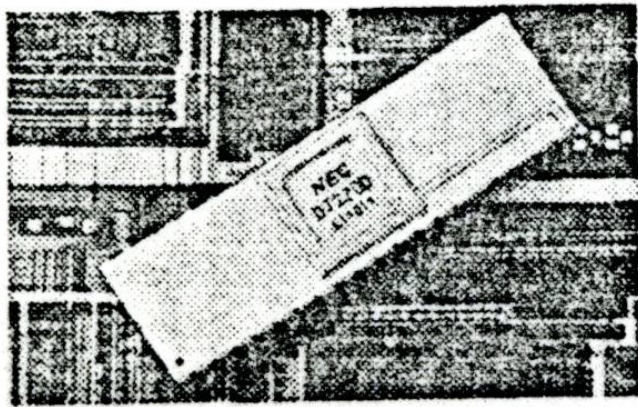# グラフィックディスプレー

制御回路をLSI化

日電が世界初 インテルが2次供給

高性能と低価格化を実現

日本電気（社長関本忠弘氏）は十九日、グラフィック・ディスプレー（用語解説参照）の制御回路を一チップに集積化したLSIを世界で初めて開発「μPD七二二〇Dグラフィック・ディスプレイ・コントローラー＝写真」の名称で九月から販売する、と発表した。

グラフィック・ディスプレーの制御回路はIC化が難しく、バイポーラーICを六百も組み合わせて使用、そのため装置が一台約一千万円と非常に高価となっていたが、同社は高度な回路設計と超LSIの高集積化技術（三ミクロンルール）を

駆使して一チップ化して高性能化と低価格化を実現したもの。

同製品は米国インテル社がセカンド・ソース（二次供給者）することになっており、開発力が劣るといわれた日本企業に米国の、しかも最も開発力に富む半導体メーカーが追随したことは日米半導体史上、異例であり、注目される。

同LSIの主な特徴は①カラー化が容易なラスタスキャン型ディスプレーの制御を目的に開発したため、高級な産業用のカラーグラフィック・ディスプレーに応用が可能②最大四〇九六ビット（画素）の表示用メモリーを直接制御できるため、現在一千万円程度の装置に比べ直線で十倍、円で一千倍以上の高速で描画が可能③描画のための演算処理を行うことができ、演算実行中でもCPUから次の描画命令を同時に受けつけられるため、CPUは描画と表示の負担か

ら解放され本来の能力を発揮できる④リフレッシュ回路を内蔵してD-RAMを使用できる―など。

グラフィック・ディスプレーは今後は大型コンピュータから経営管理や教育用などオフコンやパソコン用の入出力装置として幅広く使用されるケースがふえると予測されているが、今回の一チップ化で、この高性能化、大幅な低価格化（メモリーだけで六万円分）が可能となったので、需要拡大に拍車がかかると同社ではみている。

当面の生産規模として五十六年度下期月産一万個、五十七年度上期月産五万個で、価格はロット百個で一個二万円を予定。

Translation of this article

NEC's World's first graphics display controller LSI (issued by Nikkan Kogyo Shimbun on 2/20/1981)

Second source by Intel Achieving high performance and low price

NEC (President: Tadahiro Sekimoto) announced on the 19th that NEC has developed the world's first LSI that integrates a graphics display control logic into a single chip under the name of "μPD7220D GDC" and will start selling it in September.

The graphics display control logic was hard to integrate into an IC. The sales price of conventional graphics system implementing 600 bipolar ICs had been around ten million yen <$66,666 when 150 yen/$>. NEC made full utilization of advanced logic design and VLSI integration technology (3μm) to create the single chip achieving both high performance and low cost.

Intel Corporation becomes a second sourcer of the μPD7220D <iD82720>.

The fact that the American semiconductor manufacturer which has superior development capability followed the Japanese company which was said to be inferior in development capability, is an exceptional case in the semiconductor history both in Japan and the United States. It deserves attention.

<The rest is omitted....>

画像表示制御回路　日電、一チップLSI化

日本電気は十九日、グラフィック（画像）ディスプレイの制御回路を世界ではじめて1チップLSI化することに成功し、今年の九月から販売を開始すると発表した。
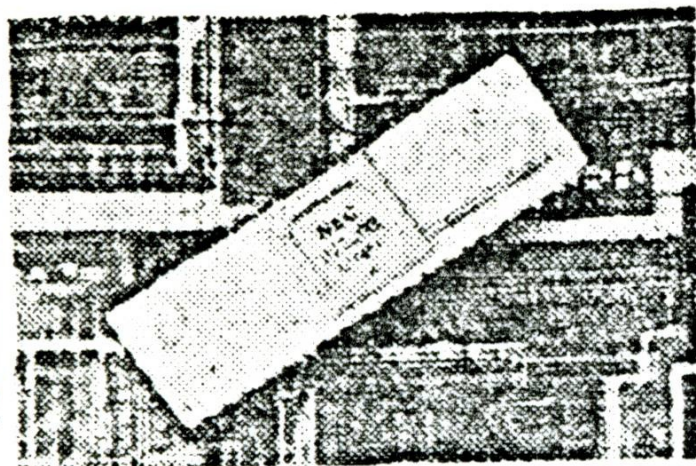
従来は約六百個のICで構成されていた制御回路を一つのLSIで実現、かつ表示機能や操作性も高めたのが特徴。価格は百個契約時で単価二万円を予定、五十六年度下期月産一万個、五十七年度上期は同五万個を計画。

開発されたLSI（μPD7220D）はカラー表示、最大四〇九六Kビット（画素）の表示メモリーを直接制御、高速描画など多くの機能を備えている。四〇ピンのセラミックDIPを採用、単一の五V電源で動作、三ミクロンを基準の高性能MOS技術により五・四ミリ角のチップ内に一万四千素子を収めたもの。

同社では十八日から二十日まで米国で開催されるISSCCで、このLSIを技術発表、また米国のインテル社が技術援助契約に基づきセカンドソースとして、生産を行う予定。なお日本電気ではISSCCで電電公社との共同開発による1チップ・コーデック、一・五ミリ基準の六四Kビット・スタティックRAM、二五ナ秒アクセス時間の高速一六Kビット・スタティックRAMも発表の予定。

日電の「μPD7220D」

グラフィック・ディスプレイ制御用LSI

日電が世界初の開発

・ディスプレイ制御用LSI「μPD七二三〇Dグラフィック・ディスプレイ・コントローラ」を開発、九月から販売を開始すると発表した。

この μPD七二三〇D はグラフィック・ディスプレイの制御回路を一チップ内に集積したもので、高級なカラー・グラフィック・ディスプレイからキャラクタ・ディスプレイまで幅広く使え、高速で描画できるなどの特徴をもっている。
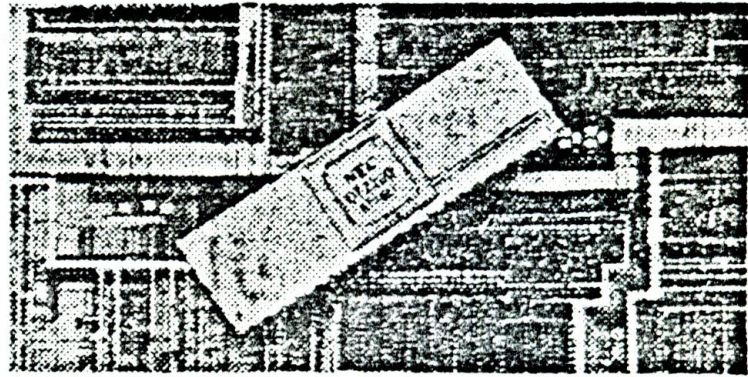
販売価格はロット百個で一個当たり二万円。五十六年度期月間一万個、五十七年上期には同五万個の生産を計画している。同社ではこの μPD七二三〇D を十八日から米国で開かれているISSCC（国際固体回路会議）で発表。米

日本電気（社長・関本忠弘氏）―国のインテル社からセカンド・ソ

は十九日、世界初のグラフィック―ースとして販売される。

描画、大幅に高速化

グラフィックディスプレー 制御用のLSI

日電が開発

グラフィック・ディスプレー制御用LSI

日本電気は十九日、グラフィック・ディスプレーの制御用LSI「μPD七二二〇Dグラフィック・ディスプレー・コントローラー」を九月から発売すると発表した。このLSIは、従来六百個程度のIC（バイポーラ型）を組み合わせて構成していた制御回路を一個のLSIに集積したもので、グラフィック・ディスプレーの高速化と低価格化を可能にするもの。価格はロット百個の場合で単価二万円。来年度下期に月産一万個、五十七年度上期に月産五万個の生産を計画している。

この製品はカラー化が容易なラスタスキャン型ディスプレーの制御を目的としており、高級なカラー・ディスプレーに応用できる。最大四千九十六ビット（画素）の表示用メモリーを直接制御でき、一千万円前後の装置の場合、従来に比べて、回線で十倍以上、円で二千倍以上の高速描画が可能である。

モリー（RAM）を使用でき、また、DMA（ダイレクト・メモリー・アクセス）回路を内蔵しているため、コンピューターの主メモリーと表示メモリー間のデータ伝送を、効率的に行うことができる。

多数のコントローラーを同期させて並列動作できるため、一つの画面に複数の表示メモリーからのデータを合成して表示することができる。「八〇八五」系の標準的なマイクロコンピューターとの接続が容易なバス構成をとっている。米国のインテル社がセカンド・ソースとしてこのLSIを生産することとなっている。

描画に必要なデータの演算処理機能を備えており、コンピュータ本体の負荷を軽減させている。リフレッシュ回路を内蔵しているため、ダイナミック型の表示用メモリー

主な仕様は次の通り。
▽デバイス＝NMOS▽電源＝五V単一▽パッケージ＝四十ピン・セラミックDIP▽クロック周波数＝五㍋▽描画速度＝ドットあたり八百ナノ秒（五㍋の場合）。

(List) K. Kobayashi H2000 T. Suzuki H2033 M. Kohno
   T. Sekimoto H2001 H. Kaneda H2046 (Circulate)
   A. Ouchi H2002 A. Kato H5300
   A. Koike H2011 I. Yamamoto F4001
   K. Kakita H2012 T. Inoue H5291
   Y. Ishii H2022 K. Nakamura H4124
   T. Matsumura K2005 J. Kobayashi H438?
   Y. Mizuno H2032 S. Ohba H4400
   H. Kanai F2005 H. Osafune NECEL
           K. Yawata "

3/15/83
List
M. Takagi

InfoWorld's Award to NEC (InfoWorld 社賞が NEC に)

雑誌名も会社名も同じ InfoWorld という雑誌があります。最近とみに有名になり、日本の 週刊 コンピュータ ワールドにも、毎号 その抄訳が掲載されております。 この InfoWorld 社が NEC の 7220 GDC (Graphic Device Controller) チップを表彰したいが NEC のどの会社に Award を出したらよいかとの 内々の電話があり、NEC Information System の関係者から、それは NEC Electronics U.S.A. であると回答しました。 表彰式は InfoWorld の本社が Palo Alto にある関係で San Francisco で行われるとのことです。 正式文書が そのうち NECEL の方にゆくと思いますが、まず確実と思われます。

ここに到るまでの 経過について 小生が興味で覚えましたので 以下 報告いたします。

NEC Information Systems では APC の拡販には Advertisement は勿論、大変重要であるが、そのほかに publicity も重要で、うまく それを使おうということで、APC について マスコミに 売り込んでおりました。過去、いくつかの 雑誌などの記事にでています。 その活動の一つの対象が InfoWorld であり、同誌が掲載した記事が 添付のものであります。 実物は きれいな色刷りになっています。

NECIS の関係者は勿論、APC を売り込んだのですが、他社より 勝れている一つの理由として 7220 chip を使っているので、グラフィック

表示がすばらしいと言ったようです。 InfoWorldの記者はこれに大変興味をもち NECELにも取材し、7220とAPCの記事になり、7220 chipが表彰の対象になりました。

7220 chipが表彰の対象になれば"受賞者は当然"NECELということになりますが、この際に示したNECISの関係者の反応は大変興味のあるものでした。

今日、内々の電話があったわけですが、その筋、NECISの関係者がこの受賞に大変共鳴し、すごく喜んでいることです。理由を尋ねますと NECISの人々は IC、LSI などについて NECELの人々から いつも教えられ、助けられ、協力を受けているので、NECELが受賞することは 大変うれしいことであるということでした。

アメリカの人々は協力とか グループ活動は大変苦手ということになっていますが、それぞれの責任分野が キチンと決まっていれば 協力もできるし、喜びも 分け合うことができるという一つの例となりました。

今回のInfoWorldへの記事の掲載、また予想される受賞は NECの半導体技術の優秀性、それによるAPCのすばらしさを示す よい publicityになっただけでなく、NECグループで 協力することの重要性を 身にしみて判りました。

以上

宮 木 政 是

添付資料 ― InfoWorld 3/24/83 の記事。

Translation of this Fax

There is a magazine called "InfoWorld" with the same magazine name and company name. It has become famous recently, and the abridged translation is published in every issue of "Weekly Computer World" in Japan. "InfoWorld" made a private telephone inquiry to us saying, "We would like to award NEC's 7220 GDC (Graphics Display Controller) chip. Which NEC company should get the award?" An official of "NEC Information Systems (NECIS)" replied, "It should be "NEC Electronics, USA (NECEL)"". Since InfoWorld's central office is in Palo Alto, the award ceremony will be held in San Francisco. It seems almost certain that the official document will be handed over to NECEL soon.

Because I am interested in the process leading up to this point, let me report it below.

"NEC Information Systems (NECIS)" considered that publicity as well as advertising is of course very important for expanding APC sales. APC has been published in several magazines in the past. One of the targets of the activity is "InfoWorld" and the article published by the magazine is attached.   The real thing is printed in beautiful colors.

Of course, the people involved in NECIS promoted APC but apparently said "One of the reasons why it is superior to other companies is that it uses a 7220 chip. Therefore, the graphics display is wonderful." A reporter from "InfoWorld" was very interested in this remark, interviewed NECEL and published an article regarding the 7220 and APC. Then the 7220 chip was awarded.

If the 7220 chip becomes an object of commendation, naturally the winner will be NECEL. At this time, NECIS officials showed a very interesting reaction.

After I received a private phone call today, NECIS officials were very excited and delighted to receive this award. When I asked them the reason, they replied "We are very happy that NECEL won the award because we were always taught, helped, and supported by NECEL about ICs and LSIs."

Americans are said to be no good at cooperation and group activities. However, if each area of responsibility is clearly defined, it is possible to cooperate and share the joy. This has been the one of the examples.

The publication of this article in "InfoWorld", and the expected award, not only became a good publicity that showed the excellence of NEC's semiconductor technology and the splendor of APC based on it but also a good opportunity to cooperate in the NEC group. I deeply realized the importance of it.

Document attached InfoWorld 3/24/83 issue

NEC's 7220 GDC chip allows high-resolution color graphics

By David Needle, IW Staff

A "resolution revolution" has begun, according to a press release from NEC Information Systems, the United States division of the giant Nippon Electric Company of Japan. At the heart of the revolution, says NEC, is the company's 7220 Graphics Device Controller (GDC) chip, a component that even some of NEC's competitors in the personal-computer field have found too good to pass up.

Introduced about a year ago, the 7220 is an integral part of an advanced optional graphics subsystem offered on NEC's Advanced Personal Computer (APC). Other manufacturers—DEC, Hewlett-Packard and Epson, to name but a few—have also incorpo-

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The 7220 GDC chip is a component that even some of NEC's competitors have found too good to pass up.

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rated the chip into the graphics options designed for their personal computers.

A number of high-resolution color-graphics terminals and systems on the market use the chip as well. Literally dozens of other companies have ordered samples of the chip to evaluate its use in future, as yet unannounced, products.

What's all the fuss about?

NEC's technical support manager, Robert Scott, explains it simply. "There's nothing else like it; it's one of a kind," he said during an interview at NEC's chip manufacturing and sales facility in Natick, Massachusetts.

(Intel is a second-source manufac-

turer of the chip. Theirs is called the 82720.)

Personal computers typically allocate part of the same central microprocessor used to control all its other operations to the task of attaining high-resolution graphics ability.

For example, the same 6502 chip that runs Apple DOS and the various

See NEC chip, page 32

The NEC 7220 graphics chip is a hot seller. DEC, Wang and NEC use it in their personal computers.

NEC chip

functions of the Apple II computer also controls the necessary memory to give the machine its 256 × 192-pixel, or dot, resolution.

The NEC 7220 graphics-device controller, on the other hand, operates independently from the computer's main processor, thereby allowing for much higher resolution and a wide variety of other feature such as colors, zooming, customized character sets and so on.

It is a specialized 16-bit microprocessor that can address up to 256K of separate memory dedicated to graphics function.

Apple's advanced Lisa computer, with its integrated-software package that includes many graphics features, has only one microprocessor chip. Even though that chip is the powerful Motorola 68000, when it comes to graphics, Scott says the 68000 "can't keep up with the 7220, even by itself."

"It [the 68000] can exceed the 7220's drawing speed, but at two to three times the cost," Scott maintains. He doubts that the Lisa will ever come with a color display because so much of its 68000 is tied up already and adding more chips would raise the system's price too high.

In NEC's APC, the 7220 gives the computer, or the computer user, a choice of three modes of operation: Graphics mode, Mixed Graphics and Character modes.

Graphics mode

The Graphics mode would typically be used in design, animation (zoom display, drawing, panning and scrolling included) and other types of line and figure drawing.

The Mixed Graphics and Character modes can be used exclusively for graphics or solely for character display. More importantly, the chip has the ability of displaying both graphics and characters on one display screen in partitioned areas or windows on the screen.

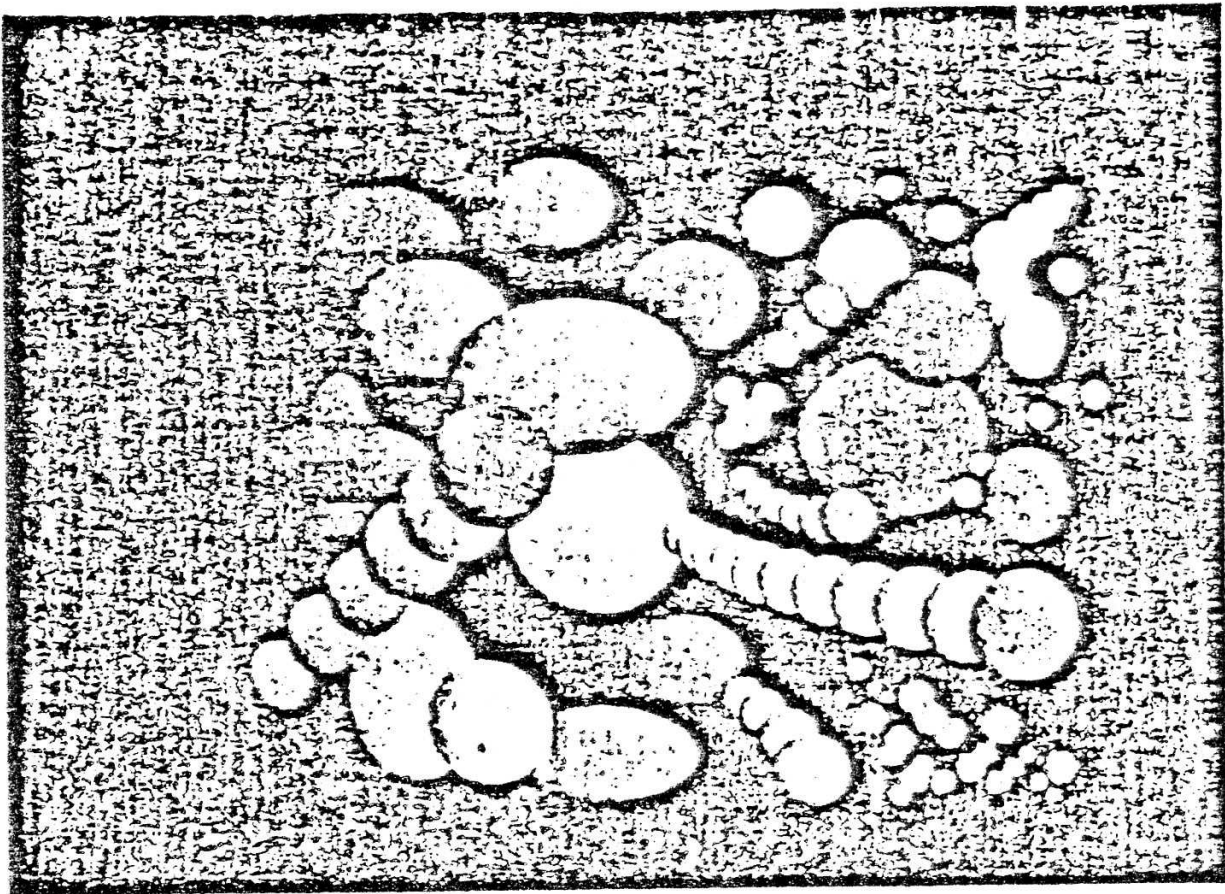The text and/or graphics on the various windows can also be merged.

The Character-Display mode allows

for a variety of different character sets and type fonts.

The DEC Rainbow 100, outfitted with an $845 color-graphics option that includes the 7220 GDC, has a high-resolution mode of 800 × 240-dot resolution with four displayable colors and a palette of 4096 colors to choose from. When operating in the

applications written for one machine to be transferred to another without being rewritten. It also includes a wide variety of "drivers, or programs, so that a single application package can run on any number of different plotters and printers.

Stan Devitt, of DRI's technical marketing staff, calls the NEC APC with the

medium-resolution mode, it offers 384 × 240 dots and 16 simultaneous colors from the same palette of 4096—more than enough to do sharp business graphics.

The graphics option on NEC's Advanced PC gives it a 1024 × 1024-pixel resolution, although the bandwidth limitation of the monitor makes this a "movable window" of 640 (horizontal) by 475 (vertical)-pixel resolution, still, by most standards, an extremely crisp resolution.
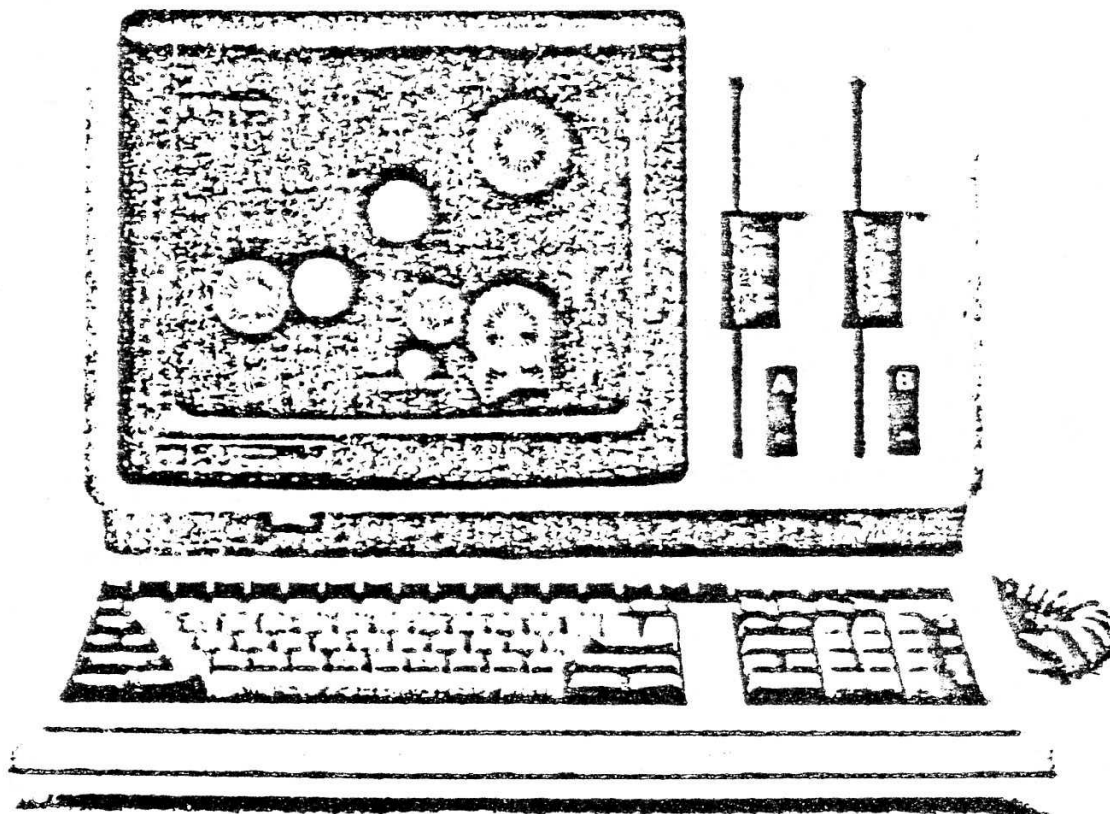
In addition, both the Rainbow and NEC machines offer the GSX graphic software system from Digital Research, Inc. (DRI), which functions as a so-called "virtual device interface." Basically this graphics system allows

7220 a "state-of-the-art" machine. "It's got hi-res, it's fast, has vivid colors and you can create extremely impressive characters."

While a DEC official concedes his company went with the 7220 because "there is no other chip like it available," he says the chip by itself has limitations.

Another company, attracted to the 7220 for its animation applications, claims to have improved the chip's performance. "We've done the most innovative work with the 7220," boasts Richard Katz, president of Vectrix Corporation in Greensborough, North Carolina. "We've pushed it to its maximum limits."

Vectrix makes a very high resolution

The Advanced Personal Computer (APC) from NEC Information Systems, model APC-H03, displays high-resolution color graphics with the optional high-resolution graphics board installed. (All photos on pages 33 and 34 are courtesy of NEC Information Systems of Lexington, Massachusetts)

(672 × 480) color-display terminal system designed to run off several popular microcomputers.

"It's a stand-alone device with a serial and parallel port so that any computer with a printer or serial port can run it," explained Katz. The firm's $1995 unit Includes a terminal that can display up to eight colors at a time from a choice of 512 colors. A $3995. model also displays up to eight colors at a time but has a choice of two million colors.
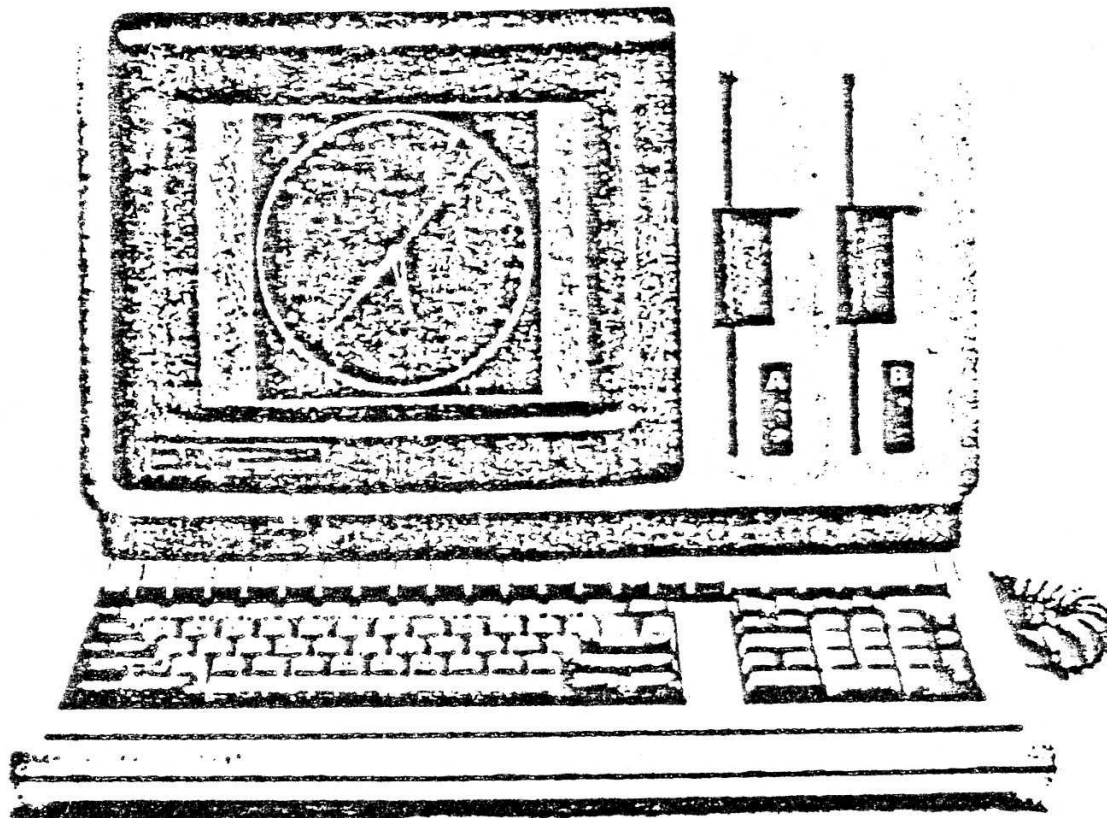
Singer/composer Todd Rundgren wrote a paint program using the Vectrix terminal and an Apple II with a graphics tablet. It is scheduled to be on display at the upcoming West Coast Computer Faire.

At the present time, NEC is selling about 5000 GDC's a month in this country and "many times more than that in Japan" where many computers, including NEC's APC, are manufactured.

NEC is working on a 7220-A chip that will run faster than the present model. NEC officials here say the parent company in Japan is rumored to be working on an Advanced Graphics Device Controller, which might be ready in about three years.

In the meantime, notes Scott, the 7220's potential has barely been exploited. NEC already has a voice-input board that can be added to the company's PC-8000 microcomputer. Once

NEC

the new board, which is being designed to fit in one of the five slots in NEC's Advanced Personal Computer, is ready, it will be able to perform graphics routines in response to voice commands.
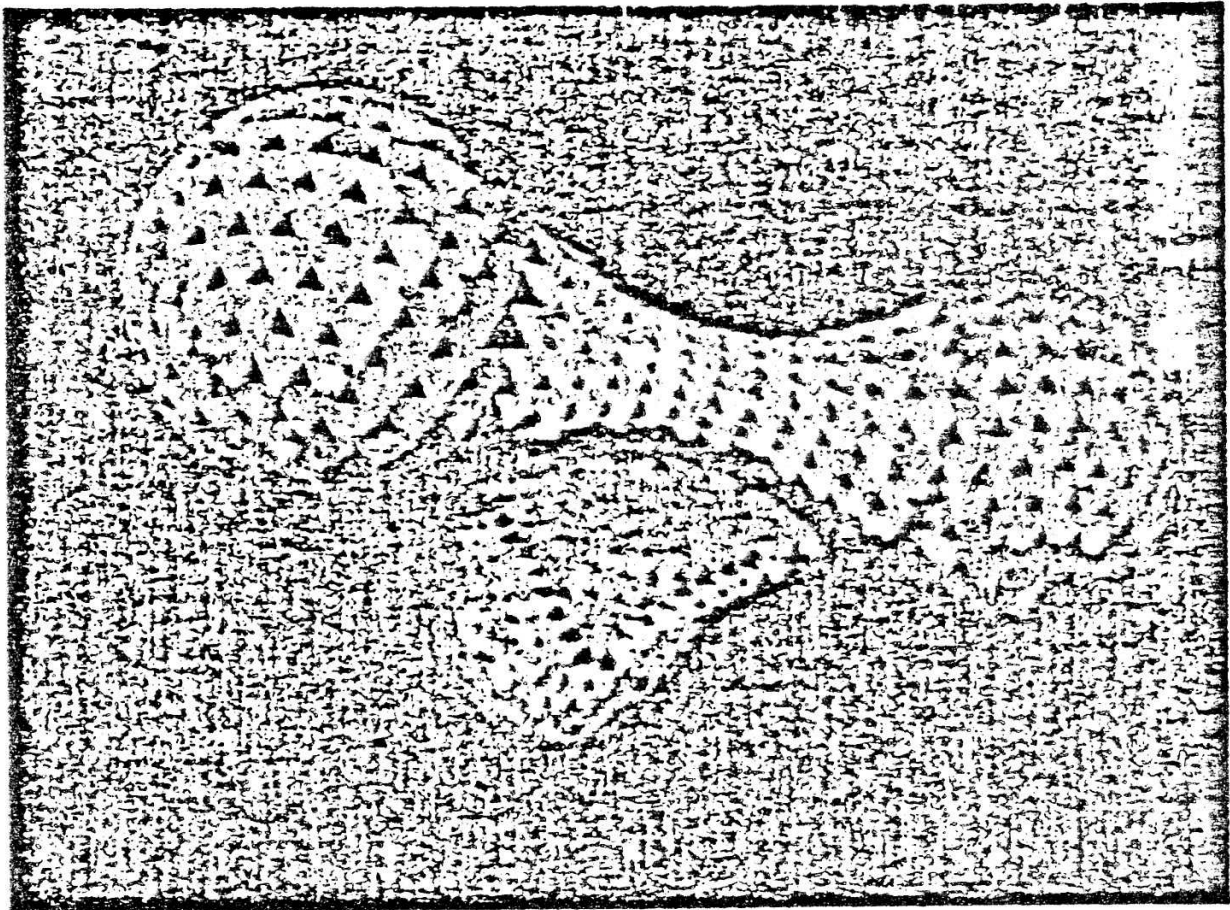
Theoretically you could "tell" the computer to graph a given range of data and separate a chunk of a pie chart and give it a different color without the user ever touching the keyboard. Similar tasks could be accomplished as quickly with other input devices such as light pens and mice that the APC can respond to.

"We're planning a lot of expansion for the APC including other intelligent peripherals," commented Scott.

One interesting product that may be out soon—either from NEC or one of several companies working on it—is a

The graphics board, which produces the graphics shown on the screen of the APC, contains an additional NEC 7220 chip and a large amount of graphics memory. There is already one 7220 in every APC for handling ROM character graphics.

printer equipped with the 7220 chip. Such a printer would be capable of storing entire multicolored or shaded images and printing them out regardless of the capacity of the monitor.

Of course, "everyone's working on a gumby," Scott told *InfoWorld*. A *gumby*, if you haven't heard, is in theory a device that allows you to create and input three-dimensional images that can then be incorporated into an existing design on the monitor or stored for use later. (*InfoWorld* will have more on gumbies in a future graphics column.)

"Other companies are probably working on imitations of the 7220, but we'll be ready to leapfrog the current technology by the time those come out," concluded Scott. ▪

InfoWorld

The Newsweekly for Microcomputer Users

HOME IS WHERE THE COMPUTER IS
23 HOME COMPUTERS COMPARED (Page 35)

NEWSPAPER

NEC's 7220 GDC chip allows high-resolution color graphics

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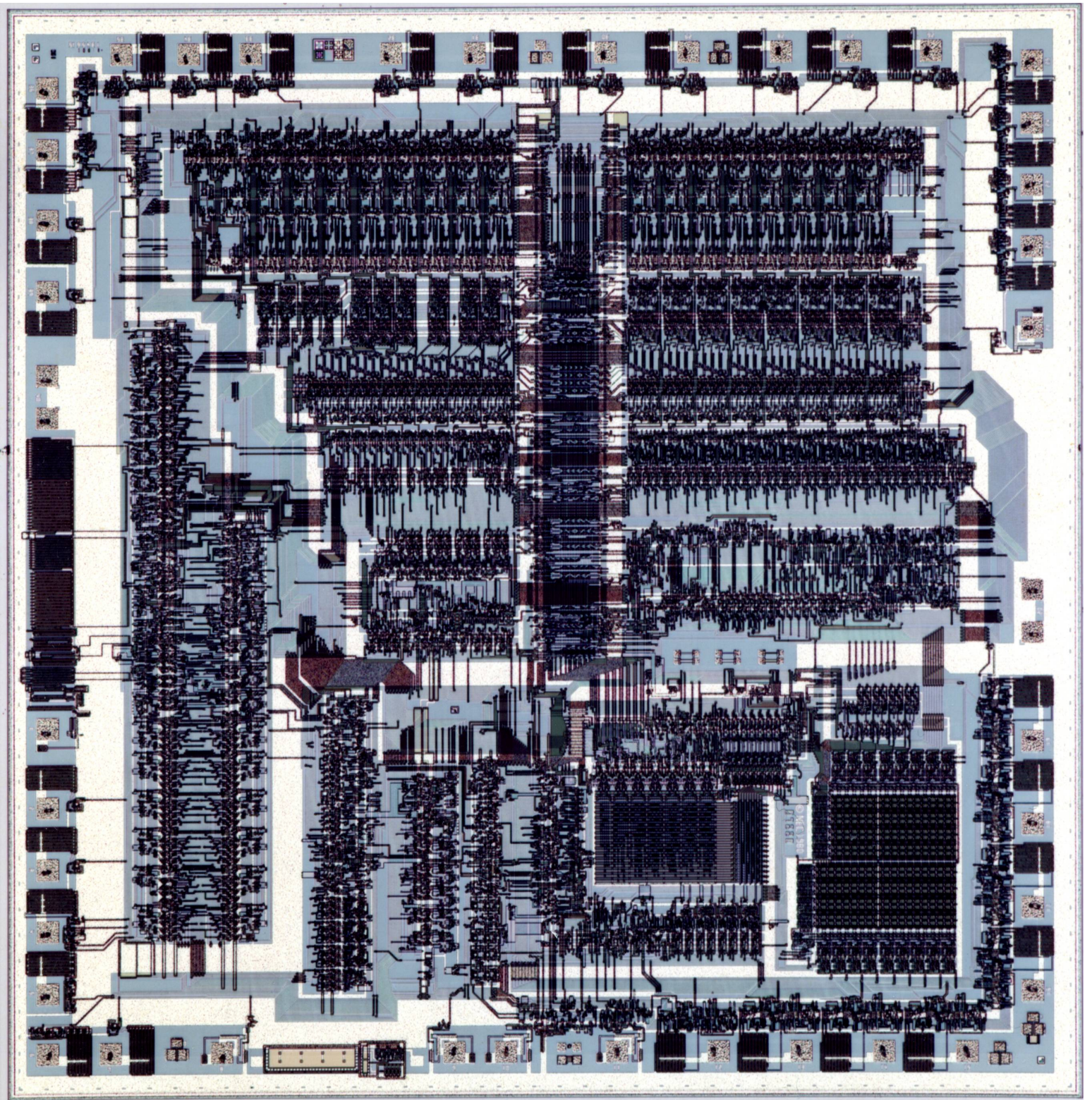
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It is a specialized 16-bit microprocessor that can address up to 256K of separate memory dedicated to graphics function.

Apple's advanced Lisa computer, with its integrated-software package that includes many graphics features, has only one microprocessor chip. Even though that chip is the powerful Motorola 68000, when it comes to graphics, Scott says the 68000 "can't keep up with the 7220, even by itself.

"It [the 68000] can exceed the 7220's drawing speed, but at two to three times the cost," Scott maintains. He doubts that the Lisa will ever come with a color display because so much of its 68000 is tied up already and adding more chips would raise the system's price too high.

In NEC's APC, the 7220 gives the computer, or the computer user, a choice of three modes of operation: Graphics mode, Mixed Graphics and Character modes.

Graphics mode

The Graphics mode would typically be used in design, animation (zoom display, drawing, panning and scrolling included) and other types of line and figure drawing.

The Mixed Graphics and Character modes can be used exclusively for graphics or solely for character display. More importantly, the chip has the ability of displaying both graphics and characters on one display screen in partitioned areas or windows on the screen.

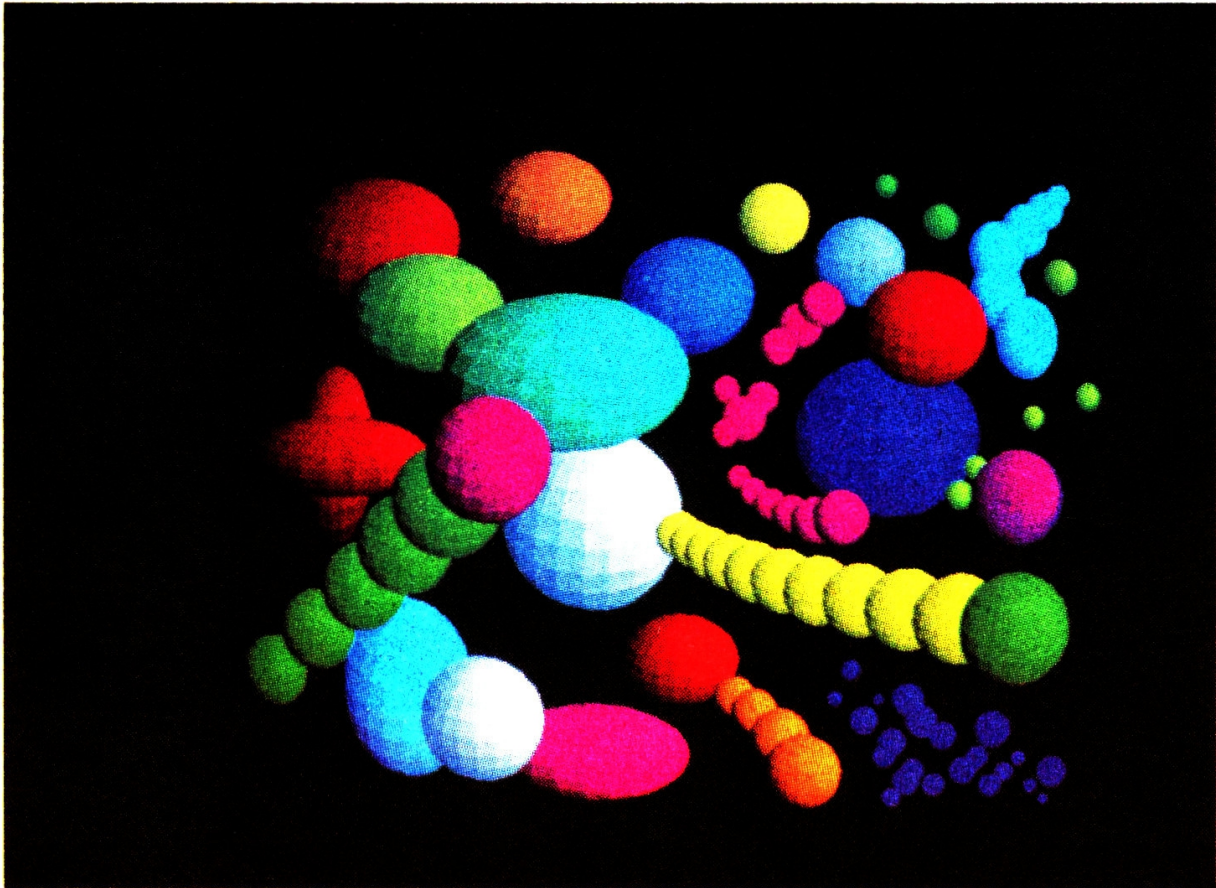The text and/or graphics on the various windows can also be merged.

The Character-Display mode allows

for a variety of different character sets and type fonts.

The DEC Rainbow 100, outfitted with an $845 color-graphics option that includes the 7220 GDC, has a high-resolution mode of 800 × 240-dot resolution with four displayable colors and a palette of 4096 colors to choose from. When operating in the

applications written for one machine to be transferred to another without being rewritten. It also includes a wide variety of "drivers," or programs, so that a single application package can run on any number of different plotters and printers.

Stan Devitt, of DRI's technical marketing staff, calls the NEC APC with the

medium-resolution mode, it offers 384 × 240 dots and 16 simultaneous colors from the same palette of 4096—more than enough to do sharp business graphics.

The graphics option on NEC's Advanced PC gives it a 1024 × 1024-pixel resolution, although the bandwidth limitation of the monitor makes this a "movable window" of 640 (horizontal) by 475 (vertical)-pixel resolution, still, by most standards, an extremely crisp resolution.

In addition, both the Rainbow and NEC machines offer the GSX graphic software system from Digital Research, Inc. (DRI), which functions as a so-called "virtual device interface." Basically this graphics system allows

7220 a "state-of-the-art" machine. "It's got hi-res, it's fast, has vivid colors and you can create extremely impressive characters."

While a DEC official concedes his company went with the 7220 because "there is no other chip like it available," he says the chip by itself has limitations.

Another company, attracted to the 7220 for its animation applications, claims to have improved the chip's performance. "We've done the most innovative work with the 7220," boasts Richard Katz, president of Vectrix Corporation in Greensborough, North Carolina. "We've pushed it to its maximum limits."

Vectrix makes a very high resolution

The Advanced Personal Computer (APC) from NEC Information Systems, model APC-H03, displays high-resolution color graphics with the optional high-resolution graphics board installed. (All photos on pages 33 and 34 are courtesy of NEC Information Systems of Lexington, Massachusetts.)

(672 × 480) color-display terminal system designed to run off several popular microcomputers.

"It's a stand-alone device with a serial and parallel port so that any computer with a printer or serial port can run it," explained Katz. The firm's $1995 unit includes a terminal that can display up to eight colors at a time from a choice of 512 colors. A $3995 model also displays up to eight colors at a time but has a choice of two million colors.

Singer/composer Todd Rundgren wrote a paint program using the Vectrix terminal and an Apple II with a graphics tablet. It is scheduled to be on display at the upcoming West Coast Computer Faire.
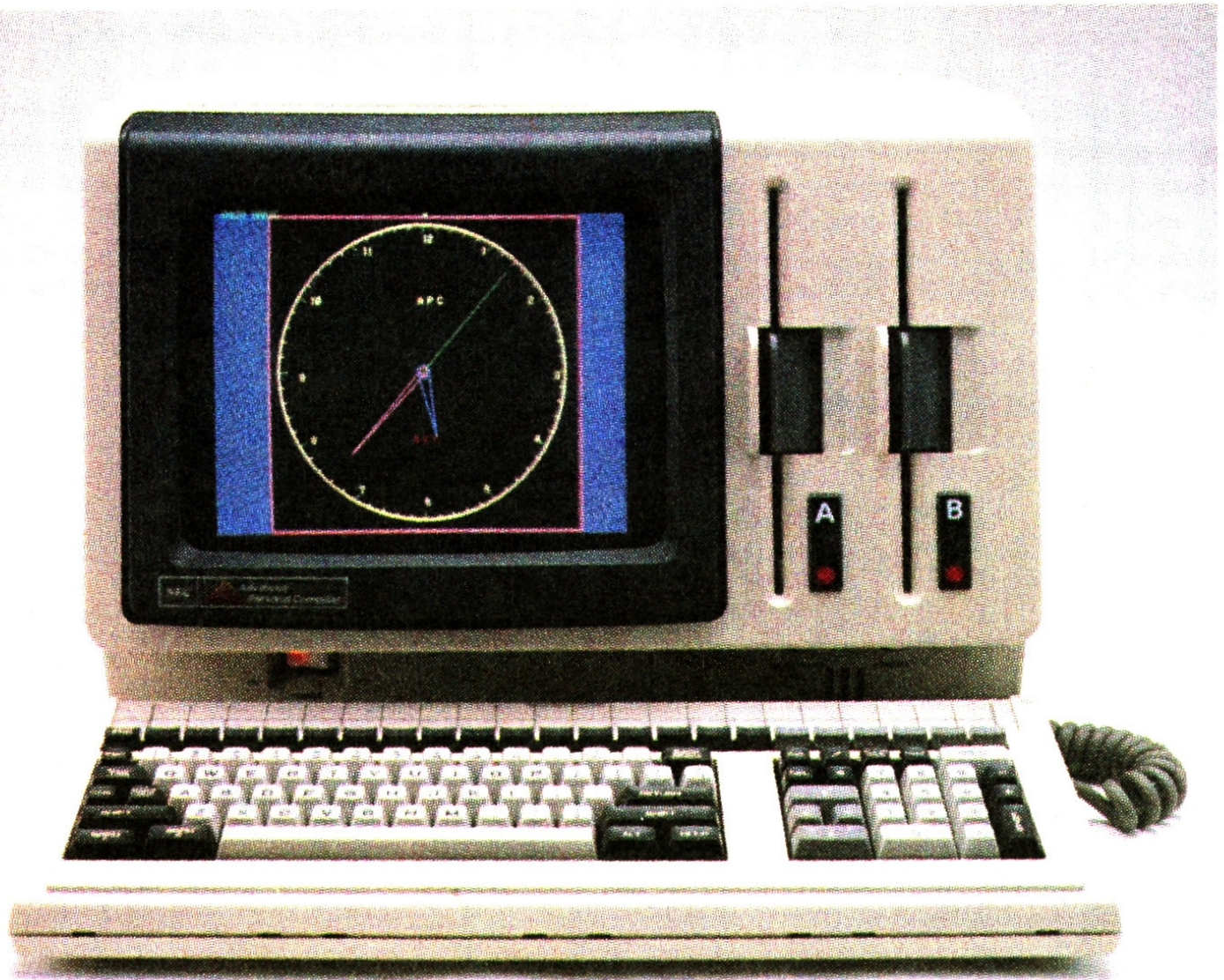
At the present time, NEC is selling about 5000 GDC's a month in this country and "many times more than that in Japan" where many computers, including NEC's APC, are manufactured.

NEC is working on a 7220-A chip that will run faster than the present model. NEC officials here say the parent company in Japan is rumored to be working on an Advanced Graphics Device Controller, which might be ready in about three years.

In the meantime, notes Scott, the 7220's potential has barely been exploited. NEC already has a voice-input board that can be added to the company's PC-8000 microcomputer. Once

Graphics

NEC

continued from preceding page
the new board, which is being designed to fit in one of the five slots in NEC's Advanced Personal Computer, is ready, it will be able to perform graphics routines in response to voice commands.
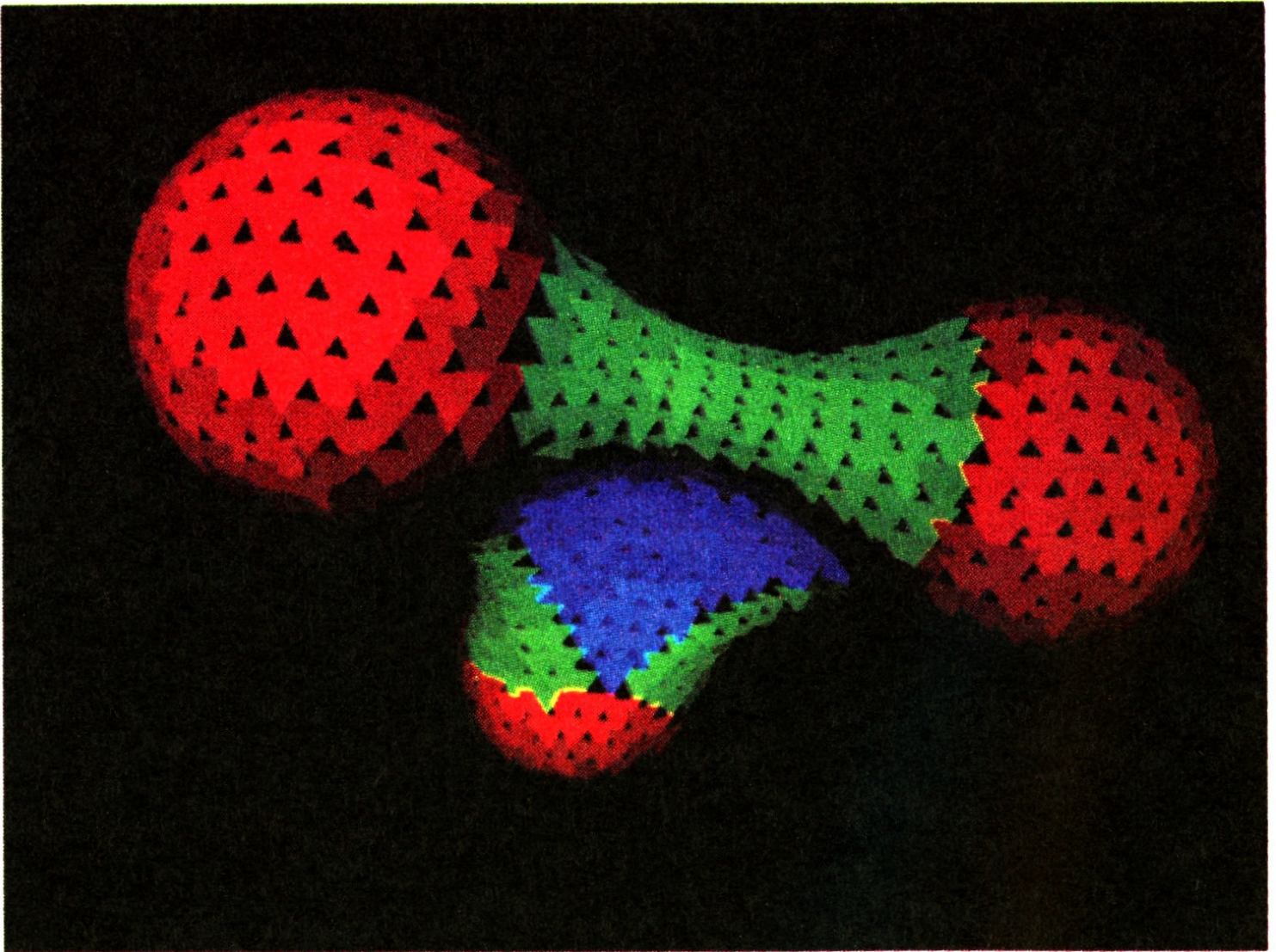
Theoretically you could "tell" the computer to graph a given range of data and separate a chunk of a pie chart and give it a different color without the user ever touching the keyboard. Similar tasks could be accomplished as quickly with other input devices such as light pens and mice that the APC can respond to.

"We're planning a lot of expansion for the APC including other intelligent peripherals," commented Scott.

One interesting product that may be out soon—either from NEC or one of several companies working on it—is a

The graphics board, which produces the graphics shown on the screen of the APC, contains an additional NEC 7220 chip and a large amount of graphics memory. There is already one 7220 in every APC for handling ROM character graphics.

printer equipped with the 7220 chip. Such a printer would be capable of storing entire multicolored or shaded images and printing them out regardless of the capacity of the monitor.

Of course, "everyone's working on a gumby," Scott told *InfoWorld*. A *gumby*, if you haven't heard, is in theory a device that allows you to create and input three-dimensional images that can then be incorporated into an existing design on the monitor or stored for use later. (*InfoWorld* will have more on gumbies in a future graphics column.)

"Other companies are probably working on imitations of the 7220, but we'll be ready to leapfrog the current technology by the time those come out," concluded Scott. ∎

NEC N5200 (APC)

NEC N5200 (APC; Advanced Personal Computer, exported to USA) designed by NEC peripheral equipment division (端末装置事業部) at Fuchu plant (府中事業場) appeared at Japanese market in April 1981, one year earlier than NEC

PC-9801 designed by NEC computer technology headquarters (コンピュータ技術本部) at Fuchu plant (府中事業場) which dominated Japanese PC market for a long time until IBM PC clone became popular in Japan in 1990's.

Both PCs implemented two µPD7220 GDCs (Graphics Display Controllers) I designed. It is no doubt that N5200 provided a terminal design idea to Apple Macintosh later on.

N5200 installed two eight inches floppy disk drives which worked under ITOS (NEC Interactive Tutorial Operation System) disk Operation System (http://museum.ipsj.or.jp/en/computer/ofos/nec/index.html). At that moment, there was no MSDOS (MicroSoft Disk Operation System) although DRDOS (Digital Research Disk Operation System) existed with no Japanese front processor implementation.

NEC peripheral equipment division requested Digital Research to make graphics library called GBIOS (Graphics Basic Input Output System). I participated in the GBIOS evaluation handling the N5200 along with an 132 columns Kanji dot matrix impact printer installed at my laboratory.

I wrote design notes and reports by Japanese word processor and spread sheet applications running on the N5200 since its early stage. I was a sole person who was able to freely handle such applications because Microsoft did not have Microsoft Word and Excel as well as Microsoft Office Suite at that time.

Downloadable Files