

provide an audio/video transceiver in which an analog and/or digital audio/video program can be received from a variety of sources. If the audio/video program is received in analog format, it may be converted to digital format, compressed into a time compressed digital format, and stored in a random access storage. If the audio/video program is received in digital format, it may then be directly compressed into the time compressed digital format and stored in the random access storage. The time compressed digital format program stored in the random access storage may then be edited and restored in the random access storage. It may then be decompressed and downloaded onto a removable storage medium in either analog or digital format. Alternatively, it may be transmitted over a burst time period to a second remotely located transceiver via any of a number of transmission mediums. Typically, a 2-hour real time audio/video program can be so transmitted over a burst time period of only 5-30 seconds. As a result, a user of the transceiver of the present invention may, for example, select an audio/video program for his evening's viewing entertainment from a remotely located audio/video library. The selected program is then transmitted to the user's transceiver over the burst time period of 5-30 seconds, where it is stored in time compressed digital format in the random access storage of his transceiver. The transceiver is then operative for decompressing the program so received and stored into either an analog or digital format for direct viewing by the user.

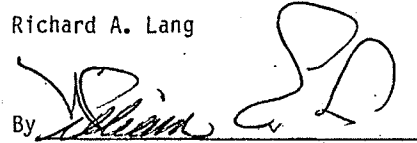
These features of applicant's specifically claimed invention are simply not shown or suggested by any of the cited references, taken alone or in any combination. For example, Baldwin teaches a multiple head helical scanning device for television tape recording in which the multiple heads are disposed on a rotatable headwheel. Nichols et al. teaches a multiple-screen editing system that permits quicker editing of recorded information.

In view of the foregoing remarks, it is respectfully submitted that applicant's new claims 33-112 are patentable over all of the cited references, taken alone or in any combination. Favorable action is accordingly solicited.

Respectfully submitted,

Richard A. Lang

By



William E. Hein
Patent Attorney #26,465

March 12, 1990
(303) 667-6741
Loveland, Colorado

RECEIVED



PTO-1083

MAR 27 1990

GROUP 230

In re Application of Richard A. Lang
No. 97/289,776

Case Docket No. 204 (1352L)

"Express Mail" mailing label number B91130846
Date of Deposit March 12, 1990

I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on date indicated above and is addressed to the Commissioner of Patents and Trademarks, Washington, D.C. 20231.

William E. Hein
(Typed or printed name of person mailing paper or fee)
William E. Hein
(Signature of person mailing paper or fee)

Filed: December 27, 1988
For: VIDEO RECORDER/TRANSMITTER

THE COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

Sir:
Transmitted herewith is an amendment in the above-identified application.
 Small entity status of this application under 37 CFR 1.9 and 1.27 has been established by a verified statement previously submitted.
 A verified statement to establish small entity status under 37 CFR 1.9 and 1.27 is enclosed.
 No additional fee is required.
The fee has been calculated as shown below:

	(Col. 1)		(Col. 2)		(Col. 3)		SMALL ENTITY		OTHER THAN A SMALL ENTITY	
	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NO. PREVIOUSLY PAID FOR		PRESENT EXTRA	RATE	ADDIT. FEE	RATE	ADDIT. FEE	
TOTAL	80	MINUS	32	=	48	x6	\$ 288	x10	\$	
INDEP.	4	MINUS	9	=	0	x15	\$	x30	\$	
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEP. CLAIM							+50	\$	+100	\$
TOTAL							\$ 288	OR TOTAL	\$	

*If the entry in Col. 1 is less than the entry in Col. 2, write "0" in Col. 3.
**If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, write "20" in this space.
***If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, write "3" in this space.
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found from the equivalent box in Col. 1 of a prior amendment or the number of claims originally filed.

- Please charge my Deposit Account No. _____ in the amount of \$_____. A duplicate copy of this sheet is attached.
- A check in the amount of \$ 378.00 is attached, in payment of the fee for the additional claims and the processing fee in the amount of \$90.00.
- The Commissioner is hereby authorized to charge payment of the following fees associated with this communication or credit any overpayment to Deposit Account No. _____. A duplicate copy of this sheet is attached.
 - Any filing fees under 37 CFR 1.16 for the presentation of extra claims.
 - Any patent application processing fees under 37 CFR 1.17.

Respectfully submitted,
William E. Hein #26,465



U.S. DEPARTMENT OF COMMERCE
Patent and Trademark Office

Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

Paper No. 8

• SWAYZE 235
07/289,776 12/27/88
Richard A. Lang

Warren F.B. Lindsley
Camel Square - Suite 200E
4350 E. Camelback Road
Phoenix, AZ 85018

MAILED

Apr. 13, 1990
GROUP 230

MARCH 12, 1990

This is in response to the communication re the Power of Attorney filed _____

- 1. The power of attorney to you in this application has been revoked by the applicant.
- 2. In view of the notice in this application of the death of _____ his power of attorney is terminated.
- 3. The power of attorney to you in this application has been accepted by the Commissioner of Patents, & Trademarks.

K.A. Nelson/om et
For Director, Operation

- 4. The assignee in this application has intervened and appointed an attorney of his own selection. Further correspondence will be held with said attorney. (Rule 36, Rules of Practice.)
- 5. The revocation of the power of attorney to _____ has been entered and said attorney has been notified. Further correspondence will be addressed to you.
- 6. On _____, the applicant appointed _____ as additional attorney in this application. Further correspondence will continue to be addressed to you as specified in the new power of attorney.
- 7. On _____, the applicant appointed _____ as additional attorney in this application. Further correspondence will be addressed to said attorney. MPEP 403.02
- 8. The associate power of attorney to you in this application has been revoked by the attorney of record.

William E. Hein
Attorney at Law
P.O. box 335
Loveland, CO 80539

K.A. Nelson/om et
For Director, Operation

RETAIN THIS COPY IN THE APPLICATION FILE

RECEIVED

MAR 27 1990

GROUP 230



AMPT
#9

IN THE
UNITED STATES PATENT AND TRADEMARK OFFICE

ART UNIT 235

Examiner W. Daniel Swayze

"Express Mail" mailing label number: B91130846

Date of Deposit: March 12, 1990

I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on date indicated above and is addressed to the Commissioner of Patents and Trademarks, Washington, D.C. 20231.

William E. Hein

(Typed or printed name of person mailing paper or fee)

William E. Hein
(Signature of person mailing paper or fee)

Richard A. Lang
CASE 204
SERIAL NO. 07/289,776
FILED December 27, 1988
SUBJECT VIDEO RECORDER/TRANSMITTER

THE COMMISSIONER OF PATENTS AND TRADEMARKS
WASHINGTON, D.C. 20231

SIR:

REVOCATION OF POWER OF ATTORNEY AND
APPOINTMENT OF SUBSTITUTE ATTORNEY

The undersigned sole inventor named in the above-identified patent application hereby revokes all previous powers of attorney and appoints in their stead William E. Hein, Registration No. 26,465, P.O. Box 335, Loveland, Colorado 80539, as his attorney, with full power of substitution and revocation, to prosecute said application, to make alterations and amendments therein, to receive the Letters Patent, and to transact all business in the U.S. Patent and Trademark Office in connection therewith.

Please forward all future written communications to:

William E. Hein
Attorney at Law
P.O. Box 335
Loveland, Colorado 80539

Please direct telephone calls to William E. Hein at (303) 667-6741.

Respectfully submitted,

Richard A. Lang
Richard A. Lang

March 7, 1990



UNITED STATES DEPARTMENT OF COMMERCE
 Patent and Trademark Office
 Address: COMMISSIONER OF PATENTS AND TRADEMARKS
 Washington, D.C. 20231

SERIAL NUMBER 077289,776	FILING DATE 12/27/88	FIRST NAMED APPLICANT LANG	ATTORNEY DOCKET NO. R 1352L
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WILLIAM E. HEIN
 ATTORNEY AT LAW
 P. O. BOX 335
 LOVELAND, COLORADO 80539
 Q

EXAMINER

RICHARDSON, R
 ART UNIT PAPER NUMBER

235

DATE MAILED:
 06/18/90

NOTICE OF ALLOWABILITY

PART I.

1. This communication is responsive to Amendment filed 3-12-90
2. All the claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice Of Allowance And Issue Fee Due or other appropriate communication will be sent in due course.
3. The allowed claims are 33-112
4. The drawings filed on _____ are acceptable.
5. Acknowledgment is made of the claim for priority under 35 U.S.C. 119. The certified copy has [-] been received, [-] not been received. [-] been filed in parent application Serial No. _____, filed on _____.
6. Note the attached Examiner's Amendment.
7. Note the attached Examiner Interview Summary Record, PTOL-413.
8. Note the attached Examiner's Statement of Reasons for Allowance.
9. Note the attached NOTICE OF REFERENCES CITED, PTO-892.
10. Note the attached INFORMATION DISCLOSURE CITATION, PTO-1449.

PART II.

A SHORTENED STATUTORY PERIOD FOR RESPONSE to comply with the requirements noted below is set to EXPIRE THREE MONTHS FROM THE "DATE MAILED" indicated on this form. Failure to timely comply will result in the ABANDONMENT of this application. Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

1. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL APPLICATION, PTO-152, which discloses that the oath or declaration is deficient. A SUBSTITUTE OATH OR DECLARATION IS REQUIRED.
2. APPLICANT MUST MAKE THE DRAWING CHANGES INDICATED BELOW IN THE MANNER SET FORTH ON THE REVERSE SIDE OF THIS PAPER.
 - a. Drawing informalties are indicated on the NOTICE RE PATENT DRAWINGS, PTO-948, attached hereto or to Paper No. _____ CORRECTION IS REQUIRED. 3-27-90
 - b. The proposed drawing correction filed on 3-27-90 has been approved by the examiner. CORRECTION IS REQUIRED.
 - c. Approved drawing corrections are described by the examiner in the attached EXAMINER'S AMENDMENT. CORRECTION IS REQUIRED.
 - d. Formal drawings are now REQUIRED.

Any response to this letter should include in the upper right hand corner, the following information from the NOTICE OF ALLOWANCE AND ISSUE FEE DUE: ISSUE BATCH NUMBER, DATE OF THE NOTICE OF ALLOWANCE, AND SERIAL NUMBER.

Attachments:

- Examiner's Amendment
- Examiner Interview Summary Record, PTOL-413
- Reasons for Allowance
- Notice of References Cited, PTO-892
- Information Disclosure Citation, PTO-1449
- Notice of Informal Application, PTO-152
- Notice re Patent Drawings, PTO-948
- Listing of Bonded Draftsmen
- Other

ROBERT L. RICHARDSON
 PRIMARY EXAMINER
 ART UNIT 235



UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office

Address: Box ISSUE FEE
COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

WILLIAM E. HEIN
ATTORNEY AT LAW
P. O. BOX 335
LOVELAND, COLORADO 80539
Q

**NOTICE OF ALLOWANCE
AND ISSUE FEE DUE**

- Note attached communication from the Examiner
- This notice is issued in view of applicant's communication filed

SERIES CODE/SERIAL NO.	FILING DATE	TOTAL CLAIMS	EXAMINER AND GROUP ART UNIT	DATE MAILED
07/289,776	12/27/88	080	RICHARDSON, R 235	06/18/90
First Named Applicant	LANG, RICHARD A.			

TITLE OF INVENTION: **AUDIO/VIDEO TRANSCIEVER APPARATUS INCLUDING COMPRESSION MEANS (AS AMENDED)**

ATTY'S DOCKET NO.	CLASS-SUBCLASS	BATCH NO.	APPLN. TYPE	SMALL ENTITY	FEE DUE	DATE DUE
2 1352L	358-335.000	G29	UTILITY	YES	\$310.00	09/18/90

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED.

THE ISSUE FEE MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED.

HOW TO RESPOND TO THIS NOTICE:

I. Review the SMALL ENTITY Status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

- A. If the Status is changed, pay twice the amount of the FEE DUE shown above and notify the Patent and Trademark Office of the change in status, or
- B. If the Status is the same, pay the FEE DUE shown above.

If the SMALL ENTITY is shown as NO:

- A. Pay FEE DUE shown above, or
- B. File verified statement of Small Entity Status before, or with, payment of 1/2 the FEE DUE shown above.

- II. Part B of this notice should be completed and returned to the Patent and Trademark Office (PTO) with your ISSUE FEE. Even if the ISSUE FEE has already been paid by a charge to deposit account, Part B should be completed and returned. If you are charging the ISSUE FEE to your deposit account, Part C of this notice should also be completed and returned.
- III. All communications regarding this application must give series code (or filing date), serial number and batch number. Please direct all communications prior to issuance to Box ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees.



Handwritten signature/initials

IN THE
UNITED STATES PATENT AND TRADEMARK OFFICE
ART UNIT 235
Examiner Robert L. Richardson

Richard A. Lang
CASE 204
SERIAL NO. 07/289,776
FILED December 27, 1988
SUBJECT AUDIO/VIDEO TRANSCEIVER APPARATUS INCLUDING COMPRESSION MEANS

THE COMMISSIONER OF PATENTS AND TRADEMARKS
WASHINGTON, D.C. 20231

SIR:

DRAWING TRANSMITTAL LETTER

In response to the drawing requirement set forth in Form PTOL-37 mailed June 18, 1990, enclosed herewith for filing in the above-identified, allowed patent application (Issue Batch No. G29) are two (2) sheets of substitute drawings that incorporate the amendments previously approved by the Examiner..

Respectfully submitted,

Richard A. Lang

Handwritten signature of William E. Hein

By William E. Hein
William E. Hein
Patent Attorney #26,465

July 26, 1990
(303) 667-6741
Loveland, Colorado

"Express Mail" mailing label number RB188452099
Date of Deposit July 26, 1990

hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on date indicated above and is addressed to the Commissioner of Patents and Trademarks, Washington, D.C. 20231.
30150C William E. Hein
(Typed or prepared name of person mailing paper or fee)
Handwritten signature of William E. Hein
(Signature of person mailing paper or fee)

Case 3:06-cv-00019-MHP Document 74-5 Filed 12/09/2006 Page 10 of 35

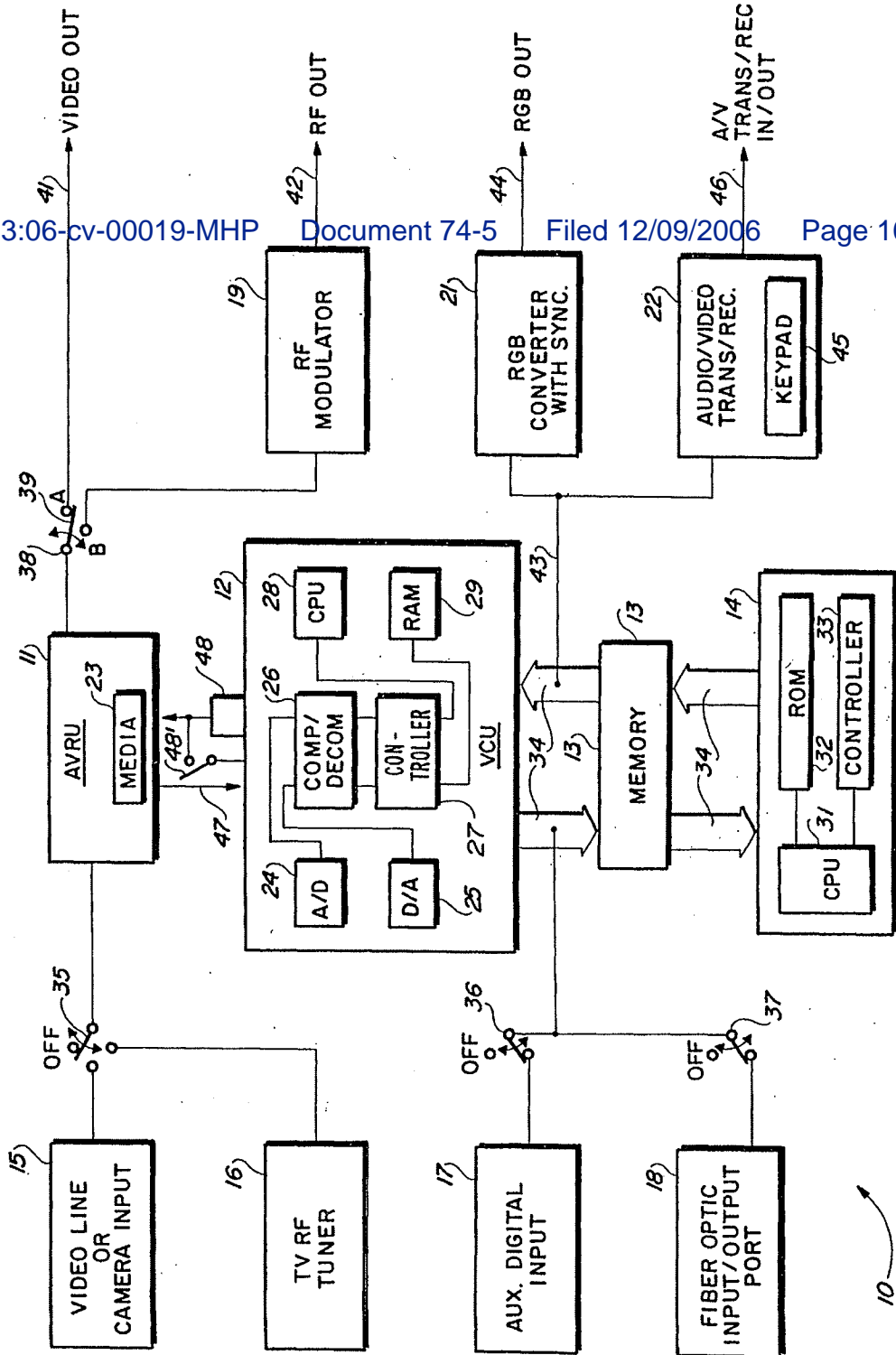


FIG. 2

PART B - ISSUE FEE TRANSMITTAL

310-242-B
15-501 E

MAILING INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE. Blocks 2 through 6 should be completed where appropriate. All further correspondence including the Issue Fee Receipt, the Patent, advanced orders and notification of maintenance fees will be mailed to addressee entered in Block 1 unless you direct otherwise, by: (a) specifying a new correspondence address in Block 3 below; or (b) providing the PTO with a separate "FEE ADDRESS" for maintenance fee notifications with the payment of Issue Fee of hereafter. See reverse for Certificate of Mailing.

1. CORRESPONDENCE ADDRESS	2. INVENTOR(S) ADDRESS CHANGE (Complete only if there is a change)
HEIN AT LAW BOX 335 LOVELAND, COLORADO 80539	INVENTOR'S NAME Street Address City, State and ZIP Code CO-INVENTOR'S NAME Street Address City, State and ZIP Code <input type="checkbox"/> Check if additional changes are on reverse side



SERIES CODE/SERIAL NO.	FILING DATE	TOTAL CLAIMS	EXAMINER AND GROUP/ART UNIT	DATE MAILED
07289, 776	12/27/88	080	RICHARDSON, R	235 06/18/90

First Named Applicant: LANG, RICHARD A.

TITLE OF INVENTION: AUDIO/VIDEO TRANSCIEVER APPARATUS INCLUDING COMPRESSION MEANS (AS AMENDED)

ATTY'S DOCKET NO.	CLASS-SUBCLASS	BATCH NO.	APPLN. TYPE	SMALL ENTITY	FEE DUE	DATE DUE
2 1352L	350-335.000	629	UTILITY	YES	\$310.00	09/18/90

3. Further correspondence to be mailed to the following:

1	William E. Hein
2	
3	

120 TL 08/10/90 07289776 1 242 310.00 CC
 120 TL 08/10/90 07289776 1 501 15.00 CC

5. ASSIGNMENT DATA TO BE PRINTED ON THE PATENT (print or type)

(1) NAME OF ASSIGNEE: Explore Technology, Inc.

(2) ADDRESS: (City & State or Country) Scottsdale, Arizona

(3) STATE OF INCORPORATION, IF ASSIGNEE IS A CORPORATION Arizona

A. This application is NOT assigned.
 Assignment previously submitted to the Patent and Trademark Office, signed by William E. Hein
 Assignment is being submitted under separate cover. Assignments should be directed to Box ASSIGNMENTS, P.O. Box 147, Washington, D.C. 20540.

PLEASE NOTE: Unless an assignee is identified in Block 5, no assignee data will appear on the patent. Inclusion of assignee data is only appropriate when an assignment has been previously submitted to the PTO or is being submitted under separate cover. Completion of this form is NOT a substitute for filing an assignment.

6a. The following fees are enclosed:
 Issue Fee Advanced Order - # of Copies 10

6b. The following fees should be charged to:
 DEPOSIT ACCOUNT NUMBER _____
 (Enclose Part C)
 Issue Fee Advanced Order - # of Copies _____
 Any Deficiencies in Enclosed Fees (Minimum of 10)

The COMMISSIONER OF PATENTS AND TRADEMARKS is requested to apply the Issue Fee to the application identified above.

(Signature of party in interest of record) William E. Hein (Date) July 26, 1990

NOTE: The Issue Fee will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the Patent and Trademark Office.

Certificate of Mailing

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to:

Box ISSUE FEE
Commissioner of Patents and Trademarks
Washington, D.C. 20231

on _____
(Date)

(Name of person making deposit)

(Signature)

(Date)

Note: If this certificate of mailing is used, it can only be used to transmit the Issue Fee. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawings, must have its own certificate of mailing.

"Express Mail" mailing label number: RB188452099

Date of Deposit: July 26, 1990

I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on date indicated above and is addressed to the Commissioner of Patents and Trademarks, Washington, D.C. 20231.

William E. Hein

(Typed or printed name of person mailing paper or fee)

William E. Hein
(Signature of person mailing paper or fee)

This form is estimated to take 20 minutes to complete. Time will vary depending upon the needs of the individual applicant. Any comments on the amount of time you require to complete this form should be sent to the Office of Management and Organization; Patent and Trademark Office, Washington; D.C.; 20231; and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, D.C. 20503.

PTO UTILITY GRANT

Paper Number 12

The
United
States
of
America

The Commissioner of Patents
and Trademarks

*Has received an application for a patent
for a new and useful invention. The title
and description of the invention are en-
closed. The requirements of law have
been complied with, and it has been de-
termined that a patent on the invention
shall be granted under the law.*

Therefore, this

United States Patent

*Grants to the person or persons having
title to this patent the right to exclude
others from making, using or selling the
invention throughout the United States
of America for the term of seventeen
years from the date of this patent, sub-
ject to the payment of maintenance fees
as provided by law.*



Harry F. Markush, Jr.

Commissioner of Patents and Trademarks

Sandra J. Merton

Attest

PTO-1584



UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office

ASSISTANT SECRETARY AND COMMISSIONER
OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

P75M

EARL MINCER
7150 EAST CAMELBACK ROAD
SUITE 300
SCOTTSDALE AZ 85251

DATE PRINTED

11/24/98

NOTICE OF PATENT EXPIRATION

According to the records of the Patent and Trademark Office, payment of the maintenance fee for the patents listed below has not been timely received prior to the end of the six-month grace period in accordance with 37 CFR 1.362(e). THE PATENT(S) LISTED BELOW HAS THEREFORE EXPIRED AS OF THE END OF THE GRACE PERIOD. 35 U.S.C. 41(b).

Expired patents may be reinstated in accordance with 37 CFR 1.378 if upon petition, the maintenance fee and the surcharge set forth in 37 CFR 1.20(m) are paid, AND THE DELAY IN PAYMENT OF THE MAINTENANCE FEE IS SHOWN TO THE SATISFACTION OF THE COMMISSIONER TO HAVE BEEN UNAVOIDABLE. 35 U.S.C. 41(c)(1).

IF THE COMMISSIONER ACCEPTS PAYMENT OF THE MAINTENANCE FEE UPON PETITION, THE PATENT SHALL BE CONSIDERED AS NOT HAVING EXPIRED, BUT WOULD BE SUBJECT TO THE INTERVENING RIGHTS AND CONDITIONS SET FORTH IN 35 U.S.C. 41(c)(2).

NOTICE OF THE EXPIRATION WILL BE PUBLISHED IN THE OFFICIAL GAZETTE.

PATENT NUMBER	U.S. SERIAL NUMBER	PATENT DATE	APPLICATION FILING DATE	EXPIRATION DATE	ATTORNEY DOCKET NUMBER
4963995	07289776	10/16/90	12/27/88	10/16/98	1352L

EL27388701-715

DAC (MFS)

PTO/RS/68 (10-99)
 approved for use through 7/31/99. OMB 0631-0016
 Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PETITION TO ACCEPT UNINTENTIONALLY DELAYED PAYMENT OF MAINTENANCE FEE IN AN EXPIRED PATENT (37 CFR 1.378(c))	Docket Number (Optional)
Mail to: Assistant Commissioner for Patents Box DAC Washington, D.C. 20231	RECEIVED SEP 08 1999 OFFICE OF DEPUTY ASSISTANT COMMISSIONER FOR PATENTS DEPUTY A/C PATENTS
NOTE: If information or assistance is needed in completing this form, please contact Patents Information at (703)305-9282.	
Patent No. <u>4,963,995</u>	Application Number <u>289,776</u>
Issue Date <u>October 16, 1990</u>	Filing Date <u>December 27, 1988</u>
CAUTION: Mandatory Identifiers: Maintenance fee (and surcharge, if any) payment must correctly identify: (1) the patent number (or reissue patent number, if a reissue) and (2) the application number of the actual U.S. application (or reissue application) leading to issuance of that patent. 37 CFR 1.368(c) and (d).	
Also complete the following information, if applicable	
The above-identified patent:	
<input type="checkbox"/> is a reissue of original Patent No. _____, original issue date _____, original application number _____, original filing date _____.	
<input type="checkbox"/> resulted from the entry into the U.S. under 35 U.S.C. 371 of International application _____ filed on _____.	
CERTIFICATE OF MAILING (37 CFR 1.8(a))	
I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being deposited with the United States Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to the Assistant Commissioner for Patents, Box DAC, Washington, D.C. 20231.	
_____ Date	_____ Signature
_____ Typed or printed name of person signing Certificate	

#13

[Page 1 of 3]

Burden Hour Statement: This form is estimated to take 1.0 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

PTO/SB/66 (10-96)
 approved for use through 7/31/99. OMB 0651-0016
 Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

1. **SMALLENTITY**

Attached herewith is a verified statement establishing small entity status.

OR

A verified statement establishing small entity status for this patent has been filed and it is confirmed that the current owner of this patent still qualifies for small entity status.

2. **LOSS OF ENTITLEMENT TO SMALL ENTITY STATUS**

NOTE: 37 CFR 1.28(b) requires "Notification of any change in loss of entitlement to small entity status must be filed in...patent prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate pursuant to Section 1.19 of this part." From the wording of 37 CFR 1.28(a): notification of change of status (a) must be made even if the fee is paid as "other than a small entity" and (b) no notification is required if the change is to another small entity. See also 37 CFR 1.366(f).

The status of this patent has changed from that of small entity to other than that of small entity.

3. **MAINTENANCE FEE (37 CFR 1.20(e)-(g))**

The appropriate maintenance fee must be submitted with this petition, unless it was paid earlier.

NOT Small Entity			Small Entity		
Amount	Fee	(Code)	Amount	Fee	(Code)
<input type="checkbox"/>	\$ _____	3 1/2 yr fee (183)	<input type="checkbox"/>	\$ _____	3 1/2 yr fee (283)
<input type="checkbox"/>	\$ _____	7 1/2 yr fee (184)	<input checked="" type="checkbox"/>	\$ 950	7 1/2 yr fee (284)
<input type="checkbox"/>	\$ _____	11 1/2 yr fee (185)	<input type="checkbox"/>	\$ _____	11 1/2 yr fee (285)

MAINTENANCE FEE BEING SUBMITTED \$ 950

4. **SURCHARGE**

The surcharge required by 37 CFR 1.20(l)(2) of \$ 164 (Fee Code 188) must be paid as a condition of accepting unintentionally delayed payment of the maintenance fee.

SURCHARGE BEING SUBMITTED \$ 1640

5. **MANNER OF PAYMENT**

Enclosed is a check for the sum of \$ 2590.

Please charge Deposit Account No. _____ the sum of \$ _____. A duplicate copy of this authorization is attached.

6. **AUTHORIZATION TO CHARGE ANY FEE DEFICIENCY**

The Commissioner is hereby authorized to charge any maintenance fee, surcharge or petition deficiency to Deposit Account No. 06-0600. A duplicate copy of this authorization is attached.

PTO/SB/88 (10-98)
Approved for use through 7/31/99. OMB 0651-0018
Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

7. OVERPAYMENT

As to any overpayment made please

Credit to Deposit Account No. 06-0600

OR

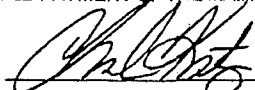
Send refund check.

8. STATEMENT

The delay in payment of the maintenance fee to this patent was unintentional.

9. PETITIONER(S) REQUESTS THAT THE DELAYED PAYMENT OF THE MAINTENANCE FEE BE ACCEPTED AND THE PATENT REINSTATED.

March 2, 1999
Date


Signature(s) of Petitioner(s)

(650) 812-3446
Telephone Number

Charles B. Katz, Reg. No. 36,564
Typed or printed name(s)

Carr & Ferrell LLP
Address

2225 East Bayshore Road
Palo Alto, CA 94303

ENCLOSURES:

- Maintenance Fee payment
- Small Entity Status Form
- Surcharge
- _____

NOTE: 37 CFR 1.378(d) states: "Any petition under this section must be signed by an attorney or agent registered to practice before the Patent and Trademark Office, or by the patentee, the assignee, or other party in interest. Such petition must be in the form of a verified statement if made by a person not registered to practice before the Patent and Trademark Office." Accordingly, the following declaration must be signed by any and all parties not registered to practice before the Patent and Trademark Office and presenting statements concerning the cause of delay.

The undersigned declares that the following statements made of his/her own knowledge are true, and that these statements made on information and belief are believed to be true; and further, that these statements are made with the knowledge that willful false statements, and the like so made, are punishable by fine or imprisonment, or both, under Section 1001, Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the patent.

Date

Signature

Typed or printed name

EL273887012US

13524

DAC

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Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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PETITION TO ACCEPT UNINTENTIONALLY DELAYED PAYMENT OF MAINTENANCE FEE IN AN EXPIRED PATENT (37 CFR 1.378(c))

RECEIVED (Optional)

MAR 08 1999

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Box DAC
Washington, D.C. 20231



OFFICE OF PETITIONS
DEPUTY A/C PATENTS

NOTE: If information or assistance is needed in completing this form, please contact Patents Information at (703)305-9282.

Patent No. 4,963,995 Application Number 289,776
Issue Date October 16, 1990 Filing Date December 27, 1988

CAUTION: Mandatory Identifiers: Maintenance fee (and surcharge, if any) payment must correctly identify: (1) the patent number (or reissue patent number, if a reissue) and (2) the application number of the actual U.S. application (or reissue application) leading to issuance of that patent. 37 CFR 1.366(c) and (d).

Also complete the following information, if applicable

The above-identified patent:

- is a reissue of original Patent No. _____, original issue date _____; original application number _____, original filing date _____.
- resulted from the entry into the U.S. under 35 U.S.C. 371 of International application _____ filed on _____.

CERTIFICATE OF MAILING (37 CFR 1.8(a))

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being deposited with the United States Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to the Assistant Commissioner for Patents, Box DAC, Washington, D.C. 20231.

03/17/1999 ACORAH
01 FC:284
02 FC:188

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	950.00 DP	
	1640.00 GP	

Typed or printed name of person signing Certificate

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OFFICE OF PETITIONS
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1. SMALL ENTITY

Attached herewith is a verified statement establishing small entity status.

OR

A verified statement establishing small entity status for this patent has been filed and it is confirmed that the current owner of this patent still qualifies for small entity status.

2. LOSS OF ENTITLEMENT TO SMALL ENTITY STATUS

NOTE: 37 CFR 1.28(b) requires "Notification of any change in loss of entitlement to small entity status must be filed in...patent prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate pursuant to Section 1.19 of this part." From the wording of 37 CFR 1.28(a): notification of change of status (a) must be made even if the fee is paid as "other than a small entity" and (b) no notification is required if the change is to another small entity. See also 37 CFR 1.366(f).

The status of this patent has changed from that of small entity to other than that of small entity.

3. MAINTENANCE FEE (37 CFR 1.20(e)-(g))

The appropriate maintenance fee must be submitted with this petition, unless it was paid earlier.

NOT Small Entity			Small Entity		
Amount	Fee	(Code)	Amount	Fee	(Code)
<input type="checkbox"/> \$	3 1/2 yr fee	(183)	<input type="checkbox"/> \$	3 1/2 yr fee	(283)
<input type="checkbox"/> \$	7 1/2 yr fee	(184)	<input checked="" type="checkbox"/> \$ 950	7 1/2 yr fee	(284)
<input type="checkbox"/> \$	11 1/2 yr fee	(185)	<input type="checkbox"/> \$	11 1/2 yr fee	(285)

MAINTENANCE FEE BEING SUBMITTED \$ 950

4. SURCHARGE

The surcharge required by 37 CFR 1.20(l)(2) of \$ 1640 (Fee Code 188) must be paid as a condition of accepting unintentionally delayed payment of the maintenance fee.

SURCHARGE BEING SUBMITTED \$ 1640

5. MANNER OF PAYMENT

Enclosed is a check for the sum of \$ 2590.

Please charge Deposit Account No. _____ the sum of \$ _____. A duplicate copy of this authorization is attached.

6. AUTHORIZATION TO CHARGE ANY FEE DEFICIENCY

The Commissioner is hereby authorized to charge any maintenance fee, surcharge or petition deficiency to Deposit Account No. 06-0600. A duplicate copy of this authorization is attached.

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7. OVERPAYMENT

As to any overpayment made please

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OR Send refund check.



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MAR 0 8 1999

8. STATEMENT

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OFFICE OF PETITIONS
DEPUTY A/C PATENTS

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March 2, 1999

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_____ Date


_____ Signature

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PETITION TO ACCEPT UNINTENTIONALLY DELAYED PAYMENT OF MAINTENANCE FEE IN AN EXPIRED PATENT (37 CFR 1.378(c))	Docket Number (Optional)
<p>Mall to: Assistant Commissioner for Patents Box DAC Washington, D.C. 20231</p> <div style="text-align: center;">  </div> <p>NOTE: If information or assistance is needed in completing this form, please contact Petitions Information at (703)305-9282.</p> <p>Patent No. <u>4,963,995</u> Application Number <u>289,776</u> Issue Date <u>October 16, 1990</u> Filing Date <u>December 27, 1988</u></p> <p>CAUTION: Mandatory Identifiers: Maintenance fee (and surcharge, if any) payment must correctly identify: (1) the patent number (or reissue patent number, if a reissue) and (2) the application number of the actual U.S. application (or reissue application) leading to issuance of that patent. 37 CFR 1.366(c) and (d).</p> <p>Also complete the following information, if applicable</p> <p>The above-identified patent:</p> <p><input type="checkbox"/> is a reissue of original Patent No. _____, original issue date _____; original application number _____, original filing date _____.</p> <p><input type="checkbox"/> resulted from the entry into the U.S. under 35 U.S.C. 371 of International application _____ filed on _____.</p> <div style="border: 1px solid black; padding: 10px; margin-top: 10px;"> <p style="text-align: center;">CERTIFICATE OF MAILING (37 CFR 1.8(a))</p> <p>I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being deposited with the United States Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to the Assistant Commissioner for Patents, Box DAC, Washington, D.C. 20231.</p> <p style="text-align: center;"> _____ Date _____ Signature </p> <p style="text-align: center;"> _____ Typed or printed name of person signing Certificate </p> </div>	

[Page 1 of 3]

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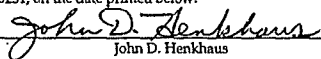
IN THE
UNITED STATES PATENT AND TRADEMARK OFFICE

INVENTOR: Richard A. Lang
PATENT NO.: 4,963,995
SERIAL NO.: 289,776
ISSUE DATE: October 16, 1990
TITLE: Audio/Video Transceiver Apparatus
Including Compressions Means
ATTY.DKT.NO.: PA1131US

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Box DAC, Assistant Commissioner for Patents, Washington, D.C. 20231, on the date printed below:

Dated: 9/3/99


John D. Henkhaus

BOX DAC
ASSISTANT COMMISSIONER FOR PATENTS
WASHINGTON, D.C. 20231

STATUS REQUEST

SIR:

Our file for the above-identified case does not reveal any action on the application since a Petition To Accept Unintentionally Delayed Payment of Maintenance Fee In An Expired Patent was filed on March 2, 1999. Records confirm that the Patent and Trademark Office received the petition and that the accompanying check cleared back in March 1999.

Enclosed are copies of the following items: returned postcard; check number 1829 dated March 2, 1999, issued by Instant Video Technologies, Inc.; and the original petition.

Please inform us as to the status of this petition as soon as possible.

Respectfully submitted,
Richard A. Lang

Dated: 9/3/99

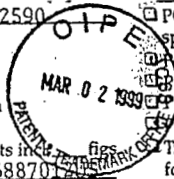
By: John D. Henkhaus
John D. Henkhaus, Reg. No. 42,656
CARR & FERRELL LLP
2225 East Bayshore Road, Suite 200
Palo Alto, CA 94303
TEL: (650) 812-3400
FAX: (650) 812-3444



Patent No. 4,963,995 Issued Date: 10-16-1990
 Title: Audio/Video Transceiver Including Compression...
 Inventor(s)/Applicant(s): Lang
 Atty. Docket No.: _____ Atty/Secty Initials: CBK:am
 Date Mailed: March 2, 1999 Docket Due Date: _____

THE FOLLOWING HAS BEEN RECEIVED IN THE U.S. PATENT & TRADEMARK OFFICE ON THE DATE STAMPED HEREON:

- Amendment/Response: _____ pgs.
- Assignment & Assignment Cover Sheet
- Certificate of Mailing
- Check in the amount of: \$ 2590
- CIP Application
- Continuation Application
- Declaration & POA
- Design Patent Application
- Divisional Application
- Drawings: _____ # of sheets in _____ figs.
- Express Mail No.: EL27388707
- Fee Calculation Sheet
- Information Disclosure Statement
- Issue Fee Transmittal
- Other: Petition to Accept Unintentionally Delayed Payment (in dupl.)
- Power of Attorney
- PTO Form 1449 IDS (in duplicate)
- Cited References
- PCT Application: _____ pgs. of specification (w/claims & abstract)
- PCT Demand: _____ pages
- PCT Request: _____ pages
- Provisional Application: _____ pages
- Petition of Ext. of Time: _____ months
- Transmittal Letter (in duplicate, PTO form 1082/1083)
- Utility Application: _____ pgs. of specification (w/claims & abstract)
- Petition for: _____



PLEASE STAMP THE DATE OF RECEIPT OF THE ENCLOSED DOCUMENTS AND RETURN THIS CARD TO THE ADDRESSEE.

INSTANT VIDEO TECHNOLOGIES, INC.

REFERENCE NO.	DESCRIPTION	INVOICE DATE	INVOICE AMOUNT	DISCOUNT TAKEN	AMOUNT PAID
Pat maint	Pat. 6,963,995 maint. fee	3/2/99	2,590.00		2,590.00
CHECK DATE	CHECK NO.	PAYEE	DISCOUNTS TAKEN	CHECK AMOUNT	
3/2/99	1828	U.S. Patent & Trademark Office		\$2,590.00	

1828

INSTANT VIDEO TECHNOLOGIES, INC.
 500 SANSONE ST., SUITE 503
 SAN FRANCISCO, CA 94111
 415-391-4465

WELLS FARGO BANK
 91-118-1221

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UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
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Washington, D.C. 20231

Paper No. 14

EARL MINCER
7150 EAST CAMBELBACK ROAD
SUITE 300
SCOTTSDALE, AZ 85251

In re Application of Lang :
Patent No. 4,963,995 :
Filed: December 27, 1988 : ON PETITION
Issued: October 16, 1990 :
Attorney Docket No. 1352L :

This is a decision on the petition filed March 2, 1999, under 37 CFR 1.378(c) to accept the unintentionally delayed payment of a maintenance fee for the above-identified patent.

The petition is **GRANTED**.

The patent issued October 16, 1990. The last day of the grace period for paying the 7.5 year maintenance fee was October 16, 1998. Therefore, since this petition was filed within twenty-four months after the six-month grace period provided in 37 CFR 1.362(e), this petition was timely filed under the provisions of 37, CFR 1.378(c).

Accordingly, the maintenance fee in this case is hereby accepted and the above-identified patent is hereby reinstated as of the mail date of this decision.

The file does not indicate a change of address has been submitted, although the address given on the petition differs from the address of record. If appropriate, a change of address should be filed in accordance with MPEP 601.03. A courtesy copy of this decision is being mailed to the address given on the petition; however, the Office will mail all future correspondence solely to the address of record.

This file is being forwarded to Files Repository.

Telephone inquiries should be directed to Petitions Attorney Steven Brantley at (703) 306-5683.

Beverly M. Flanagan
Supervisory Petitions Examiner
Office of Petitions
Office of the Deputy Assistant Commissioner
for Patent Policy and Projects

cc: Charles Katz
Carr & Ferrell LLP
2225 East Bayshore Road
Palo Alto, CA 94303



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EARL MINCER
7150 EAST CAMELBACK ROAD
SUITE 300
SCOTTSDALE, AZ 85251

In re Application of Lang
Patent No. 4,963,995
Filed: December 27, 1988
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Beverly M. Fjaragan

Beverly M. Fjaragan
Supervisory Petitions Examiner
Office of Petitions
Office of the Deputy Assistant Commissioner
for Patent Policy and Projects

cc: Charles Katz
Carr & Ferrell LLP
2225 East Bayshore Road
Palo Alto, CA 94303

SYSTEMS ARCHITECTURE

Peripheral Storage: Who's Got What

by Carl Warren, Contributing Editor

System platforms, regardless of architecture, have become powerful data processing engines. Like a racing car that gulps gallons of fuel by the second, these new systems gobble up and spit out data streams at unprecedented rates. To match the performance of these "data engines," storage devices such as Winchester disk drives, flexible disk drives, tape subsystems, semiconductors, and emerging optical storage units are offering equally impressive performance and capacity. Moreover, manufacturers of these storage devices can offer this capability at a fraction of the cost of devices available just five years ago.

The storage device has become the system core, and the latest crop of new storage announcements is stepping ahead in technology capability. For example, system designers can purchase Winchester disk technology in the 765-Mbyte-plus range with under 20-msec average access times, tape drives that match virtually any capacity demand, and even erasable optical storage drives. Further, interfacing technology, due to the increased popularity of the Small Computer Systems Interface (SCSI), is rapidly becoming a commodity business (see *Embedded SCSI Brings High Performance, Smarts to Smaller Drives*, p. 62).

System manufacturers, however, demand more than capacity and performance. Indeed, the real impetus behind the burgeoning storage market is cost/performance per cubic inch. The goal: to inexpensively pack more storage solution

into the smallest amount of space. Even full-sized 5 1/4" Winchester disk drives are staying true to this axiom.

The major performance providers—Control Data Corp. (Minneapolis, MN), Maxtor Corp. (San Jose, CA), and Micropolis Corp. (Chatsworth, CA)—offer fast 380-Mbyte and 765-Mbyte drives with average access times below 20 msec. Workstation vendors and host CPU makers are snatching up these drives.

Demand for the drives is helping to push the price per megabyte into the \$2 range; but so are innovative storage subsystem designs. One OEM array solution from Micropolis is the

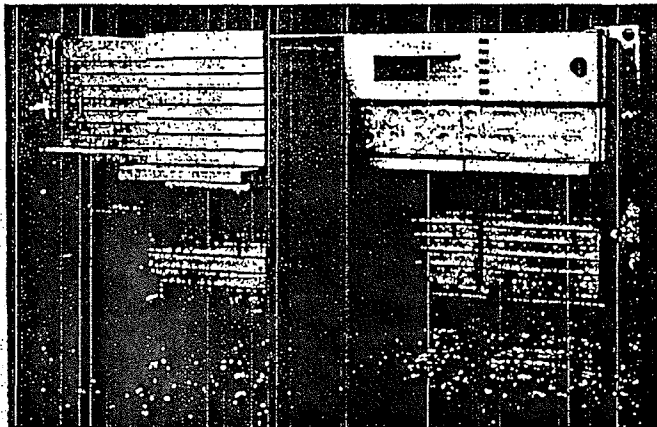


Figure 1: Though this 3-Gbyte data storage array from Micropolis did not prove an apt fit for the company's disk line, such arrays will be pursued by other vendors, especially those who find promise in SCSI-II.

SYN

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SYSTEMS ARCHITECTURE

1804 (Figure 1). This storage array used a combination of four data drives and a parity drive (4 + 1 array). In addition to enhancing channel performance and increasing overall capacity, this combo also improves the transfer rate. For example, an array using disk drives with 10-MHz transfer rates produces an aggregate bandwidth of 40 MHz (3 Mbytes/sec).

Besides the benefit of a higher bandwidth, arrays fit more storage into smaller footprints. Thus, the overall cost/megabyte/cubic inch is lessened. For example, a 3-Gbyte array built using the Micropolis 1580 series of 15-MHz ESDI drives would fit into less than half the space required for a 1.2-Gbyte IBM 3380 subsystem, and consume one-third the power.

Although arrays offer certain benefits, there is a price to pay. For example, the subsystem demands synchronized controllers, timing controls, and buffers to properly match the transfer rate to the host I/O controller.

Interestingly, designers have been using ESDI drives to achieve high bandwidths. For the best system match, the drives are coupled to SCSI controllers, which increases the overall cost. The

Packing more storage solution into a smaller space, at a lower cost, is the goal.

trend, however, is to move away from ESDI and instead go straight to SCSI. This is permissible since the emerging SCSI-II more than meets bandwidth requirements for high-performance systems. In addition, command overhead, once the bane of SCSI developers, has dropped from a 1-msec average to the nano-second range.

Another company making use of the array concept, but as a fault-tolerant storage system, is Pacstor Inc. (Los Gatos, CA). The company's Integra series of subsystems uses Conner Peripherals' (San Jose, CA) 3 1/4" 100-Mbyte Winchesters to create arrays up to 1.2 Gbytes.

Besides using 3 1/4" Winchesters, the fault-tolerant aspects of the overall system make the Pacstor approach unique. The Integra system is an intelligent standalone unit that uses an Intel 80386 to control file access and data management. Pacstor uses SCSI to its fullest extent as a peripheral bus. Thus, drives can be easily removed or added without disturbing subsystem operation—a function of the disconnect/reconnect feature of SCSI.

Pacstor has also developed proprietary file and error correction management that makes it possible to fully reconstruct a file should a disk drive malfunction. Pacstor pricing is between \$4000 and \$9000, depending on the configuration.

WORMING Its Way In

Write Once Read Many (WORM) optical technology, although not an overwhelming market giant, is proving useful in some niche segments. Ian Turner, vice-president of engineering at Laserdrive Ltd. (Santa Clara, CA), sees the technology as well suited to the imaging business. "Images take up lots of space and usually need to be considered permanent," says Turner. To this

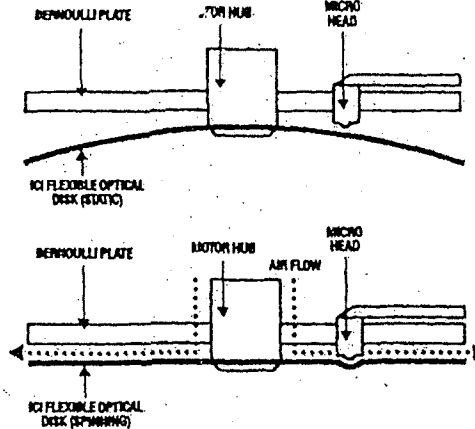


Figure 2: The Bernoulli Optical drive uses the ICI Digital Paper, mounted on a hub under a plate that guides the air flow, creating a lift effect. Thus, the media flies rather than the head. The head/media interface as shown creates a dimpling much like the prow of a boat plowing through water.

end, Laserdrive packages (in a 5 1/4" form factor) 405 Mbytes per side of storage; a three-interleave Reed-Solomon error correction code (ECC) is implemented with the Neal Glover chip set from Scientific Microsystems Inc. (Mountain View, CA).

Since the Laserdrive 810 series of optical drives are write once, the company has implemented the management of write once protocol in the drive firmware. The upshot is that the host operating system doesn't require any specialized software.

Although WORMs are early to market, 5 1/4" drives haven't really caught on. Moreover, they may be ignored in favor of emerging erasable optical.

Verbatim first introduced a magneto optical erasable drive over four years ago, but Maxtor stands as today's market leader, with drives developed both in-house and with Seiko/Epson. And by this month, Maxtor should have made early shipments of its Fiji and Tahiti optical drives.

The Fiji I is a 3 1/2" drive with 160 Mbytes of removable storage and a 100-msec average access time. The Tahiti, on the other hand, is a 5 1/4" optical drive that stores 600 Mbytes to 1 Gbyte of data, depending on the format. Maxtor adheres to the ANSI standard that specs 600 Mbytes, and offers an extended format for higher capacity. OEM pricing for the Tahiti is \$2500; \$1000 for Fiji. Erasable media will add about \$200 to the cost.

The technology used by Maxtor is called thermo magneto optical (TMO). This uses a medium, in this case built by Phillips Dupont, that combines optical sensitivity with magnetic read/write characteristics. Here, a laser is used to heat a spot on the media until a bias field of about 250 Oe is achieved, causing a reorientation of the magnetic domain. The result is a written bit that can be sensed by the read/write head.

Although bits can be reoriented, there is no overwrite capability. Consequently, an erase pass must take place before a new bit is written. This might seem to slow operation. However, with careful integration, such as using buffers in combination with a fast Winchester, the system impact should be negligible.

An interesting write once optical technology is being pursued by Iomega Corp. (Roy, UT) in concert with the British firm ICI Electronics. ICI has developed an optical Digital Paper. The drive being developed by a subsidiary of Iomega, Bernoulli Optical Systems Corp. (BOSCO) (Boulder, CO), is based on Bernoulli

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SYSTEMS ARCHITECTURE

principles whereby the media floats in relationship to the read/write head (Figure 2). The company claims the ability to store 1 Gbyte of data, with a 40-msec access time and a SCSI transfer rate of 1.5 Mbytes/sec.

The ICI Digital Paper (Figure 3) is a dye polymer infrared sensitive coating on a polyester-based substrate. The media has the look and feel of a wrapping paper, and since it is flexible, it can be used in rotating media, or tape drives. Developed by Creo Products, Inc. (Vancouver, Canada), the Creo drive stores up to 1 Tbyte of data on a 12" reel.

Half-Inch Upgrades

The half-inch tape is the only standard for interchange. IBM's 1/2" cartridge tape drive, the 3480, has been carried over to an easily handled cartridge. But third-party versions are few, and only one

firm has emerged with a viable alternative to the high-end 3480.

Working in a very open joint development effort with IBM, Cipher Data Products, Inc. (San Diego, CA) has fabricated the 3000i series of 1/2" drives. Designed for 8" and 5 1/4" form factors, the 3000i series drives store 320 Mbytes on a single 1/2" cartridge with 600' of tape.

This significant storage boost over IBM's 200-Mbyte capacity is achieved via the Multitrack Serpentine Recording (MSR) format. A variation of the proposed Half Inch Tape Cartridge (Hi/TC) standard, this format permits serpentine (continuous loop) recording on either two or four tracks on the 24 specified in MSR. This, too, denotes a significant step over IBM's 18-track format. However, IBM writes all 18 in a parallel fashion. The Cipher drive relies on a stepping mechanism to index over the track real estate.

The 3000i drives employ the standard 1/2" tape cartridge used in the IBM drive, which is a chromium dioxide tape that is priced in the \$5 range in OEM quantities. Cipher reports 27,000 flux reversals/inch and ensures a 1 x 10-byte to 12-byte error rate.

The Many Lives of Magnetic Tape Technology

by Joe Phillips, 3M Data Storage Products Div., St. Paul, MN

Magnetic tape technology refuses to die, despite periodic predictions of its demise at the hands of competitive products—first from magnetic disk drives as a primary storage medium, and, more recently, from technologies such as optical disk in removable storage applications. Half-inch reel-to-reel tape has survived and flourished by its adaptability to a variety of applications where cost per megabyte and data interchange are the primary concerns.

The earliest data recording tape recorded information at 100 bits/inch. The technology has evolved to a 500-fold increase: The current generation of data storage tape products has boosted density beyond 60,000 bits/inch.

Today's mainstream magnetic tape technologies break down into four general categories: 1/2" reel-to-reel; 1/4" data cartridge, both in standard-sized DC900 and the micro-sized DC2000 mini cartridges; 1/2" single-reel cartridges (e.g., IBM 3480 and DEC Compaq tape media); and various helical scan formats, including 8-mm and Digital Audio Tape (DAT). A possible fifth category having minor applications has developed for digital data cassette systems using a Philips-type cassette and various nonstandard 1/2" cartridge designs.

Higher densities now being demonstrated with a helical scan format are the result of advanced tape formulations with greatly increased coercivities—up to 1450 oersteds using metal particle tape on DAT cartridges. In comparison, 1/2" reel-to-reel tape has held the line at around 290 oersteds. A planned move to higher coercivity pigments for future 1/4" data cartridge media will also offer higher areal recording densities; plans for a next-generation 1/4" data cartridge product specify 40 tracks of data at a linear recording density of 40,000 bits/inch to achieve 1 Gbyte on a standard-size cartridge by 1990. These newer 1/4" data cartridges have moved coercivities to 900 oersteds.

With both product segments (helical and linear recording), as track and bit densities increase, vendors are becoming more concerned with accurate head positioning on these ever-smaller data tracks. Various types of servo positioning systems will be incorporated into these products to ensure the required level of data integrity; sophisticated ECC will be included as well.

Although the venerable 9-track reel-to-reel systems have

Technology	Tracks	Media	Form Factor	Capacity	Transfer Rate	Other
Data Cartridge	14,000	28	Ferric oxide	1/2"	320 Mbytes	240 Ibits/sec
Reel-to-Reel	6250	9	Ferric oxide	1/2"	195 Mbytes	1.25 Mbytes/sec
IBM 3480	35,000	18	Chromium dioxide	1/2" cartridge	200 Mbytes	3 Mbytes/sec
Data DAT	61,000	1600	Metal particle	3.81 mm	1.3 Gbytes	183 Ibits/sec (effective)

served as the dominant means of data interchange in mainframe and minicomputer applications for 25 years, most observers predict that within the next few years drives based on the IBM 3480 1/2" cartridge will become the most popular in the 1/2" tape arena. Storage Tek, Hitachi, Fujitsu, NEC, Cipher, and Aspen have all announced 3480 drives, ensuring this technology's use in the major data centers of the world.

Currently, 3480 cartridges are rated at 200 Mbytes/transport using 18 parallel tracks having a linear recording density of 24,889 flux changes/inch for a bit density of 38,000 bits/inch. The media uses chromium dioxide-based magnetic tape and thin-film read-write heads. Chrome tape has the potential to support much higher densities—over eight times the current level—and it is expected that IBM will soon upgrade the 3480 drive modules, at least doubling current capacity. In some proprietary drives based on the 3480 cartridge, storage capacities of up to 320 Mbytes are now being demonstrated.

The future of tape technology looks promising. Much of the research into magnetic tape coating and resulting developments can be shared both in commercial audio and video applications as well as data recording. The metal particle media used for DAT drives is the same as that used for consumer audio recording. Moreover, research into advanced videotape formulations may possibly provide the answer for the next generation of high-coercivity tape used in data cartridge applications. With this synergistic research, it's a safe bet that continued technical improvements will make magnetic tape products strong competitors in the data storage market well into the next decade.

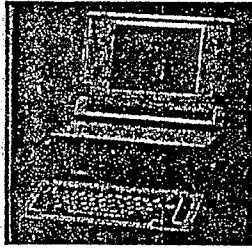


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Compaq's SLT/286 features a supertwist VGA display.

AC outlet or an internal Enhanced Nicad Battery Pack. The battery life is over three hours, and it recharges when the laptop is connected to an AC outlet. Power packs weigh 1.8 pounds each and recharge in 1½ hours when the system is not in use and connected to a 110-, 220-, or 240-volt source.

The user conserves power by pressing a Standby button that powers down the display, microprocessor, drives, modem, and keyboard when the system is not in use. The SLT/286 automatically enters Standby mode when it has been inactive for a user-defined time period. Operation is restored by pressing the Standby button. An LED indicator and audible signal indicate low

See Compaq, Page 5

Users Would It Than Switch

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"The majority of my larger clients find that the current release of 1-2-3 meets the majority of their spreadsheet needs," said Richard Creeth, a consultant in Norwalk, Connecticut.

But in organizations that haven't standardized with one product, competitive products are attractive.

"A lot of people buying new machines are taking a serious look at Excel," said Richard Silverston, senior systems support consultant with Arco, in Los Angeles. Especially with 80386 systems, many users are buying Excel rather than 1-2-3.

See Lotus, Page 8

PHOENIX

IBM's OS/2 Named-Pipe Support Quells LAN Incompatibility Fears

BY SHARON FISHER

IBM will support the named-pipes interface in OS/2, Version 1.1, an IBM executive confirmed last week, helping to dispel fears that IBM and Microsoft's OS/2 communications will not work with each other.

"Named pipes are in there," said Mike O'Dell, IBM product manager of distributed systems products. "It's not something we've announced." O'Dell also confirmed that named-pipe API calls would be documented for IBM's OS/2.

Because OS/2, Version 1.1 (due to ship this month) has no communications capability, the named-pipes API is so far supported only within a single machine, not on a LAN. O'Dell would not say whether named pipes would be supported in OS/2 Extended Edition, Version 1.1 or the LAN Server, which IBM uses to provide communications and LAN features to OS/2. IBM said previously, however, that all the features in OS/2 Standard Edition would be present in Extended Edition.

IBM provided further evi-

dence of interoperability between its Extended Edition and Microsoft's LAN Manager last week by demonstrating an Extended Edition client running under a 3Com 3+Open server, which is LAN Manager-based.

In addition, 3Com said, but did not demonstrate, that DOS users running IBM's PC LAN 1.3 can communicate with a 3+Open server.

IBM has said that DOS users who want to communicate with IBM's OS/2 LAN Server should use PC LAN 1.3, which means

See Pipes, Page 8

Job's Next Machine Wins Praise, Poses Questions

BY THE INFO WORLD STAFF

SAN FRANCISCO — Steve Jobs' dream machine has finally arrived — sort of.

The wunderkind of Silicon Valley wowed the industry last week with the promise of a workstation that includes a 256-megabyte read/write optical drive, a minimum of 8 megabytes of memory, a 17-inch megapixel monitor, and a new user interface he vows will

change the way people use computers.

But while the Next computer holds great promise, Jobs also said the \$6,500 machine won't be available until the second quarter of 1989, and then will be marketed solely to the higher education market.

Many analysts, developers, and academic buyers, while generally impressed with the machine, are already looking for a lower-priced model. And many questioned when the company will provide a machine for the business market.

One explanation Jobs offered last week for targeting academia

See Next, Page 93



Steve Jobs introduced Next Inc.'s 68030 Unix workstation.

Next Interface to Enhance IBM's Unix Environment

BY NICK ARNETT

IBM's licensing of the Next Step interface from Next Inc. represents a Unix strategy intended to complement, rather than threaten, its OS/2 Presentation Manager strategy, an IBM official said last week.

IBM and Next do not plan to develop the interface jointly, officials of each company said. IBM will, on its own, add color to its version, said William Filip, assistant general manager of

AT DEADLINE

IBM Says Presentation Manager Is on Schedule

IBM will announce the availability of its Presentation Manager for OS/2 Standard Edition on October 31, according to sources. The company will make the announcement in New York, where a handful of software developers, including Microsoft Corp., Aldus Corp., and Micrografix Inc., are expected to demonstrate applications running under Presentation Manager.

Several sources said Microsoft was planning to show a version of

Next

Continued From Page 1

was the opportunity he feels the machine has to broaden that market. "The key thing to note here is that although there are a lot of computers in higher education, they have not penetrated into the curriculum," Jobs said. "To develop courseware takes months and months, if not years. If we can allow people to write in two or three days what would have taken months, a lot more people will use computers. We want to be the first computer to contribute to the curriculum."

Other aspects of the academic market doubtlessly appealed to Jobs. A relatively small sales force can market new technology to universities, compared to the business market. Academic users are generally focused on developing their own applications, meaning they will be less concerned with the lack of applications software for the new machine.

POSITIVE REACTION. Reaction to the machine from universities was generally positive. "They had very aggressive goals, technologically, and I think they've reached them," said Kenneth King, a member of the Next advisory board and president of Educum, the higher education computing consortium in Princeton, New Jersey.

"It's unfortunate that the price is at the upper end of what universities generally spend for instructional technology," King said. "[Jobs has] been advised by his advisory board that he has to get it down to the \$3,000 level before students will buy it in significant numbers. It's the hope of the advisory board that an entry-level machine emerges."

"It clearly is a price breakthrough for all that it offers in one package," said Ira Fuchs, vice president for computing and information technology at Princeton University. "But it's not going to be a machine that Princeton students are going to buy because students aren't prepared to spend more than \$2,500 to \$3,000. We sell a lot of Macs and IBM PS/2 Model 30s. Even with an impact printer and word processing software, they are under \$2,500."

"We want to see a machine without the disk, where we cluster them all and run them off servers," Fuchs continued. "Come second quarter I expect him to offer a more naked machine." Fuchs estimated that Princeton would order about 50 Next machines in the 1988-89 academic year.

"What excites me is the object-oriented environment and the opportunity for sharing critical components among universities," said Ron Danielson, director of information services at Santa Clara University. "It takes 100 to 1,000 hours for each hour of student contact

with the machine. If you want students to spend an hour in front of the machine, you have to spend at least 100 hours developing. The Interface Builder will cut down that time."

COSTLY MEDIA. Many developers, though impressed with the Next technology, are hoping for markets beyond higher education and expressed amazement that Next expects applications to be distributed on optical disks that cost \$50 each.

"I wish they had said more about their distribution strategy," said Clinton Nagy, national sales manager for Adobe Systems' Systems Division. "Higher education is not enough; I hope we'll be buying the Next machine at Businessland next year."

According to Dan I. Lewis, Next's vice president for sales and marketing, the company is looking at several options for software distribution, including having Next act as a distribution center for programs.

Effect of the Next machine on the overall computer market is likely to be minimal in the near term, particularly in light of Job's own slow-growth business plan, which envisions the product in the hands of developers and universities for the next two years. "The impact will be nothing in the near term," said Michele Preston, an analyst with Salomon Brothers. "The only question right now is how it will affect Apple's position in the education market."

"When the first generation of students using the Next computer graduate, they will take their machines with them into business," predicted Peter Tiege of Infocorp.

"The technology is wonderful, but the deal with IBM is the smartest part," said Esther Dyson, editor of Release 1.0. "The Next machine will get applications because of IBM, and IBM will lead the way right into the business market."

Next Ups the Price/Performance Ante

Offers \$2,000 Postscript Laser; I/O Chip Transfers DMA at 5 MBPS

BY MARTIN MARSHALL

The Next Inc. introductions produced few surprises in the hardware offered but dramatic confirmation that a new price/performance plateau would soon be reached.

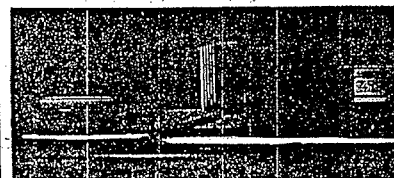
Claiming that "people don't want impact printers anymore," Next unveiled its 400-dpi laser printer, which works only with the Next CPU. The \$2,000 price for a Postscript-speaking laser printer seems phenomenal, cutting the present market price of such printers in half, until one considers that Postscript is not in the laser printer, it is in the CPU running Display Postscript.

The image is created by the 68030 in a frame buffer in RAM, then an I/O processor effects the Direct Memory Access (DMA) transfer at a rate of 5 megabits per second without further burdening the CPU. The Postscript interpreter and associated RAM required in other Postscript printers do not exist in the Next laser printer. Only a single VLSI chip is required in the printer, which otherwise uses a Canon SX engine and downsized packaging that makes the printer 60 percent the size of other laser printers.

The same architecture that allows the low-cost laser printer transfers without burdening the CPU also works to speed up other parts of the overall system processing, the company said. This makes optimum use of the 5-MIPS processing power of the 68030 CPU.

Although Next is using Nubus protocols for the two expansion slots, its 25-MHz implementation will not be compatible with add-on products for Mac II Nubus boards. Next would not say what add-on

Standard Configuration of the Next Machine



Hardware:

- Motorola 68030 microprocessor running at 25 MHz
- Motorola 68882 floating-point processor running at 25 MHz
- 10-MIPS Motorola 56001 Digital Signal Processor
- 12 DMA channels
- 25-MHz backplane using Nubus protocols
- Two proprietary VLSI chips (Integrated Channel Processor and Optical Storage Processor)
- 256-megabyte read/write/erasable optical disc, 60- to 70-ms average access time, 4MB/sec burst transfer rate
- Built-in Ethernet adapter
- 17-inch monochrome gray-scale display, 1,120-by-832 resolution, 2 bits per pixel
- Keyboard
- 2-button mouse
- 8 megabytes of RAM
- Three available expansion slots that can hold up to 3 more CPU boards
- "Mac-compatible" SCSI controller
- Two "Mac-compatible" serial ports
- Speaker and headphone jack

Software:

- Display Postscript
 - Mach System Software
 - Sun's Network File System (NFS)
 - Application development tools including Objective-C, GNU C compiler, debugger, and EMACS; and BSD 4.3 utilities
 - Next Step software environment (includes Window Server, Workspace Manager, Application Kit, and Interface Builder)
 - Digital Librarian searching and indexing tool
 - Unix electronic mail
 - Write Now word processor
 - Mathematics
 - Next SQL Database Server
 - Allegro CL Common Lisp
 - Jet personal database
 - Digital Library
- Options:**
- 400-dpi Postscript-compatible laser printer
 - 330MB or 660MB Winchester hard disk
 - 16 megabytes of RAM

boards are in preparation for the system, but it does plan to license its backplane technology that uses Nubus protocols to other companies.

The digital signal processor

that is used for synthesizing sound someday also will be used to emulate a 9,600-bps modem, according to Next. The machine also has a 32-bit implementation of Ethernet.

Developers Eye Next, But Microsoft Abstains

BY PEGGY WATT

A fistful of software packages — including an object-oriented development program — will ship with the Next machine, and a respectable number of software developers are eyeing the system for future development.

The new computer comes with Mach, a flavor of Unix developed at Carnegie-Mellon University and compatible with BSD 4.3; and Next Step, an object-oriented environment developed by Stepstone Corp.

BUNDLES. Also being bundled with Next are Adobe Postscript, as both display and printer driver; T/Maker Write Now word processor; Mathematics from Wolfram Research Inc.; Franz Inc.'s Allegro Common Lisp; and Sybase SQL Server

database technology. It also comes with Next's Sound & Music generation software and a Unix-Mail compatible graphical Mail program.

Frame Technology Corp., Cricket Software, Mark of the Unicorn Inc., and Farallon Computing also endorsed Next and promise applications; others said they are considering development. More than 500 developers signed up for a Next conference held the day after the product's announcement, said John Ison, Next's director of applications product marketing.

Next is also bundling a Digital Library comprised of Webster's Ninth New Collegiate Dictionary, Webster's Collegiate Thesaurus, the Oxford Dictionary of Quotations, and the Oxford Press' William Shakespeare: *The Complete Works*.

with Digital Librarian search and indexing tools. All Next documentation is also on-line.

ABSENT. Conspicuously absent from the supporters is Microsoft — first to endorse the new technology in Apple co-founder Steve Jobs' earlier innovation, the Macintosh. Microsoft Chairman Bill Gates declared the Next machine's higher education market too small and said he "decided not to put the energy into" development now. "We'd have to get the impression that it would sell in very, very big numbers, like a corporation coming in and telling me they don't want to stick to a few standards any more," Gates said.

NEXT STEP. "We'd love to have Microsoft software on this ma-

chine," Jobs said. He expects applications will be speeded with the help of Next Step — also licensed by IBM for its RT and Intel-based systems.

Software developers face such new challenges as distributing programs on \$50 CDs instead of floppy disks.

Ashton-Tate is evaluating the Next machine, which would probably require entirely new products, said Terry Garnett, an Ashton-Tate vice president. "The environment he's done is so different in terms of multimedia that we'll have to go back and ask, what do users want in that environment?"

In a prepared statement, Lotus president Jim Manzi congratulated Jobs and his team, but fell short of announcing a version of 1-2-3 for the new machine.

INPOWORLD