this printer, Wang Laboratories seeks a higher level of customer involvement than has been expected in the past. In addition, maintenance practices will differ from those of other products in the Wang Laboratories product line.

Printer installation at the customer site will be accomplished by a Wang representative if the installation is in conjunction with a new system installation, the installation of other equipment normally installed by Wang representatives, or if the printer requires the installation of a printer controller, e.g., it is the first printer installed on the system. Otherwise the customer will be provided with adequate information to accommodate installation by the customer's personnel. Additional assistance will be available through nearest Customer Engineering office.

The print head, with a life expectancy of approximately one hundred million characters, is operator replaceable and is treated as a consumable just as is a printwheel on a daisy printer. They may be purchased through the local Wang office and installed by the customer when a failure occurs or when worn out.

On site printer repair is not provided. The printer will be returned to a Wang Laboratories repair depot by a Wang Customer Engineer, for diagnosis and repair. A replacement printer, guaranteed to be in like new operating condition, will be provided. No attempt will be made to ensure that the printer removed from the site is returned to that customer. If the failure is caused by the print head, the customer will be charged the replacement price regardless of whether not the printer is on rental or under a service contract unless the printer is under warranty.

All International model 2245 matrix printers will be delivered to Wang representatives and subsidiaries with a power cord which has no AC plug. It is the Wang representative and subsidiaries responsibility to install the plug which meets their national standards.

ORDERING INFORMATION

International versions of the 2245 are ordered by specifying printer Model 2245. If character support other than French or United Kingdom is required specify the desired Language Option from the list below. When a Language Option is ordered in conjunction with a Model 2245, the printer will arrive converted to provide the desired character support at no charge. Language options model numbers are written in the following form, LO 2245-YY where YY is a two letter language suffix. Language Options may be ordered either as a conversion to a new 2245 printer as described above, or as an upgrade to an existing printer to provide the desired International character support. In the latter case there is a charge of $250 int'l list price for the conversion kit. The following Language Options are currently available:

Model Number	Supports
LO 2245-GE	German
LO 2245-SU	Swiss French, Swiss German
LO 2245-GL	Greek/Latin
LO 2245-IC	Icelandic
LO 2245-NL	Netherlands (Dutch)
LO 2245-NO	Norwegian, Danish
LO 2245-SW	Swedish, Finnish
LO 2245-CA	Canadian
LO 2245-SP	Spanish (Euro. and Latin American)

SPECIAL ORDERING NOTES

Order all items through International Order Processing. Specify one of the above language options. For example, if one wants a Model 2245 printer to support Finnish in Finland, the following information should be passed through International Order Processing channels:

1.)   Order (1) one Model 2245.

2.)   Order (1) one LO 2245-SW.

Note that several of the language options provide support for more than one language. As illustrated in the example LO 2245-SW not only provides the character support required for Swedish but also for Finnish. In addition Character support for American (upper and lower case) is implied for all Language Options, with the exception of Greek/Latin, which provides upper case English only. For more information regarding the character sets please consult the last page of this document.

INTERNATIONAL PRICING

All prices are in US Dollars.

PRINTER

MODEL	DESCRIPTION	PURCHASE	MONTHLY MAINTENANCE
2245	80 CPS matrix model	$1250	$19

CONSUMABLES

Order from local Wang office only.

PART NUMBER	DESCRIPTION	PURCHASE PRICE
725-0165	Cartridge print ribbon	$162.50 /box of 6 ribbons, 1 to 5 boxes $144.00 /box of 6 ribbons, 6 to 19 boxes $130.00 /box of 6 ribbons, 20 boxes or more
725-0166	Print head	$125.00 per print head

LANGUAGE OPTIONS

There is no charge for any Language Options when the following conditions are met:

1. The language option must be ordered simultaneously with a 2245 matrix printer.

2. The requested language option is a language indigenous to that country.

Otherwise, the following prices per Language Option are in effect:

INT'L
LIST

$250.00

Please note that the whole 2200 system should be converted to the specific language.

AVAILABILITY

International orders for the model 2245 will be taken starting in December 1981, with delivery in approximately 5 days.

LANGUAGE OPTION SPECIFICATIONS
& CONVERSION INSTRUCTIONS

The LO 2245 consists of a Character Set stored in a PROM, which is located on the HMPT board:

LO	PROM #	LOCATION	Supports
LO 2245-CA	378-5029	2B	Canadian
LO 2245-GE	378-5030	2B	German
LO 2245-GL	378-5031	2B	Greek/Latin
	378-5032	3B	
LO 2245-IC	378-5033	2B	Icelandic
LO 2245-NL	378-5034	2B	Netherlands
LO 2245-NO	378-5035	2B	Danish/Norwegian
LO 2245-SP	378-5036	2B	Spanish
LO 2245-SW	378-5037	2B	Swedish/Finnish
LO 2245-SU	378-5038	2B	Swiss (Fr/Ge)

The model 2245 printer will be delivered to Wang Laboratories representatives and/or subsidiaries with either the requested language option or the standard language proms.

The following procedure should be used to convert field units or those printers which do not provide the desired character support.

1. The power cord should be removed from the A. C. power recepticle.

2. The manual paper feed knob should be removed from the platen shaft by simply sliding it off the end.

3. The wire form paper guide (separator and roller) should be removed by depressing the side rails near the end inserted in the printer case.

4. The four cover retaining screws should be removed from the underside of the printer case.

5. The plastic upper half of the printer case may be removed by raising it and slipping it over the exposed paper feed platten shaft. Care should be taken to avoid damage to the wire harness located on the control panel side of the printer.

6. To replace the existing language, remove and discard the PROM in location 2B on the HMTP board (see figue 1). Select the appropriate Prom from the preceding list and install it in location 2B. For LO 2245-GL it is also necessary to replace the PROM in location 3B. NOTE: The appropriate PROM(s) will be supplied with the language option kit.

The printer should be reassembled in reverse order.

All 50 Hz printers are delivered to Wang Representatives and Subsidiaries with the forms length established at 12 inches (30.48 cm.)at 72 lines/page. The selection of form length is accomplished by setting the dip switches on the HMPT board. International versions may be selected for forms length of 11 inches (27.9 cm.) on 66 lines/page by changing the setting of the switch number 1 on Dip switch number 2 from the "on" to the "off" position. See figure 1.

Location of Language PROMS & Forms Length Switch
on the HMPT Board

FIGURE 1
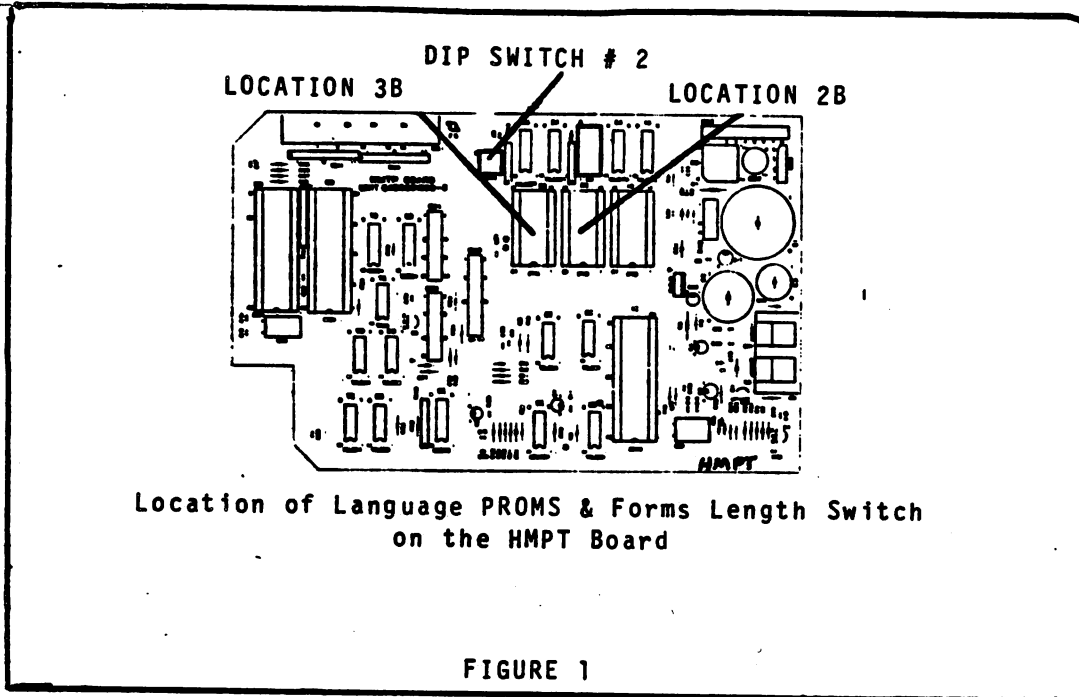
IMPORTANT NOTES:

- The standard language proms support American, United Kingdom and French character requirements. Below is a sample printout of the standard character set.

2245   UNITED STATES
        UNITED KINGDOM
        FRANCE(AZERTY)·

- In order to support Greek Latin two proms must be replaced on the HMPT board.

- Per specific request of the Netherlands, the Dutch version will support the data processing character set (the character set with square brackets).

2245 CANADIAN

```
  0123456789ABCDEF
1 âêîôûÄÊÎÔÛàèôÀÈÙ
2  !"#$%&'()*+,-./
3 0123456789:;<=>?
4 @ABCDEFGHIJKLMNO
5 PQRSTUVWXYZ[\]↑←
6 °abcdefghijklmno
7 pqrstuvwxyzÇÉé§¢
8 .◆▶◀→◻⌐|"'`^◼‼↕β¶
9 •◇▲▼↓¬√°{}▲◻
A ‾ ─||⊓
B
C
D
E
F
```

2245 DUTCH

```
  0123456789ABCDEF
1 âêîôûäëïöüàèôÄÖÜ
2  !"#$%&'()*+,-./
3 0123456789:;<=>?
4 @ABCDEFGHIJKLMNO
5 PQRSTUVWXYZ[\]↑←
6 °abcdefghijklmno
7 pqrstuvwxyzƒ£é§¢
8 .◆▶◀→◻⌐|"'`^◼‼↕β¶
9 •◇▲▼↓¬√°{}▲◻
A ‾ ─||⊓
B
C
D
E
F
```

2245 GERMAN

```
  0123456789ABCDEF
1 âêîôûäëïàèÙ[\]éß
2  !"#$%&'()*+,-./
3 0123456789:;<=>?
4 @ABCDEFGHIJKLMNO
5 PQRSTUVWXYZÄÖÜ↑↓
6 °abcdefghijklmno
7 pqrstuvwxyzäöü§¢
8 .◆▶◀→◻⌐|"'`^◼‼↕β¶
9 •◇▲▼↓¬√°{}▲◻
A ‾ ─||⊓
B
C
D
E
F
```

2245 GREEK/LATIN

```
  0123456789ABCDEF
1 αβγδεζηθικλμνξοπ
2  !"#$%&'()*+,-./
3 0123456789:;<=>?
4 @ABCDEFGHIJKLMNO
5 PQRSTUVWXYZ[ρ]↑←
6 ΑΒΓΔΕΖΗΘΙΚΛΜΝΞΟΠ
7 ΡΣΤΥΦΧΨΩστυφχωα¢
8 .◆▶◀→◻⌐|"'`^◼‼↕β¶
9 •◇▲▼↓¬√°{}▲◻
A ‾ ─||⊓
B
C
D
E
F
```

2245 ICELANDIC

```
  0123456789ABCDEF
1 ÁÉÍÓÚÝáé    íóúý
2  !"#$%&'()*+,-./
3 0123456789:;<=>?
4 ÐABCDEFGHIJKLMNO
5 PQRSTUVWXYZÞ\Æöö←
6 ðabcdefghijklmno
7 pqrstuvwxyzþ æö
8 .◆▶◀→◻⌐|"'`^◼‼↕β¶
9 •◇▲▼↓¬√°{}▲◻
A ‾ ─||⊓
B
C
D
E
F
```

2245 NORWEGIAN/DANISH

```
  0123456789ABCDEF
1 âêîôûäëïöüà[§]éü
2  !"#$%&'()*+,-./
3 0123456789:;<=>?
4 @ABCDEFGHIJKLMNO
5 PQRSTUVWXYZÆØÅ↑←
6 `abcdefghijklmno
7 pqrstuvwxyzæøå£¢
8 .◆▶◀→◻⌐|"'`^◼‼↕β¶
9 •◇▲▼↓¬√°{}▲◻
A ‾ ─||⊓
B
C
D
E
F
```

2245 SPANISH

```
  0123456789ABCDEF
1 áéíóú    üäèÙ¿íÜ
2  !"#$%&'()*+,-./
3 0123456789:;<=>?
4 @ABCDEFGHIJKLMNO
5 PQRSTUVWXYZ[ñ]↑←
6 `abcdefghijklmno
7 pqrstuvwxyz§ñ§±¢
8 .◆▶◀→◻⌐|"'`^◼‼↕β¶
9 •◇▲▼↓¬√°{}▲◻
A ‾ ─||⊓
B
C
D
E
F
```

2245 SWEDISH/FINNISH

```
  0123456789ABCDEF
1 @æ ø\§£áàèÙ[°]↑É
2  !"#$%&'()*+,-./
3 0123456789:;<=>?
4 ÉABCDEFGHIJKLMNO
5 PQRSTUVWXYZÄÖÅÜ|
6 éabcdefghijklmno
7 pqrstuvwxyzäöåÜ¢
8 .◆▶◀→◻⌐|"'`^◼‼↕β¶
9 •◇▲▼↓¬√°{}▲◻
A ‾ ─||⊓
B
C
D
E
F
```

2245 SWISS FRENCH/GERMAN

```
  0123456789ABCDEF
1 âêîôûäëïöüàèôÄéÜ
2  !"#$%&'()*+,-./
3 0123456789:;<=>?
4 @ABCDEFGHIJKLMNO
5 PQRSTUVWXYZ[\]↑←
6 `abcdefghijklmno
7 pqrstuvwxyzäöü§
8 .◆▶◀→◻⌐|"'`^◼‼↕β¶
9 •◇▲▼↓¬√°{}▲◻
A ‾ ─||⊓
B
C
D
E
F
```

M E M O R A N D U M

To: Distribution

From: Gary Mastny

Dept.: New Products/Technical Operations

Date: July 6, 1984

Subj.: Final Maintenance Plan

Enclosed is the Final Maintenance Plan for the PC-PM016/2245-160 Printer.

Distribution
Dan Beaudry
John Candy (WESA)
Jim Cronin
Eric DeMaertelaere (WESA)
Bob Donavon
Bill Giglio
Dan Horne
Peter Hubbard
Rick Robert
Jim Riley
Jim Stack
Perry Talley
Charlie Tharp

cc: Wayne Justason
    Richard Petzold
    Matt Zaboy

WANG
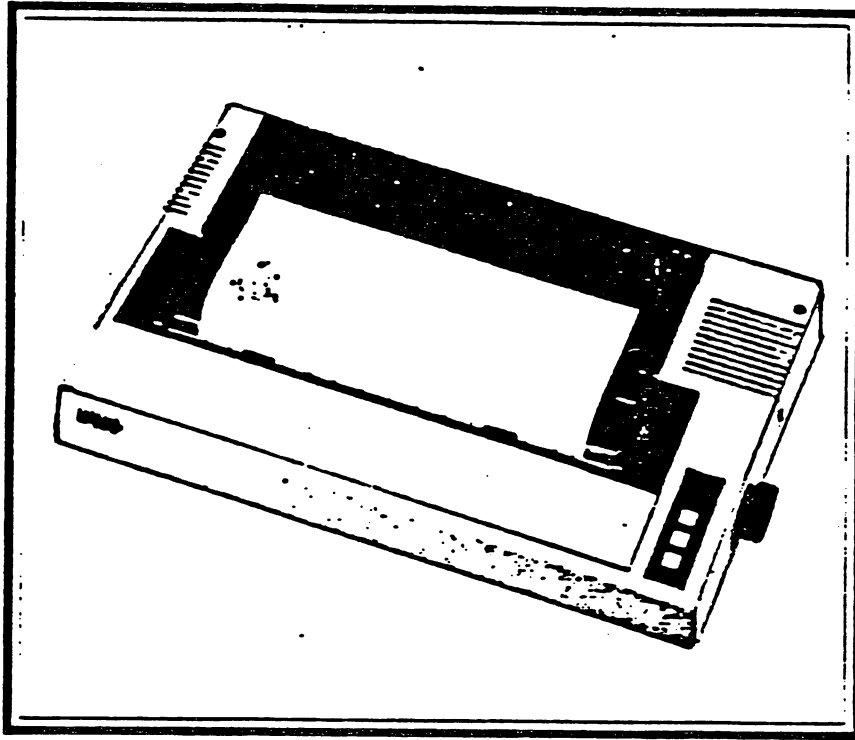
PC-PM016/2245-160 MATRIX PRINTER

CUSTOMER ENGINEERING MAINTENANCE PLAN

NEW PRODUCT ENGINEER
Gary Mastny

PRODUCT LINE MANAGER   7/4/84
Matt Zaboy

PRODUCT LINE DIRECTOR
Richard Petzold

<u>INDEX</u>

i

I. PRODUCT OVERVIEW

_2245 IS MX80_

1.1 General Description _2245-160 IS FX-100_

The PC-PM016/2245-160 (FX-100 Epson Printer) is a low cost 160 CPS draft quality matrix printer. It has a 132 column capability in 10 pitch, and 158 column capability in 12 pitch. The printer will be available for Professional Computer and 2200 systems using a Centronix compatible parallel interface. Graphics quality and draft quality are available on the P.C., however only draft quality is available on the 2200 system. The character font uses a 9x9 dot matrix.

1.2 Marketing Forecasts

	2245/160		PC-PM016	
	Dom.	Intn'l	Dom.	Intn'l
Q1 '85	105	70	633	341
Q2 '85	222	148	1645	885
Q3 '85	287	191	2112	1137
Q4 '85	328	219	2507	1350

1.3 First Customer Ship

Domestic FCS for PC version is July 1984
International FCS for PC version is August 1984
Domestic and International FCS for 2200 version is August 1984

II PRODUCT SPECIFICATIONS

2.1 Field replaceable electronic assemblies

No parts are replaceable due to complete unit swap maintenance philosophy.

2.2 Field replaceable mechanical assemblies

No parts are replaceable due to whole unit swap maintenance philosophy.

2.3 Media

Letter paper :	width	- 7.25 inches to 14.4 inches
	length	- 14 inches
Fanfold paper:	thickness	- 0.3 mm (.0011 inches) or less
	# of copies	- 1 original / 2 copies
	width	- 4 inches to 16 inches
		(using the tractor feed assembly)

2.4 Operating System

The software levels required to support this device are:

PC The minimum release level required is 1.22 of the PC operating system incorporating 1.20 printer driver.

2200 A new printer driver will be included in general release 2.6 and available by FCS.

2.5 Configuration

PC-PM016 will be used on the professional computer as an output matrix printer and will be customer installable.
2245/160 will be used on the 2200 computer system as an output matrix printer and will be customer installable.

III DESIGN SPECIFICATIONS

3.1 Specifications

Print speed	160 CPS max.
Column width	10 pitch 132 columns
	12 pitch 158 columns

3.2 Physical Dimensions

Height	150	mm	5.9	inches
Width	594	mm	23.4	inches
Depth	354	mm	13.9	inches
Weight	10.5	kg	23	lbs.

3.3 Power / Environmental Requirements

input voltage	Domestic	120v 60 hz (+- 20 %)
	International	220v 50 hz (+- 20 %)
power consumption		70 watts @ 120V
		88 VA @ 220V
operating temperature range		5 C to 35 C
		50 F to 90 F
operating humidity range		10 % to 80 % non-condensing
heat dissipation		102 btu/hr
		25.5 Kcal/hr

3.4 Government / Industry Standards & Approvals

DOMESTIC: EMI/RFI - Class B computing device (FCC)
ESD: Wang SPI 10-623
UL Standards for Safety 114 (Office Appliance and Business Machines) or 478 (Data Processing Equipment).
Wang Standard for Mechanical and Environmental Testing - SP 10-708

INTERNATIONAL: CSA Standard for Safety C22.2 No. 154 (Data Processing Equipment).
IEC 435 (Safety of Electrically Energized Office Machines).

2

3.5 Servicing Space Requirements

Height	760 mm	30 inches
Width	1205 mm	48 inches
Depth	963 mm	38 inches

3.6 Special Considerations

This printer is customer installable. The print head and ribbons
are customer replaceable and consumable. These parts should be
ordered through supplies department. All preventive maintenance
is to be completed by the customer in accordance with the users
guide.

Customer Replaceable Items
Printhead   725-0171
Ribbon   725-0173

IV MAINTENANCE

4.1 Maintenance Objectives

A complete unit swap philosophy will be used to correct customer
printer problems.

4.2 Calls per month

The following is based on 8 hours a day and 5 days a week.
With a 25% duty cycle (2 hours a day), calls per month should
average 0.03

4.3 Mean time to Repair.

The mean time to repair goal is .5 hours.

4.4 Preventive Maintenance

Preventive Maintenance for the PC-PM016/2245-160 is not required
by Customer Engineering.

4.5 Special Tools and Test Equipment

None required.

V SUPPORT

5.1 Technical Documentation

Epson FX 100 printer maintenance manual will be reprinted and
distributed. This manual includes general information,
principles of operation, assembly and disassembly procedure,
troubleshooting, troubleshooting flow charts, Vendor to Wang
equivalent Part Numbers, and maintenance.

5.2 Training

Because the FX-100 is a complete unit replacement and is similar to the MX-80 printer, no special training is required.

5.3 Logistics

A complete unit swap will be done to effect customer repair for field service. Therefore only complete units will be shipped to the field.

5.4 Repair

The units will be returned to the FSC, and will be returned to the vendor for repair. For details see repair plan for this unit.

CE CAN ORDER REPLACEMENT UNIT through NORMAL Logistic Channels

5.5 Diagnostics

Self test can be run at time of power up.

5.6 Alpha / Beta Site Test Plan

Customer testing started on PC applications in May.

VI. ADDENDUM

6.1 Recommended Spares List as of June 10, 1984

Wang Part #	Epson Part #	Description
725-0145		120V 60 hz. printer assembly
220-0369		parallel printer cable assembly

FOR INTERNATIONAL FSC

Wang Part #	Epson Part #	Description
725-0145-1		220V 50 hz. printer assembly
379-2004		WISCII PROM A4
379-2005		WICSII PROM A5
726-2130	F315064000	paper feed motor
726-2131	F315059000	carriage motor
726-2132	F315060000	PTS sensor
726-2135	Y440205000	FMBD PCB (w/o PROMs)
726-2136	Y440203200	220/240 FIL PCB
726-2137	A170202502	reed switch
726-2138	F315021130	ribbon mask
726-2139	Y440509000	240V transformer
726-2140	Y440508000	220V transformer
726-2141	F317055000	home sensor
726-2142	F310057020	timing belt
726-2149	F315054000	terminator

Business Plan

Epson FX-100
for
PC and 2200

(PC-PM016 & 2245/160)

July 16, 1984
George Kavanagh

Rev. G

OVERVIEW

This Preliminary Business Plan proposes the inclusion of Epson's FX-100 in the 2200 and PC product lines. The FX-100 will not replace the existing MX-80 printers, however, signifigant bookings migration to the FX-100 is expected.

I. PRODUCT DESCRIPTION

Epson's FX-100 is a 160 cps, 132 column draft quality matrix printer. The FX-100 will provide draft printing on 16" wide paper at an instantaneous print speed of 160 cps. The printer will be shipped to us by Epson with a Wang logo, in Wang colors, and in a Wang labelled, reusable shipping carton.

Wang will reship the FX-100 along with an autoenclosure consisting of an FCC "B" data cable, Wang Users Manual (PC or 2200), and in PC versions, a "PC Install Utility" diskette, and a PC Quick Connect Reference Card.

At the proposed pricing ($ 995), the FX-100 will be positioned at a price & performance point between the PC-PM010 (Wang's version of Epson's MX-80) and the DP-55 daisy. The FX-100 will provide the PC and 2200 lines with an attractive, highly regarded low end draft matrix printer.

FX-100 features.

* 160 cps instantaneous print speed
   Throughputs of:
      xxx lpm at 10 pitch (132 columns/line)
      xxx lpm at 12 pitch (158 columns/line)
* Bidirectional, logic seeking
* Design MTBF: 5 million lines
* 100 Million character printhead
* 3 Million impression ribbon
* Same hardware for both PC and 2200 applications
* Parallel interface
* Self test diagnostics
* Resident WISCII draft font
* RAM for additional downloaded fonts (non-Latin, special purpose, etc.)
* Graphics resolution of 72x72 dpi
* ESD: Wang SPI 10-623
* FCC: Class A, B
* UL, CSA, IEC, VDE .
* Audible noise: 60 DbA(Pressure)

II. PRODUCT STRATEGY

The product strategy is to offer a highly reliable, state of the art, low-end draft matrix printer to PC and 2200 users, offering a next step up in capability from the MX-80's.

The FX-100's 160 cps burst speed and 132 column carrage is seen as the top of the line in low end matrix printers. Epson's excellent name and reputation for quality has already made the FX-100 the de facto industry standard of 132 column low end matrix printers.

Two versions of the FX-100 will be offered, a 60Hz. version for domestic shipments and a 50Hz. version for International shipments.

International Marketing's requirements for latin based fonts will be met by a PROM-based WISCII font (resident in all printers). Special international font PROM's (Arabic, etc.) will be developed by International R&D.

International (50 Hz.) printers will be shipped with English manuals. The Wang offices in individual countries will supply local translations.

The FX-100 will be offered on the Tempest PC. This version of the printer must be RS-232 serial as Tempest PC's have no parallel port. Parallel FX-100's will be converted to serial (an Epson serial board substituted for the parallel board) as they are being configured into the Tempest RF enclosure. A separate Product Plan is being prepared by the Tempest Marketing Group for the Tempest FX-100.

The FX-100 is not intended to obsolete the current MX-80 printer in the product lines, although migration from the MX-80's to the FX-100 is expected.

III.   DEVELOPMENT PLAN

Printer R&D and central QC will establish the printer's reliability and regulatory certifiabilty. Wang-specific features such as Logo, color, special connector, etc. will be specified and communicated to Epson.

The PC Generalized Printer Driver will drive the FX-100. Future versions of the PC operating system will be capable of automatically configuring the Generalized Driver for the PC-PM016 by a menu pick. Until that time, the PC-PM016 will be shipped with an "Include Utility" diskette that will aid the user in setting up the Generalized Driver.

The Small Systems Development group will develop an FX-100 device driver to support the FX-100 on the 2200.

Schedule
This outline schedule has been compiled from estimates supplied by R&D, Purchasing, and Product Line Marketing.

May 30:	Completion of all R&D and QC Reliability evaluations; availability of autoenclosures & packaging, Data Sheets and Users Manuals.
June 1:	Receipt of 500 Wang-configured FX-100's from Epson.
June 30:	Domestic announcement in FOCUS
August 1	PC-PM016 Domestic FCS
August 15:	PC-PM016 International FCS 2245/160 Domestic and International FCS

Development Risks

The main risk in the Development Plan is the possibility of unfavorable design or reliability reports. Past experience with Epson has shown that this is extremely unlikely. Exposures to this risk are:

1) the Wang-configured units to be received in June.

2) changing gears to continue offering volumes of the MX-80 after the planned July changeover period. This is the larger risk, as MX-80 purchase orders have been halted. Epson's turnaround time is on the order of 90 days.

3) Lost FX-100 business due to unavailability of product.

IV. MARKETING PLAN

Target Markets
The target market for the FX-100 printer is those customers for needs for a draft quality 132 column matrix printer. The FX-100 is targeted particularly at customers requiring a wide bodied draft printer for Multiplan and Lotus 1-2-3 spreadsheets.

The FX-100 is considered a commodity peripheral: vanilla versions of the printer are available in many computer stores; the Epson quality, name, and design are well known in the user community; introduction of spinoff designs of the FX-100 are expected from several manufacturers at this year's NCC.
Historically, commodity printers have been agressively marketed in large volumes through retail and discount sales channels for profit margins as low as 25%. Epson's current output of the FX-100 is in the vicinity of 12,000 a month. The current street reatil price for an Epson FX-100 ranges from $895 to $950.

These factors combine and result in a very price sensitive market. In order to encourage sales of the Wang-configured FX-100 over vanilla FX-100's on our PC and 2200 system sales, we must price the FX-100 in this competitive range.

Product Position
The FX-100's wide carrage & 160 cps draft printing speed position the printer above the MX-80; its draft quality print positions it below the DP-55.
The proposed price of $ 1,125 also positions the FX-100 above the MX-80's (at $ 900) and below the DP-55 (at $ 1,295).

Sales Channels
The FX-100 will be marketed and sold through the Supplies Division. Since the discounts allowed on supplies items are relatively controllable, the printer can be offered at a competitive list price. ISO dealers, Wang Direct, and Wang Business Centers will not carry the FX-100; they will direct orders for the printers to the Supplies Division.

Pricing
Subject to Pricing Committee approval, the PC-PM016 and the 2246/160 are to be priced:

```
Recommended
Domestic Sale
    PC-PM016 and 2245/160..............$ 995
```

Domestic Monthly Rental

	1 year	2 year	3 year
PC-PM016 and 2245/160	$ 59	$ 50	$ 44

Forecasts

Bookings forecasts are based upon these assumptions:

+ Selling Price: $ 995; discounts as per Supplies' Agreements; 20% Max.

+ Domestic/International split will follow respective CPU split.

+ Domestic FCS: July 2, 1984.

+ International FCS: August 15, 1984

+ Selling price will track Epson's price, hence competitive price, over forecast period.

+ Printer bookings forecasts are based on CPU bookings forecasts

Period	......2200.........			........PC.........			Total
	Dom.	Intn'l	WW	Dom	Intn'l	WW	
Q185	136	136	272	1065	435	1500	1722
Q285	285	285	570	2766	1129	3895	4465
Q385	369	368	737	3550	1450	5000	5737
Q485	422	421	843	4213	1722	5935	7515

(See also Fig. I)

Financial

Revenue Projections; Domestic

```
Five Quarter Forecast Bookings..
Selling Price, Q1................     $ 995
Gross Revenues.(@ list, Q1).....  $
     Less avg. discount @ 24% ........
```

Costs

Prime Material, OEM........	$ 478	(at projected quantities)
Burden @ 10% PM..........	48	
Autoenclosures, burdened...	32	
Total Burdened Cost........	$ 558	

Profits & Margins; Domestic

```
Selling Price....................  $ 995
Burdened Cost....................    558
Gross Profit.....................  $ 537
Gross Margin.....................   43.9%
```

Announcement, MX-80/FX-100 migration

Product announcement is scheduled for July 2, 1984. It is expected that a signifigant number of customers in the MX-80 backlog will debook and switch to the FX-100, a better printer. Reduction of the MX-80 backlog is thus of prime importance in reducing the impact of FX-100 announcement.

Announcement of the PC-PM016 will cause significant bookings migration away from the PC-PM010. The impact of Wang FX-100 availability has been included in projected PC-PM010 bookings:

Period	Dom	Intn'l	WW
Q384	945	405	1350
Q484	639	261	900
Q185	178	72	250
Q285	109	44	153
Q385	61	25	86
Q485	38	16	54

(See also Fig. I)

Risks

The most risky issues surround the timing of FX-100 announcement. Wang currently holds an inventory of PC-PM010's that will be difficult to move after FX-100 announcement. Disposition of this inventory is of major concern.

Time to market is also a risk factor. A Wang FX-100 is being requested increasingly. The planned July announcement will coincide with the announcement at NCC by up to six other manufacturer's printers with features similar to the FX-100's. Wang OEM of the FX-100, announced in June and FCS in July, is seen as crutial to establishing the PC's full system capabilities.

An additional uncertanty is the product's life at a street price of $ 895, list. The prevailing street price of printers in this category have eroded rapidly once market saturation nears. Discsount dealers can be expected to sell at 25% margins or less, putting the street price at $600 or less. Saturation is expected to take 12-24 months.

The FX-100 purchase orders to Epson will be written to continually guarantee Epson's lowest price as the product matures. This has been accomplished on the MX-80 deals very satisfactorally and a smooth implementation is expected.

V. SUPPORT
User Training

The FX-100 will be a user installable device, supplied with a user's manual and illustrated installation reference card. The simplicity of the device allows user training to be limited to self-study of the user's manual.

Service

Service will be available in a mail-in/service contract basis exactly analogous to the arrangements available now for the MX-80 printers. Customer Engineering, New Products Support will provide a detailed plan covering procedures.

Spares/Module Repair

The FX-100 will be supported with spares in a manner similar to the current MX-80 support. Key modules will be available at area service depots. Customer Engineering will provide a detailed plan covering procedures, required spares, and budget spares cost figures.

VI.   COMPETITIVE ANALYSIS

Epson's standard FX-100 is sold in computer stores (ComputerLand, etc) and in discount houses for an average of $ 900. Hewlett Packard is selling a version of the FX-100 $ 995.

Only a few 132 column 160 cps matrix printers are available today. Okidata's micro 93 at $1,249 list is representative.

The FX-100 is in a class by itself at $ 895, list. Texas Instruments, IDS (TEK), Panasonic, Centronics (Cannon), and others are working on 132 column, 120 - 160 cps printers for introduction by NCC in July. The target list prices are all the $800 - $1000 range.

PRODUCT SPECIFICATION

WANG MODEL PC-PM016, 2245, 160 MATRIX PRINTERS
WANG P/N 725-0145 60HZ
WANG P/N 725-0145-1 50HZ

COPY

SHEET NO	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
REV. LEVEL	B	A	A	A	A	A	A	B	A	A	A	B	B	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
SHEET NO.	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58
REV. LEVEL	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A						
SHEET NO	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87
REV. LEVEL																													
SHEET NO.	88	89	90	91	92	93	94	95	96	97	98	99																	
REV. LEVEL																													

	BY	L.T.
	DATE	10/10/84

REVISION	ORIGINAL RELEASE	Changed per E.C.O.# 33936.
LVL	A	B

JOHN STRAZDES

WANG	DWN Strazdes	DATE 6/20/84	TITLE	WLI NUMBER
	CHK Donald Morse	DATE 6/21/84	PRODUCT SPECIFICATION	191-0998
	APPR	DATE	WANG MODEL PC-PM016 AND	
LABORATORIES. INC.	APPR	DATE	2245/160 MATRIX PRINTERS WANG P/N 725-0145/725-0145-1	SHEET 1 OF 52 / REV B

TABLE OF CONTENTS:

WANG LABORATORIES, INC.	DWN	DATE	TITLE	WLI NUMBER		
	CHK	DATE	PRODUCT SPECIFICATION WANG MODEL PC-PM016 AND 2245, 160 MATRIX PRINTER WANG P/N 725-0145/725-0145-1	191-0998		
	APPR	DATE				REV
	APPR	DATE		SHEET 2 OF 52		A

Printed in USA 13-6057-01 1-8:

13.0 CHARACTERS
APPENDIX "A"

14.0 TECHNICAL MANUAL
APPENDIX "B"

<u>FIGURES</u>

	DWN	DATE	TITLE	WLI NUMBER	
WANG	CK	DATE	PRODUCT SPECIFICATION WANG MODEL PC-PM016 AND 2245, 160 MATRIX PRINTER WANG P/N 725-0145/725-0145-1	191-0998	
LABORATORIES, INC.	APPR	DATE		SHEET 3 OF 52	REV A
	APPR	DATE			

Printed in U S A 13-8057-01 1-8:

1.0 INTRODUCTION

1.1 SCOPE

THIS DOCUMENT DESCRIBES THE DIFFERENCES BETWEEN THE EPSON AMERICA STANDARD MODEL FX-100 AND THAT PRODUCT REQUIRED TO MEET WANG LABORATORIES UNIQUE PRODUCT REQUIREMENTS.

IT IS THE FX-100 HAVING THE FUNCTIONALITY DESCRIBED IN THE EPSON FX-100 MANUAL NUMBER P8390052, (SEE APPENDIX "B") WITH THE DIFFERENCES DESCRIBED HEREIN, THAT WILL BE PURCHASED TO MEET THE REQUIREMENTS OF A PROGRAM TO PROVIDE A LOW COST MATRIX PRINTER FOR THE WANG PC AND 2200 PRODUCT LINES.

THIS PRODUCT WILL BE MARKETED BY WANG LABORATORIES AS MODELS PC-PM016 AND 2245/160.

1.2 CORPORATE GOAL

IT IS A GOAL TO RECEIVE DELIVERY OF THIS PRODUCT IN SUCH A FASHION AS TO ALLOW RESHIPMENT TO WANG LABORATORIES'CUSTOMERS WITHOUT EVER OPENING THE ORIGINAL INDIVIDUAL SHIPPING CONTAINERS.

TO SATISFY THIS GOAL THE PRINTER MUST MEET THE APPEARANCE, OPERATION, QUALITY, AND SAFETY REQUIREMENTS OF WANG LABORATORIES.

2.0 BASIC PRINTER

THE BASIC PRINTER IS THE EPSON MODEL FX-100.

EACH PRINTER IS TO BE SHIPPED WITH ONE BLACK INKED CARTRIDGE RIBBON, ONE POWER CORD AND ONE PAPER SEPARATOR.

3.0 MODELS

3.1 VERSIONS

WANG LABS WILL INITIALLY PURCHASE TWO DIFFERENT VERSIONS OF THE FX-100 PRINTER.

ONE VERSION WILL BE TO SATISFY THE UNITED STATES MARKET AND WILL BE CONFIGURED FOR 120VAC, 60HZ OPERATION.

THE OTHER VERSION WILL BE PRIMARILY TO SATISFY THE "OFF SHORE" MARKET AND WILL BE CONFIGURED FOR 220/240VAC, 50HZ OPERATION.

3.2   WANG PART NUMBERS

   3.2.1   O.E.M. PART NUMBER 60 HZ

            THE WANG O.E.M. PART NUMBER FOR THE 120 VAC, 60HZ
            VERSION IS 725-0145.

   3.2.2   O.E.M. PART NUMBER 50 HZ

            THE WANG O.E.M. PART NUMBER FOR THE 220/240 VAC, 50HZ
            VERSION IS 725-0145-1.

3.3   POWER CABLE REQUIREMENTS:

   3.3.1   STANDARD CABLE

            THE 725-0145 WILL BE SHIPPED TO WANG LABORATORIES WITH
            THE STANDARD AC POWER CABLE PROVIDED BY EPSON.

   3.3.2   RIGHT ANGLE CABLE

            THE 725-0145-1 WILL BE SHIPPED TO WANG LABORATORIES
            WITH A POWER CABLE HAVING A RIGHT ANGLE FEMALE
            CONNECTOR; BROWN, BLUE, AND GREEN WITH YELLOW STRIPED
            WIRES AND NO CONNECTOR AFFIXED TO THE OPPOSITE END OF
            THE CABLE.

4.0   INDUSTRY STANDARDS AND THIRD PARTY CERTIFICATION

   IT IS REQUIRED THAT EPSON GAIN AND MAINTAIN CERTIFICATION OF COMPLIANCE
   WITH STANDARDS ESTABLISHED BY UL AND CSA. ALSO, COMPLIANCE WITH FCC
   SPECIFICATIONS IN SUBPART J OF OF FCC RULES AND IEC 380 FOR A CLASS B
   COMPUTING DEVICE.

   PRINTERS SHIPPED TO WANG LABORATORIES SHOULD BE MARKED AS REQUIRED BY
   THOSE AGENCIES TO INDICATE COMPLIANCE.

   WANG LABORATORIES WILL SEEK INDEPENDENT CERTIFICATION UNDER THE WANG
   LABORATORIES LABEL.

5.0   DEVICE CABLE CONNECTOR

   5.1   THE STANDARD FX-100 COMES EQUIPPED WITH 36 PIN FEMALE DEVICE
          CABLE CONNECTOR WITH WIRE FORM CABLE RETAINING CLAMPS.

          WANG LABORATORIES REQUIRES THAT THE 36 PIN DEVICE CABLE
          CONNECTOR BE MODIFIED TO ALLOW RETENTION OF THE DEVICE CABLE
          WITH THREADED SPACERS HAVING U.S. NUMBER 4 MACHINE SCREWS HAVING
          40 THREADS PER INCH. REFERENCE WANG DRAWING NUMBER 06815-267.
          SEE FIGURE 4 FOR SPECIFICATION OF THE THREADED SPACERS, AND
          FIGURE 2 BOTH INCUDED HEREIN. THE SAME THREADED SPACERS THAT ARE
          USED TO MODIFY THE MX-80 PRINTERS ARE ACCEPTABLE.

6.0 CONNECTOR GROUNDING

6.1 BOTH MOUNTING SCREW OF THE 36 PIN DEVICE CABLE CONNECTOR SHALL BE CONNECTED TO ELECTRICAL GROUND IN THE PRINTER WITH A FLAL BRAIDED CONDUCTOR. SEE FIGURE 2, DETAIL "C".

7.0 MARKINGS

MARKINGS SHALL BE IN ACCORDANCE WITH CARRIER RULES AND REGULATIONS AND CONTAIN, IN ADDITION, WANG LABORATORIES, INC'S "STANDARD MARKINGS".

THE PALLETIZED LOAD SHALL BE MARKED ON THE OUTSIDE SUCH THAT EASY IDENTIFICATION OF THE CONTENTS CAN BE MADE.

THE FOLLOWING MINIMUM MARKINGS SHALL BE APPLIED:

1) WANG LABORATORIES, INC. PART NUMBER
2) WANG LABORATORIES, INC. DRAWING NUMBER AND REV LEVEL
3) ITEM NAME
4) PURCHASE ORDER NUMBER
5) CONTENTS QUANTITY
6) MANUFACTURE'S NAME AND PART NUMBER
7) DATE CODE (WHEN APPLICABLE, SEE 7.1)
8) LOT CONTROL NUMBER (WHEN APPLICABLE SEE 7.2)
9) BOX_____OF_____(WHEN APPLICABLE
10) ATTENTION INCOMING INSPECTION AND STORES:
    "THIS PACKAGE TO BE KEPT INTACT FOR IN-PLANT STORAGE, HANDLING AND Q.C. INSPECTION"

7.1 DATE CODE

WHEN DATE CODE REQUIREMENTS ARE SPECIFIED ON THE DRAWING, RELATED DOCUMENTATION OR PURCHASE ORDER, THE MANUFACTURER SHALL APPLY A NUMERIC IDENTIFIER ON THE UNIT AND PALLETIZED LOADS SIGNIFYING THE WEEK AND CALENDAR YEAR ON WHICH THE SHIPMENT OF ITEMS WERE ACCEPTED AT VENDOR'S FINAL INSPECTION.

THE FOLLOWING EXAMPLES ARE GIVEN, BUT ALTERNATE DATE CODES ARE ACCEPTABLE:

FIRST SHIPMENT

DATE CODE 8405 WOULD INDICATE ACCEPTANCE DURING THE 5TH WEEK OF THE YEAR 1984.

SECOND SHIPMENT

DATE CODE 8450 WOULD INDICATE ACCEPTANCE DURING THE 50TH WEEK OF THE YEAR 1984.

7.2 LOT CONTROL OR SERIALIZATION

WHEN SERIALIZATION OR LOT CONTROL REQUIREMENTS ARE SPECIFIED ON
THE DRAWING, RELATED DOCUMENTATION OR PURCHASE ORDER, THE
MANUFACTURER SHALL INCLUDE THE APPLICABLE CONTROL NUMBERS WITH
THE STANDARD MARKINGS (LOT AO23, SERIAL NO'S, 157950, 157951,
157952, 157953).

ALL SERIAL NUMBERS OF THE ITEMS WITHIN A PALLET LOAD SHALL
APPEAR IN THE CONTAINER MARKINGS.

8.0 SHIPPING CONTAINER

8.1 PRINTERS SHOULD BE SHIPPED TO WANG LABORATORIES IN SHIPPING
CONTAINERS OF THE SAME MECHANICAL AND BASIC BOX COLOR
SPECIFICATIONS AS THAT CURRENTLY USED BE EPSON BUT MARKED
(PRINTED) SIMILARLY TO THAT ILLUSTRATED IN WANG DRAWING
D00290-017.

8.1.1 EACH INDIVIDUAL SHIPPING CONTAINER SHOULD BE MARKED TO
INDICATE THE SPECIFIC WANG LABORATORIES OEM PART
NUMBER (I.E. 725-0145 OR 725-0145-1) AND WANG LABS
SERIAL NUMBER OF THE PRINTER CONTAINED IN THAT
CONTAINER.

THE APPROPRIATE BLOCK ON THE SHIPPING CONTAINER SHOULD
BE MARKED TO INDICATE WHETHER THE PRINTER IS A

120 VAC, 60 HZ VERSION OR A

220/240 VAC, 50 HZ VERSION.

9.0 LABELS

9.1 A WANG MODEL/SERIAL NUMBER LABEL SHALL BE AFFIXED TO EACH
PRINTER IN A LOCATION SIMILAR TO THAT IDENTIFIED IN FIGURE 2
HEREIN.

9.1.1 A HIGH TEMPERATURE WARNING LABEL (THE INTERNATIONAL
SYMBOL) IS TO BE AFFIXED TO THE PRINT HEAD IN THE
LOCATION SIMILAR TO THAT IDENTIFIED IN FIGURE #3. THIS
WILL ALSO APPLY TO PRINTHEADS USED AS REPLACEMENT ON
WANG UNITS.

	DWN		DATE		TITLE	WLJ NUMBER
WANG					PRODUCT SPECIFICATION	191-0998
	CK		DATE		WANG MODEL PC-PM016 AND	
	APPR	·	DATE		2245, 160 MATRIX PRINTER	SHEET 7 OF 52	REV B
LABORATORIES. INC.	APPR		DATE		WANG P/N 725-0145/725-0145-1	

10.0 WANG LOGO

A WANG LOGO (DRAWING NUMBER 06611-0396, REV 3) SHALL BE AFFIXED TO EACH PRINTER IN THE LOCATION NORMALLY RESERVED FOR THE EPSON LOGO. THIS LOCATION IS SPECIFIED IN FIGURE 1, HEREIN.

11.0 DIP SWITCH SETTINGS

WANG LABS REQUIRES THAT ALL PRINTERS BE SHIPPED WITH THE DIP SWITCHES SET AS FOLLOWS:

SWITCH # 1	DEFAULT SETTING
1-1	OFF
1-2	OFF
1-3	OFF
1-4	OFF
1-5	OFF
1-6	ON
1-7	ON
1-8	ON

SWITCH # 2	DEFAULT SETTING
2-1	ON
2-2	ON
2-3	OFF
2-4	OFF

12.0 PRINTER OPERATIONS MANUAL   700-8742

12.1 WANG PRINTER OPERATIONS MANUAL
WANG ENCLOSE A UNIQUE END-SYSTEM-SPECIFIC USER'S MANUAL.
WITH EACH PRINTER AS THEY ARE SHIPPED TO WANG'S DISTRIBUTION POINT.
THEREFORE, EPSON SHALL SHIP THE PRINTER TO WANG WITH NO OPERATIONS MANUAL.

13.0 CHARACTER

ALL PRINTERS SHIPPED TO WANG LABORATORES SHALL BE MODIFIED WITH A CHARACTER SET AS DEPICTED IN APPENDIX "A" OF THIS SPECIFICATION.

THIS CHARACTER SET TO BE RESIDENT IN THE PRINTERS IN PLACE OF THE ASCII/ITALIC ASCII CHARACTER SET IN STANDARD FX-100.

14.0 TECHNICAL MANUAL

EPSON DOCUMENT NUMBER P8390052

WANG LABORATORIES. INC.	DWN	DATE	TITLE PRODUCT SPECIFICATION WANG MODEL PC-PM016 AND 2245, 160 MATRIX PRINTER WANG P/N 725-0145/725-0145-1	WLI NUMBER 191-0998	
	CK	DATE			
	APPR	DATE		SHEET 8 OF 52	REV A
	APPR	DATE			