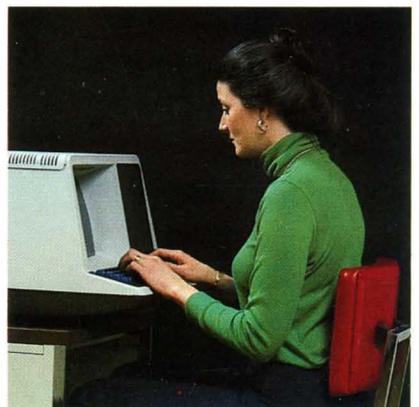
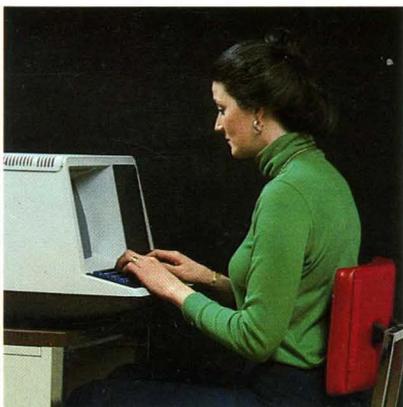


# TRAX

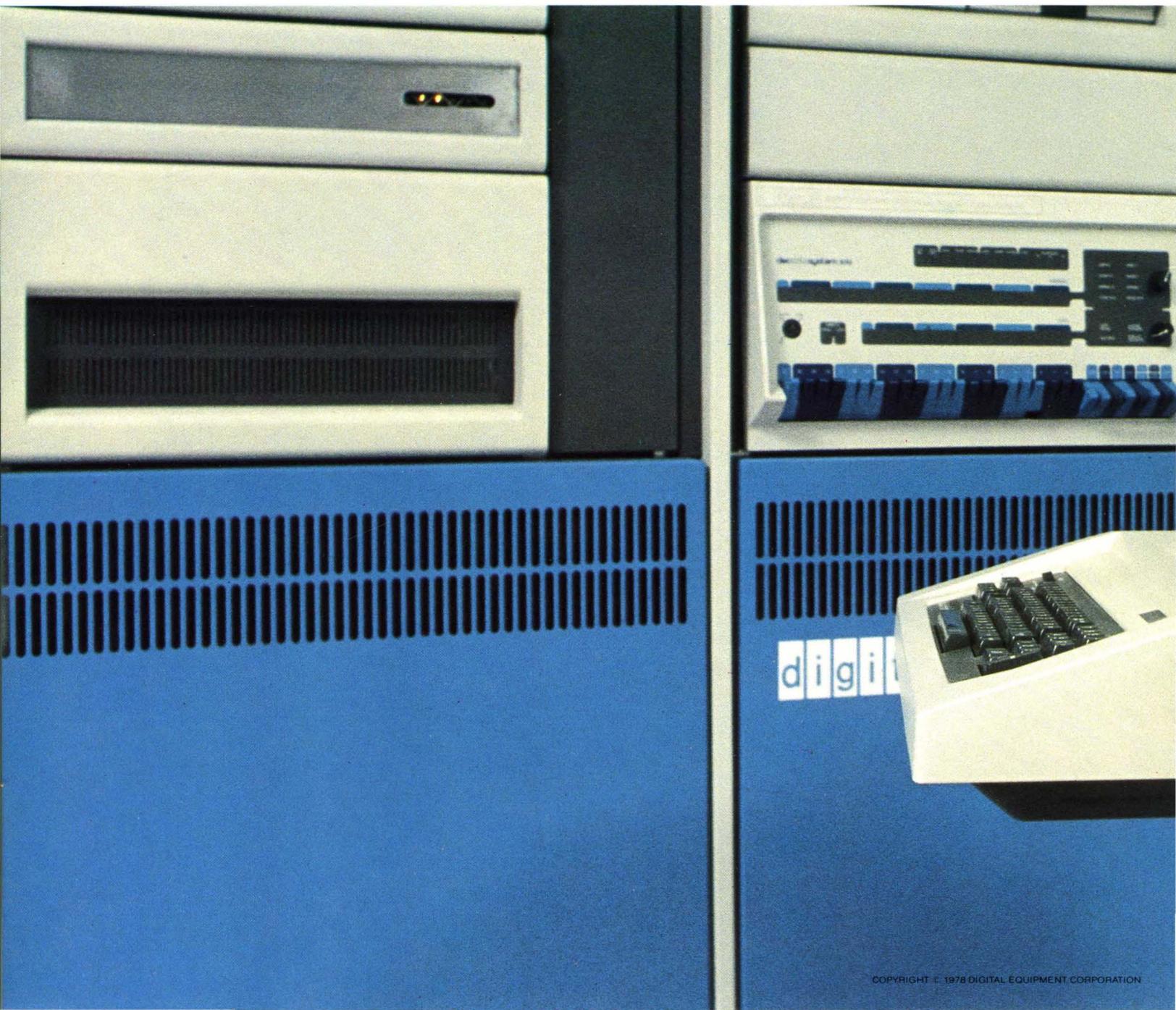
digital

THE COMPLETE  
ON-LINE TRANSACTION  
PROCESSING SYSTEM



# TRAX FROM DIGITAL.

ON-LINE TRANSACTION PROCESSING  
IS NOW A LOT EASIER.



With TRAX from Digital, solving transaction processing problems is easier—and much less expensive. TRAX has everything you need to easily develop and maintain on-line transaction processing applications. It combines the best on-line mainframe features with all the advantages of minicomputers and adds capabilities rarely found anywhere. TRAX is a totally integrated system that

economically meets managements' most demanding requirements—high performance, high uptime with assured data safety, intersystem communications, and ease of use by programmers **and** clerical workers at terminals.

TRAX is designed for high-volume transaction processing and easy application development. Its new forms-oriented terminal is very easy for the unsophisticated user. TRAX has an efficient architecture, a simplified programming style, and powerful facilities that simplify the development and maintenance of applications.

Until now, many features essential to on-line transaction processing were either unavailable or very expensive—features like automatic application recovery and restart, comprehensive data integrity, **all** programming in high level languages, distributed processing, fast terminal response and high throughput, and terminals that guide users through every transaction step. Now they're all available in TRAX—so transaction processing is much easier, and less expensive, than ever before.



## TRAX IS EASY TO PROGRAM

TRAX saves you the high cost of hiring system programmers. TRAX has all system programs built in—all you write are application programs. For



example, TRAX includes restart/recovery, staging, and forms handling capabilities.

TRAX application-design style, supported in both software and documentation, helps the application designer or analyst easily create efficient applications.

TRAX is highly approachable by application programmers who use ANSI-standard COBOL, or BASIC-PLUS-2, and a very simple forms language to write all applications easily.

Programmers write small, structured, modular tasks instead of large, complex, and hard-to-maintain application programs. Programs are created and tested interactively—so applications are developed easily and rapidly. With the English-like forms language, ATL, a novice programmer can format screens.

All files are accessed directly from COBOL or BASIC-PLUS-2. Data management services support sequential, relative, and indexed file organizations and sequential and random record access.

The built-in communications options are also used with COBOL or BASIC-PLUS-2. TRAX systems can easily talk to each other. They can also talk to mainframe systems, using TRAX

3271 protocol emulation.

In addition, comprehensive “how-to” documentation, a demonstration application, and interactive utilities make application design, programming, and system operation simpler than ever before.

## YOUR PEOPLE CAN USE TRAX EASILY

Clerical or sales people, order-takers or production expeditors can easily use TRAX without understanding computers. The smart, forms-oriented VT62 terminal—designed exclusively for TRAX systems—gives you and your terminal users these benefits:

- **Fast training.** The system guides users with menu selection and function keys so users don't need to know computer commands.



- **Fewer typing errors.** Local terminal intelligence permits instant detection and immediate correction of errors.
- **Minimized confusion.** With reverse video, automatic cursor positioning, and left and right justification, screens are easy to understand.
- **Greater feeling of control.** Smart, locally buffered terminals instantly echo typed characters.
- **Fewer misunderstandings.** Separate message and display areas make application messages to the user easy to read.
- **Increased user**

satisfaction. TRAX provides rapid application terminal response.

## TRAX SAFEGUARDS YOUR DATA

TRAX has a unique combination of features that cope with hardware, software, and human problems—to safeguard your records—to keep serving you while protecting your data.

Data integrity is assured despite hardware or software failures. TRAX provides efficient, automatic on-line **application recovery** from system crashes, power failures, resource interlock between transactions, and user and system transaction aborts. Application recovery means transactions aren't lost or reentered.

**Journaling** provides recovery from media failure without reentry of transactions.

**Staging** delays record updates until transactions are complete—so they can always be aborted with records left intact. With **record locking**, TRAX prevents simultaneous updates of records, unlike systems that severely limit user access by locking large data blocks or the entire data base.

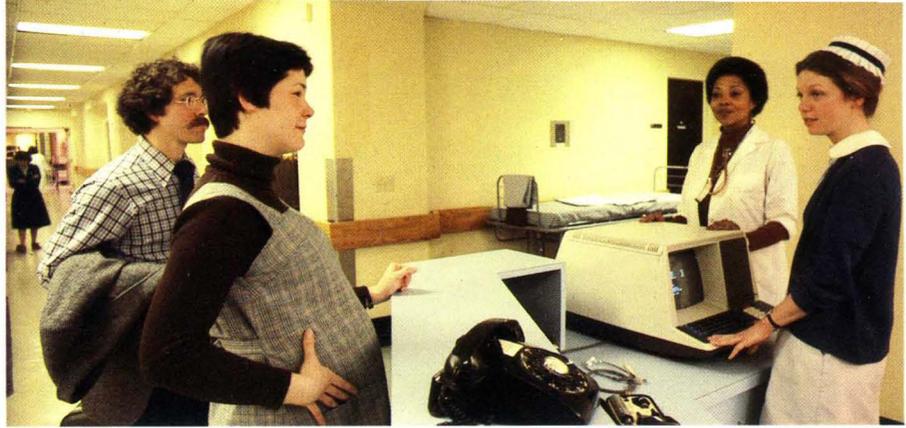
TRAX guards against unauthorized activity with user sign-ons, passwords, and identity codes. It also has user and terminal work classes that define what transactions are available to a user or a terminal.

TRAX utilities log hardware and software errors to help provide increased uptime by spotting trouble areas early.

## TRAX PERFORMS

TRAX integrates many hardware and software features that increase **system throughput** and speed **terminal response** so you benefit from:

- **High performance.** You can use Digital's comprehensive TRAX measurements to accurately estimate performance of **your application.**
- **Increased disk throughput** with software caching, multiple disk controllers, overlapped seeks, and shared, resident data management services.
- **Fast file access** because all application files are opened when the application is started.
- **Higher system throughput** with block mode transmission and auxiliary processors reducing terminal handling overhead.
- **Fast execution** and higher performance with shared system code, and small, fast application modules instead of large programs that use a lot of memory.
- **Optimized performance,** after application is in production use, with software performance monitoring and simple tuning.
- **Instant data entry validation** with local error detection in smart VT62 terminals.



## TRAX SAVES

Because TRAX provides complete transaction processing capabilities at minicomputer costs, you save in the initial system purchase. Savings continue because TRAX lifetime costs are much lower than with any comparable system.

Applications are brought up quickly using modular application design and high-level languages. You don't add highly paid system programmers to your staff. Programming time is reduced with extensive editing and debugging tools, all used on-line. System tools speed program check out—so applications get on-line fast and risks of errors during production are reduced.

System operations costs are also reduced. TRAX system-generation sets new standards of ease and efficiency. Applying updates to TRAX software is a fully automated procedure.

TRAX systems range from those based on the smaller PDP-11/34 to those based on the large and powerful 11/70 (with main memory up to four million bytes). Application programs written on one TRAX system can run unchanged on any other.

VT62 screen formats can be modified without changing the application programs that process the user-typed data.

Multidrop VT62 terminals cut communications costs by efficiently sharing lines. Choose fast synchronous or less expensive asynchronous modems.

With its 3271 protocol emulation option, TRAX is easy to integrate into your mainframe setup—TRAX may be a better

alternative than upgrading your mainframe for transaction processing.

## MINICOMPUTER IMPLEMENTATION

Compared to mainframes, minicomputer on-line transaction processing has several advantages:

- hardware is less expensive
- maintenance and development costs are lower
- environments are easier to control
- interactive capabilities are optimized
- computers are located where work is done.

Developing a mainframe transaction-processing application can be complex, costly, and time consuming. The origins of many mainframe transaction processing systems are in batch techniques; the nature of on-line transaction processing requires interactive architecture.

TRAX has minicomputer features such as an on-line forms language and interactive program development and check out performed simultaneously with transaction processing. TRAX is unique in combining minicomputer advantages, VT62 applications terminals, and sophisticated software developed specifically for transaction processing; TRAX combines the best on-line mainframe features with all the advantages of minicomputers and adds capabilities rarely found anywhere. With TRAX, on-line transaction processing is now easier than ever before.



# AN APPLICATION EXAMPLE

An example points up the benefits of on-line transaction processing and the advantages of TRAX.

If you are unacquainted with on-line transaction processing, the example should serve

as an introduction. If you are familiar with transaction processing, the example will explain the many benefits of TRAX—the complete on-line transaction processing system.

Although the example may not resemble **your** application,

it does illustrate some requirements of **all** on-line transaction processing systems...requirements such as ease of use, reliability, data protection, high performance, communications, and economy.

## A TRADITIONAL SYSTEM



Jerry down at Jerry's Auto Diagnostic Center anxiously phones Apex Automotive Supply with an order for six number 43Q gaskets that he needs for a valve job. While Jerry is on the phone, Marsha, an Apex salesperson, looks at a weekly report of inventory items and finds that eight 43Q gaskets are in stock. She then writes out an order with all customer data, including items ordered and "ship to" and "bill to" addresses. When enough orders have been received, Marsha sends them to keypunch, where an operator punches the gasket order.

If the keypunch operator cannot read Marsha's handwriting, the order must be returned for clarification. The order is then keypunched. At last the cards

are read into the computer for processing with a batch of other orders. During processing, inventory records and prices are checked against items ordered. Customer information (addresses, credit status, etc.) is checked, and picking orders are issued. For Jerry's order, however, a report is printed stating that there is no such item as number 432 gaskets. The report is routed to Marsha who looks at her copy of the original order and finds that the keypunch operator entered "432" instead of "43Q" as the gasket part.



By now hours or days have passed. Marsha must call Jerry and explain the delay, then reenter the order. No other keypunch errors occur, but when the order is again keypunched

and processed, it is found that Jerry's more recent orders for mufflers and ignition sets have exceeded his credit limit. The credit manager insists on payment before letting the gaskets ship. Again Marsha must call Jerry to explain the problem.

### EXCEPTION REPORT--INVENTORY INSUFFICIENT

27 April 1978

Customer	Cust No.	Order No.	Item	Qty. Ordered	Qty. in Stock	Qty. Short
Bovary Repair	0407	0138	ND3RJ rotor	10	08	02
Carmo's	0077	0151	37ZR77 exhaust	01	00	01
Jerry's Auto	0893	0074	430 gasket	06	05	01
Rainbow	0210	0049	M45-R3 bracket	25	18	07
Utrillo Service	0190	0120	7084J clamp	100	00	100

Jerry insists that he sent a payment a few days ago. Checking with bookkeeping, Marsha confirms this but finds that payments received the day Jerry's check arrived are still in keypunch, yet to be processed and applied to customer accounts.

Late in the day the credit manager agrees that Jerry's account is okay to ship, and his order is resubmitted the next day for processing. The order is again processed, but a report is issued stating that only five 43Q gaskets are in stock because three were sold since Marsha's last weekly inventory report was printed\*.

### EXCEPTION REPORT--CREDIT INSUFFICIENT

26 April 1978

Customer	Cust No.	Order No.	Order Amt.	Balance	Credit Limit	Credit Exceeded
Acme Body	0453	0087	234.17	192.00	300.00	126.17
B & T Repair	0048	0081	16.40	0.00	0.00	16.40
Dart Garage	0193	0104	870.34	704.80	1000.00	575.14
Jerry's Auto	0893	0074	24.00	492.00	500.00	16.00
Long's Station	0329	0132	77.00	0.00	50.00	27.00
Rainbow	0210	0049	134.40	885.35	1000.00	19.75
Terry's Service	0427	0060	442.00	7835.75	3000.00	277.75



\*While it is perhaps unlikely that all these mishaps would occur in just one case, the narrative is intended to point up the inherent constraints of batch processing.

# THE NEW ALTERNATIVE

Jerry throws up his hands and decides to order the gaskets from Sleek Auto. There, people use a TRAX transaction processing system to manage his account quite differently.



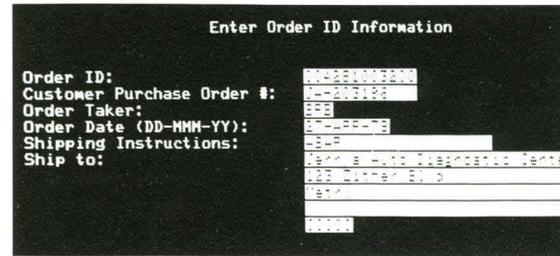
Jerry speaks to Steve who sits at a VT62 applications terminal, a part of the Sleek TRAX system.

Having been burned before, Jerry tells Steve he wants to order six 43Q gaskets and asks Steve to make sure Sleek's inventory and his credit are sufficient.



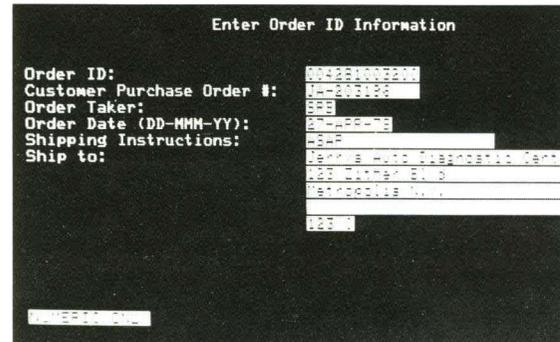
Steve requests the first form of the Enter Order transaction.

Moving the terminal cursor to the Enter Order transaction listed on his transaction-selection menu, Steve presses the SELECT key which confirms his selection by highlighting "Enter Order" in reverse video. Steve then presses the ENTER key, and a form appears with the cursor positioned at the beginning of the "customer ID number" field, prompting for Jerry's customer identification number. Because Jerry doesn't know his ID number, Steve moves the cursor and enters instead "Jerry's Auto Diagnostic Center" in the customer name field also provided on the form. Steve then hits the ENTER key. The alternative look-up capability (by customer number or name) is made possible by TRAX's multikey ISAM feature.



Steve types Jerry's ordering information.

Steve inadvertently hits the letter "T" instead of a "6" while typing where the form and automatic cursor positioning prompts for Jerry's ZIP Code. At the instant he hits the "T," the terminal buzzes, an error light comes on, and the message "numeric only" appears on the screen's error line. The cursor



Terminal responds instantly to typing errors.

does not move, nor does the letter appear on the screen. Steve corrects this error,

detected in the terminal's microprocessor without CPU involvement, by pressing the RESET key and typing the number "6."

## TRANSACTION SELECTION

- DDCST - Add Customer Record
- ADDSTK - Add Stock Record
- APPPAY - Apply Payments
- CHNCST - Change Customer Data
- CHNSTK - Change Stock
- CSHSAL - Cash Sale
- DPYBCK - DISPLAY Back Orders
- DPYCYST - DISPLAY Customer Data
- DPYINV - DISPLAY Invoice
- DPYORD - DISPLAY Order
- DPYSTK - DISPLAY Stock
- ENTER - Enter Order
- PROBCK - Process Back Orders
- RCVSTK - Received Stock
- SHPFORD - Ship Order

Transactions Steve can use are displayed on his terminal.

## TRANSACTION SELECTION

- DDCST - Add Customer Record
- ADDSTK - Add Stock Record
- APPPAY - Apply Payments
- CHNCST - Change Customer Data
- CHNSTK - Change Stock
- CSHSAL - Cash Sale
- DPYBCK - DISPLAY Back Orders
- DPYCYST - DISPLAY Customer Data
- DPYINV - DISPLAY Invoice
- DPYORD - DISPLAY Order
- DPYSTK - DISPLAY Stock
- ENTER - Enter Order
- PROBCK - Process Back Orders
- RCVSTK - Received Stock
- SHPFORD - Ship Order

Terminal confirms selected transaction.

## Customer Identification

Customer #:

Customer Name:

Terminal displays first form of Enter Order transaction.

## Customer Identification

Customer #:

Customer Name:

Steve types customer name where prompted by form.

Almost instantly, the screen shows a return form which displays the order number and date, and prompts Steve to enter Jerry's purchase order number and shipping instructions.



Steve works on a commission, so he'd never want to damage the system. But there's no way he can even **accidentally** use operating system commands—the VT62 hardware and software is isolated from them. In addition, Steve must sign on to his terminal whenever he starts to work. Anyone who came along while Steve was not signed on would need a user identification and password to use the terminal.

## TRAX DELIVERS

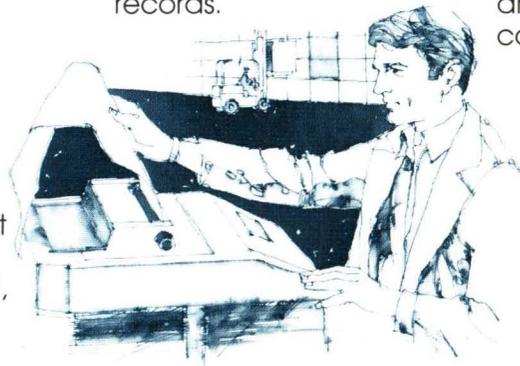
As he talks to Jerry, Steve has been able to find out that the gaskets are in stock and that Jerry's credit is good. This information reflects the moment's reality, not the status of files in an outdated report generated during a batch run. And now, after he presses the key to enter Jerry's gasket order, a picking slip starts to print on a remote Digital printer attached to a VT62 terminal in Sleek's warehouse on Commerce Street across town from the Main Street office, where Steve works. The order is rapidly picked, packed, and shipped. Hardware-implemented DDCMP communications ensure the accuracy of all TRAX data transmission.

## REMOTE TERMINALS

In the Commerce Street warehouse, Sleek's busy shipping and receiving department has several VT62 terminals handling their transactions. When

the picking slip is handed in and the gaskets packed, a clerk enters Jerry's shipment on a VT62 terminal. The application designer has dedicated the warehouse terminals to the Ship Order and Receive Stock transactions. Since there are no other transactions needed in this location, the terminals here are limited to these two. The Ship Order transaction entered for Jerry's gaskets automatically generates other transactions in Sleek's TRAX system that

- issue, on another printer in the warehouse, a packing list to include with Jerry's shipment
- adjust Jerry's accounts receivable and credit records, and print an invoice
- update Sleek's inventory records.

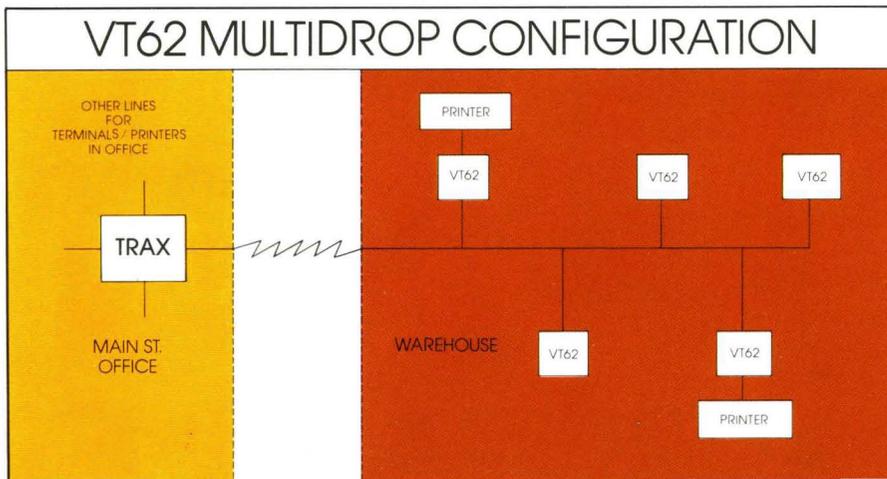


The invoice immediately issued as a result of the Ship Order transaction lets Sleek bill for goods the same day they're shipped. This reduces the average time between sales and payments compared to batched billing. With their large volume of business, this cash flow improvement is very important to Sleek.

With transactions designed to print reports automatically when inventory items are low or out, Sleek personnel spot reordering situations as they occur. They can thus keep inventories smaller than is possible with weekly checking and ordering procedures.

Communications costs are low because only one phone line is needed for all the terminals and printers in Sleek's Commerce Street warehouse. The VT62s in the warehouse are multidrop terminals that share one line to the TRAX system in Sleek's Main Street office, where Steve works. Each printer in the warehouse shares a microprocessor and line interface with a VT62. However, a printer is independent of its associated VT62 so far as the application programmer and terminal users are concerned.

## VT62 MULTIDROP CONFIGURATION





WORLDWIDE ENTERPRISES WORLDWIDE ENTERPRISES

## TRAX COMMUNICATIONS OPTIONS

Sleek Auto is a subsidiary of Worldwide Enterprises, a large firm headquartered in Chicago, nearly a thousand miles from Sleek. There, a mainframe computer in Worldwide's central data processing facility is interactively kept up to date on Sleek's activities via TRAX 3271 protocol emulation. Other Worldwide subsidiaries also have TRAX systems, so Worldwide managers can stay on top of activities in all their operational areas. And TRAX systems in different Worldwide subsidiaries can talk to one another over dial-up lines, with one TRAX system generating remote transactions in another, using the TRAX-to-TRAX communications option. One TRAX system can, for example, locate a part in the inventory of another.

## EXPENSIVE UPGRADE AVOIDED

Worldwide Enterprises has even installed a TRAX system to handle transaction processing in their Chicago headquarters. Adding a TRAX system that communicates with their mainframe via 3271 protocol emulation was faster and more economical than upgrading the large computer to handle on-line transaction processing.

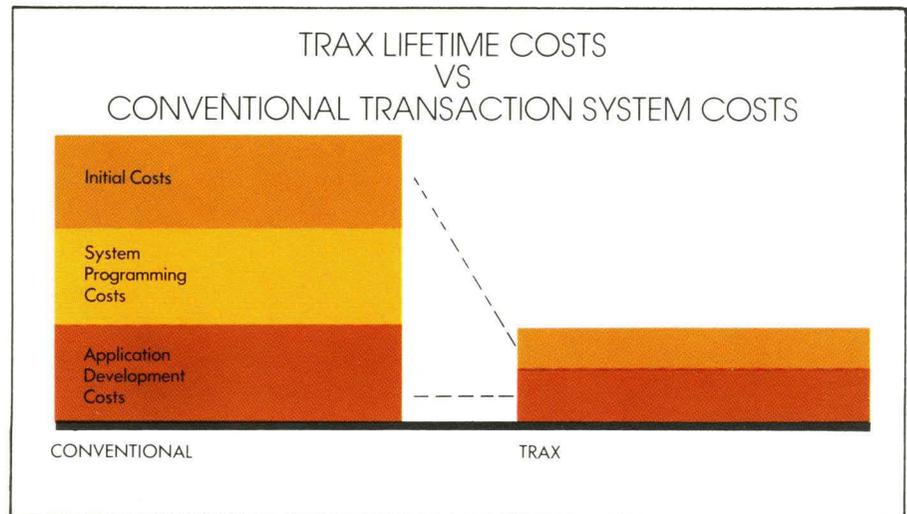
## PROGRAMMER APPROACHABILITY

Sleek's application programmer was able to write all local and remote-to-Chicago communications code in COBOL. In fact, system programmers from Worldwide's mainframe staff did not have to visit Sleek — **TRAX applications never require system-level programming.**

TRAX has all system programs built in. So all the Sleek programmer had to write were

the applications. Using COBOL, the simple forms language, and several TRAX utilities, Sleek's programmer was able to write, debug, and get applications on-line in months instead of years.

easy-to-use management tool, helps Sleek executives make ad hoc inquiries and prepare reports analyzing inventory, purchasing, and cash flow. The data used for these reports is always accurate to the minute —



## TRAX PERFORMANCE

Our story ends happily. Jerry receives his gaskets the next day. Steve and his many co-workers who use VT62s at Sleek's TRAX installation are as happy with its rapid terminal response as is Sleek's management with TRAX throughput. And because Digital has comprehensive performance measurements of emulated but realistic applications, the TRAX system configured by the Digital salesperson and software specialist performs as Sleek desired.

## TRAX PROVIDES MANAGEMENT INFORMATION

Sleek puts their TRAX system to use in a host of applications. TRAX is used for accounts payable, materials management, fixed asset management, project management, and purchase orders, as well as for the order entry, credit verification, inventory, picking, shipping, receiving, and accounts receivable transactions already mentioned. DATATRIEVE, an optional,

a primary benefit of on-line transaction processing.

## TRAX AND YOUR APPLICATION

As with Sleek Auto, business events — transactions — are probably the nuts and bolts of **your** daily operations. If accurately capturing and quickly processing transaction data into meaningful information can aid the operation and management of your organization, you may want to learn more about TRAX. A Digital sales representative can explain TRAX features — and the benefits your organization can expect from TRAX.

### TRAX SUPPORTED DEVICES

Max. Memory	Disks	Tapes	Terminals	Line Printers
<b>PDP-11/34</b>				
256KB	RK07 — 28MB RM02 — 67MB RP04 — 88MB RP05 — 88MB RP06 — 176MB	TE16 — 1600bpi, 45ips TU16 — 1600bpi, 45ips TU45 — 1600bpi, 75ips	LA36 VT52 VT62 LA180	LP11 — 96 char, 132 col
<b>PDP-11/60</b>				
256KB	RK07 — 28MB RM02 — 67MB RP04 — 88MB RP05 — 88MB RP06 — 176MB	TE16 — 1600bpi, 45ips TU16 — 1600bpi, 45ips TU45 — 1600bpi, 75ips	LA36 VT52 VT62 LA180	LP11 — 96 char, 132 col
<b>PDP-11/70</b>				
4MB	RM03 — 67MB RP04 — 88MB RP05 — 88MB RP06 — 176MB	TE16 — 1600bpi, 45ips TU16 — 1600bpi, 45ips TU45 — 1600bpi, 75ips	LA36 VT52 VT62 LA180	LP11 — 96 char, 132 col

**digital**

**Digital Equipment Corporation, Maynard, Massachusetts 01754**  
**Digital Equipment Corporation International (Europe), Geneva, Switzerland**