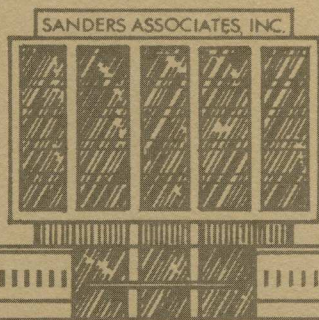# 620-720

DATA COMMUNICATION SYSTEMS

15 November 1968

SA **SANDERS ASSOCIATES, INC.** **DATA SYSTEMS DIVISION**

*T.M. Sanders Associates, Inc.
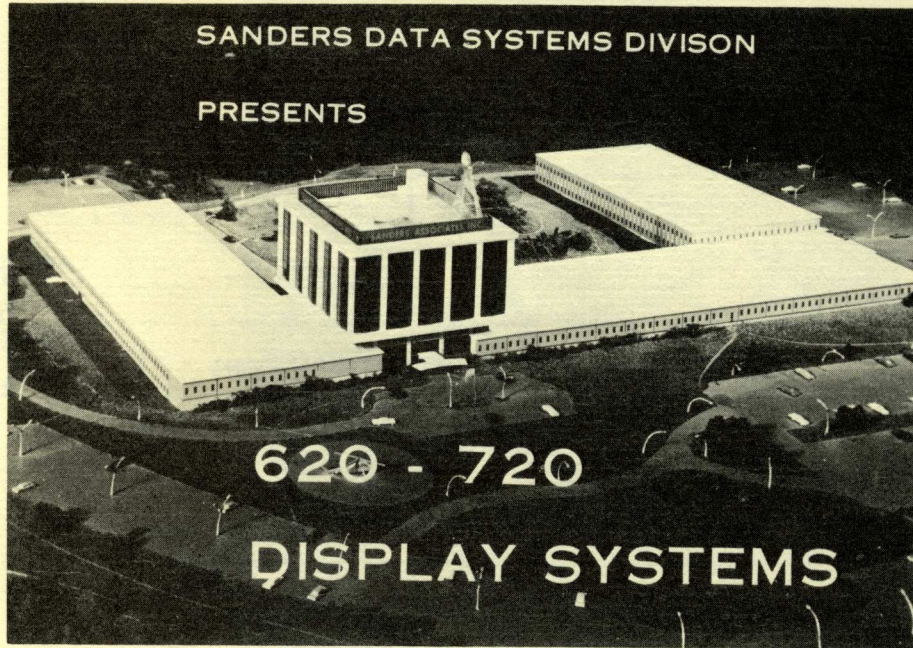
620-720 DATA DISPLAY SYSTEM

CONTENTS

620-720 DATA DISPLAY SYSTEM

SANDERS DATA SYSTEMS DIVISON

PRESENTS

620 - 720

DISPLAY SYSTEMS

INTRODUCTION

The Data Systems Division of Sanders Associates, Inc. was founded to provide a large research, marketing and support organization for the sale of commercial data displays. Since its inception, through continuing research and product development, the Division has become recognized as an industry leader offering a variety of sophisticated and reliable alphanumeric displays and peripheral equipment and providing nationwide field support. This publication is intended for management personnel and presents the Data Systems Division product line, discusses system configurations and software considerations in a formal manner. Should any questions arise several Technical Publications are available and the local Sanders Representative will be pleased to provide all assistance possible.

620/720 DISPLAY SYSTEMS

Sanders Data Systems Division which is housed in the new Corporate Headquarters building; South Nashua, New Hampshire is proud to present the 620/720 Display System Product Line.

SA

SA

COMMERCIAL
DISPLAYS

ENGINEERING   MANUFACTURING
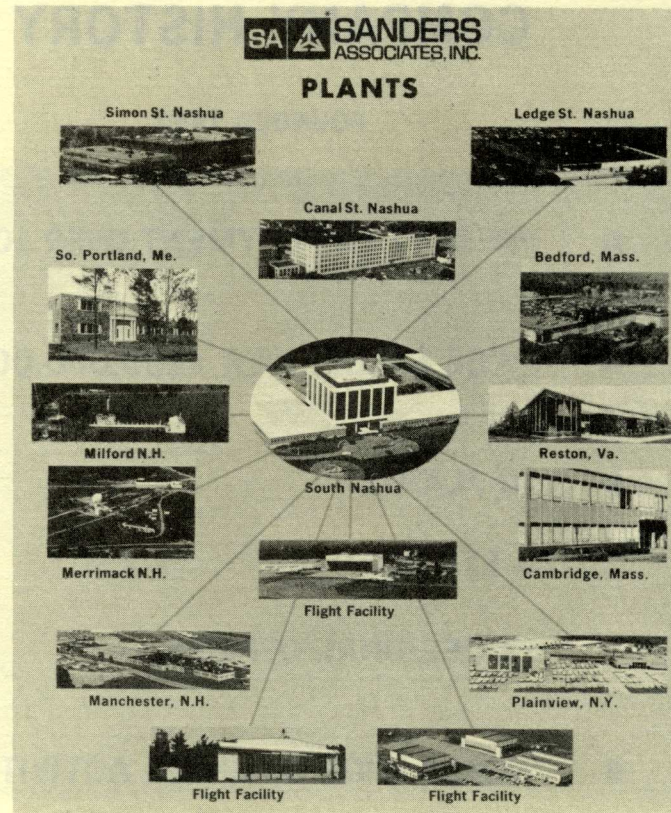
GLOBAL
COMMUNICATIONS   SOFTWARE   INFORMATION
RETRIEVAL
AND
DISPLAY

Sanders Associates since its
inception has been deeply in-
volved in electronics and
communications.

SA

The company is playing an ever in-
creasing part in many vital roles
for our country. Counterclockwise,
beginning in the upper left, we see
illustrated our:

- Ocean Systems installations
  at Nashua, New Hampshire;
  Portland, Maine; and Milford,
  New Hampshire

- Electronic countermeasures
  test range at Merrimack,
  N.H.

- Flexprint Division and flight
  facilities at Manchester, N. H.

- Test stand construction at
  Plainview, New York, location
  of the Sanders/Diebold 500 Data
  Retrieval System

- Mithras Division in Cambridge,
  Mass. laser development and
  nuclear research

- International Ground Support
  Division located at Reston,
  Virginia

- Fuzing and Arming develop-
  ment and manufacturing
  facilities at Bedford, Mass.

- Microwave research and
  development located at
  Ledge Street in Nashua, N.H.

- Main manufacturing facility
  at Canal Street in Nashua and

- New Corporate Headquarters
  featured as the centerpiece
  located in South Nashua.

Sanders also has sales offices in most major cities in the United States and
an International Office in London, England and Toronto, Canada.

COMPANY HISTORY

- **PRESENT EMPLOYMENT OVER 10,000**

- **FY'68 SALES OVER $190,000,000**

- **10 PLANTS**

  5 STATES

  12 REGIONAL OFFICES

- **WORLD WIDE BUSINESS ACTIVITIES**

Sanders is a dynamic, highly responsive user oriented, electronic systems company now employing over 10,000 people.

Sanders Associates, Inc., was founded in 1952 by Royden C. Sanders Jr. and eleven other Raytheon employees who were involved in the development of continuous wave radar.

SA △ *
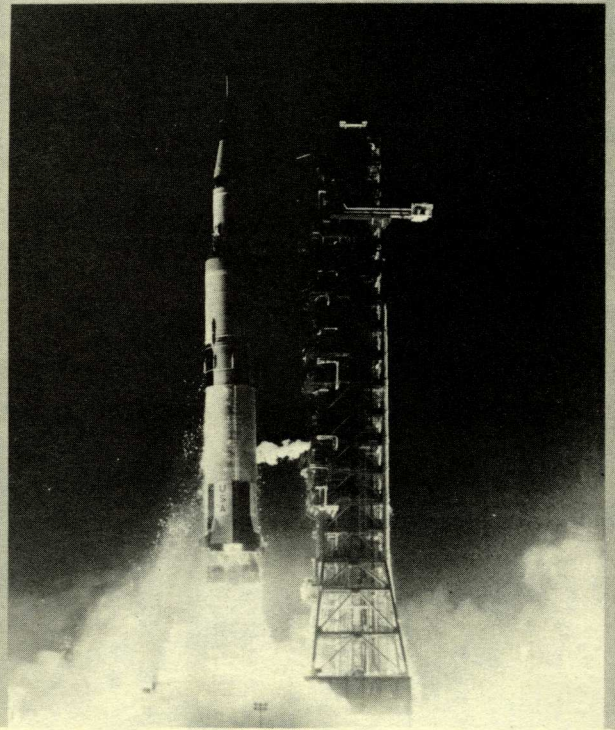
SATURN V

Sanders Associates, Inc. has many years background and experience
in computer controlled data management systems for both military
and commercial applications.

Sanders contributed to the monitoring and control of the mighty
Saturn V rocket shown at lift-off!

SA △

SATURN V CONTROL ROOM
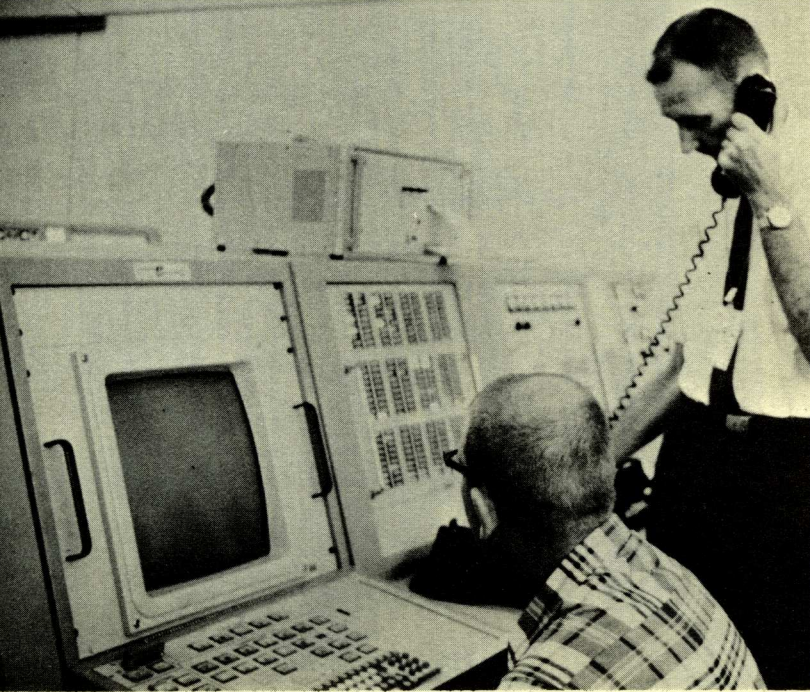
A view of the Saturn V control room.

Four similar complexes, each with 28 large high speed Sanders Graphic Displays, monitor and control each Saturn V launch.

SA △

HISTORY OF DISPLAY SYSTEMS DEVELOPMENT

Development of Display Systems at Sanders.

1965	'66	'67	'68

SATURN V SYSTEM

720 COMMUNICATION SYSTEMS

960 HIGH SPEED GRAPHIC DISPLAY

920 TABULAR DISPLAY

980 REAL TIME PROJECTION DISPLAY

ADVANCED DIGITAL DISPLAY SYSTEM

ELECTROLUMINESCENT DISPLAYS

620 COMMUNICATION SYSTEMS
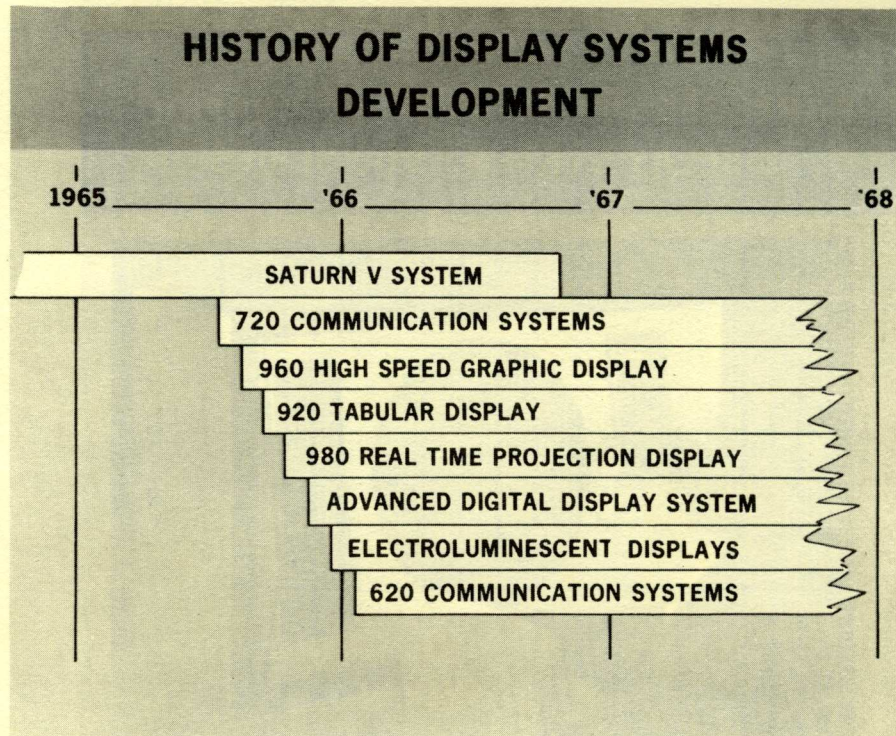
The unique high speed yoke developed for the complex Saturn V Monitor System is incorporated in the 620/720 display line providing special features. Integrated circuits throughout make low cost possible.

SA △

7

COMPUTER DRIVEN HI-SPEED GRAPHIC DISPLAY SYSTEM - 900 SERIES
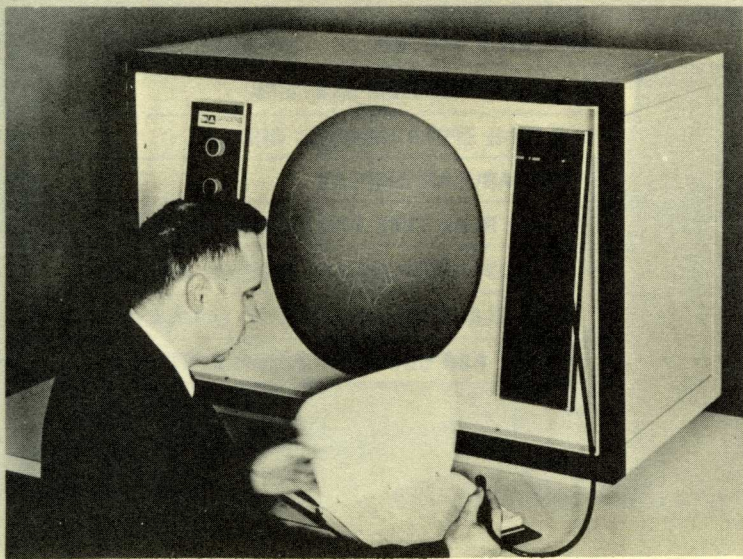
The 960 display system depicted here is a high speed Graphic Display with the following features:

- 20 inch diameter viewing area

- Up to 6000 alphanumeric characters

- Up to 10,000 inches of vectors at 500,000 inches per second

- Various character sizes

- CPU core memory for refresh

- Photopen

SA ◣

COMMERCIAL DISPLAYS

SANDERS 720 DISPLAY SYSTEM
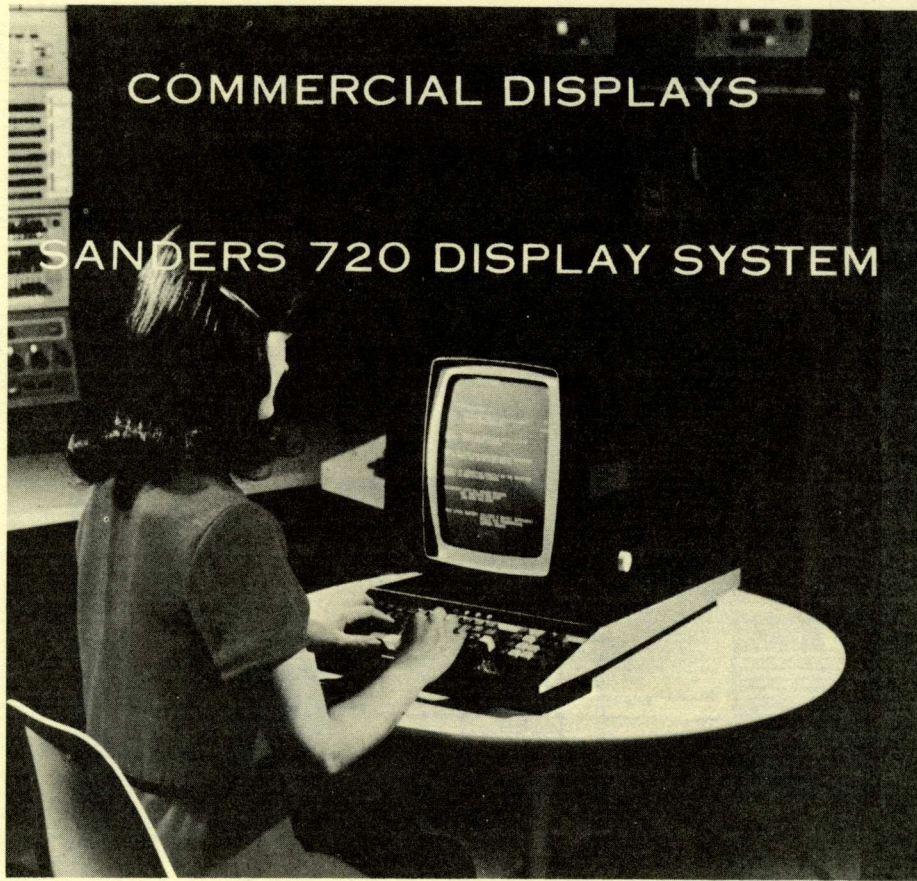
The preceding pages illustrate the company's wide experience in display design and development and expertise in all areas. The 720 system was a logical development from the larger Saturn V Monitors and the 620 followed to fill needs expressed in a very comprehensive market survey taken in 1967.

SA △*

MAJOR COMPONENTS OF
SANDERS 720 SYSTEM

- MODEL 731 DATA COMMUNICATIONS BUFFER
  (COMPUTER INTERFACE)

- MODEL 701 CONTROL UNIT

- MODEL 708 DISPLAY TERMINAL

- MODEL 7242 KEYBOARD

IBM SYSTEM 360 — 731 DCB / 701 CONTROL UNIT — 708 DISPLAY — KEYBOARD 7242
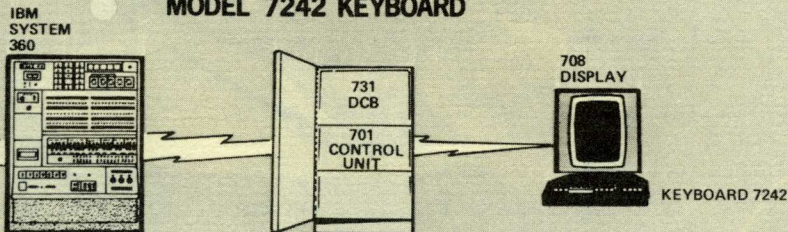
Major Components of Sanders
720 System.

- Model 731 Data Communications Buffer (Computer Interface)

- Model 701 Control Unit

- Model 708 Display Terminal

- Model 7242 Keyboard

The functions and operational features of the above components will
be described in order as this presentation develops.

SANDERS 731
DATA COMMUNICATIONS BUFFER
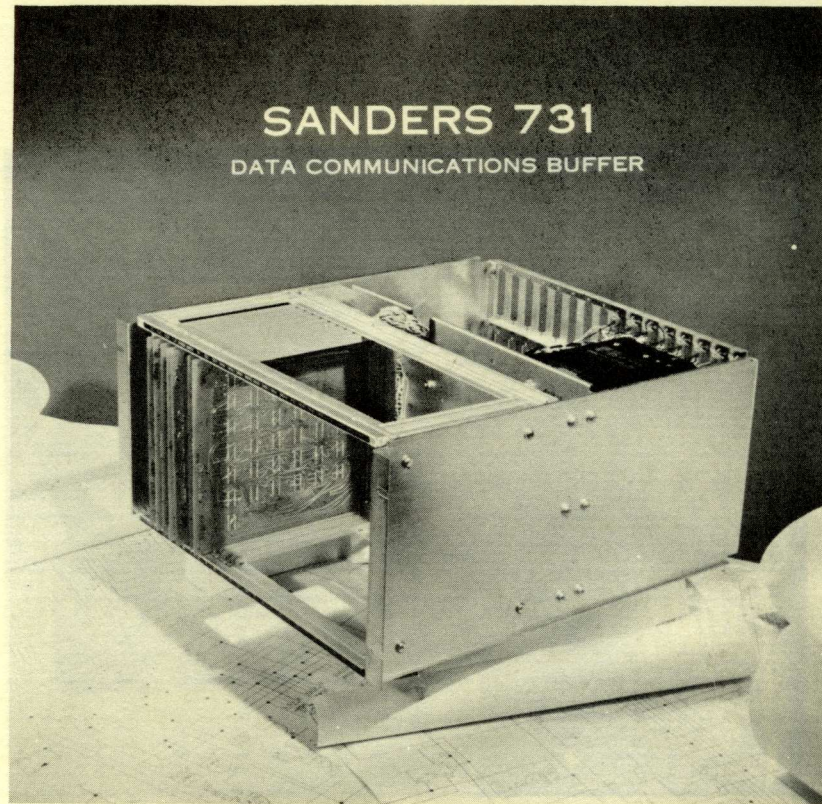
The Sanders 731 Data Communication Buffer (D.C.B.) is a small sophisticated piece of logic and electronic design serving as an interface between IBM Model 360 computers and Sanders 620 and 720 Commercial Data Display terminals.

SA ▲*

731 RACK
MOUNTED IN
CONTROL
UNIT CABINET
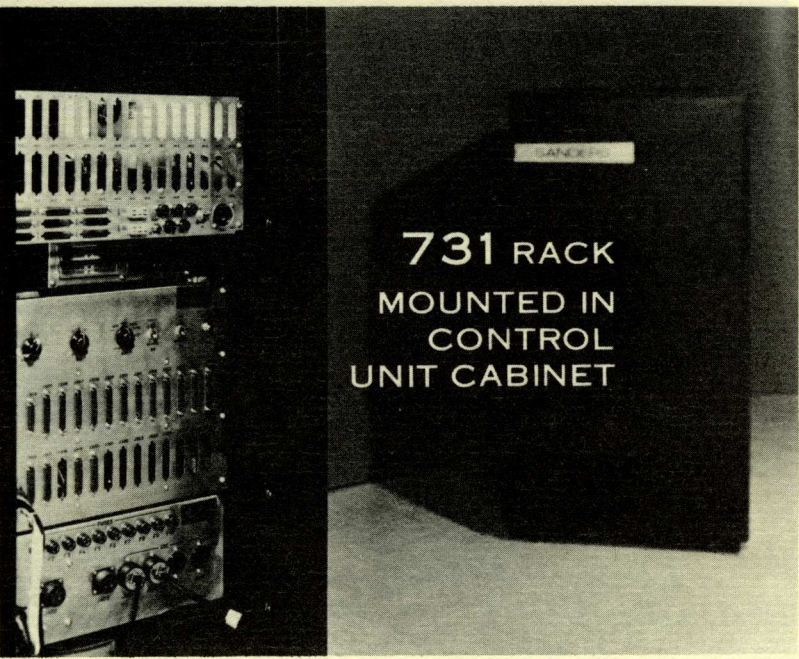
The D.C.B. is housed in the upper portion of a cabinet which can also contain a control unit and power supply. It occupies approximately 12 vertical inches of rack space.

SA ▲
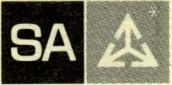
Back Panel - Data Communications Buffer

COMMUNICATION LINE CONNECTIONS FOR LOCAL OPERATION

DATA PHONE CONNECTIONS

EPO CABLE CONNECTIONS
(EMERGENCY/POWER OFF)

ON/OFF
SWITCH

RESET
BUTTON

TAG OUT   TAG IN

DATA OUT   DATA IN

CHANNEL
CONNECTIONS
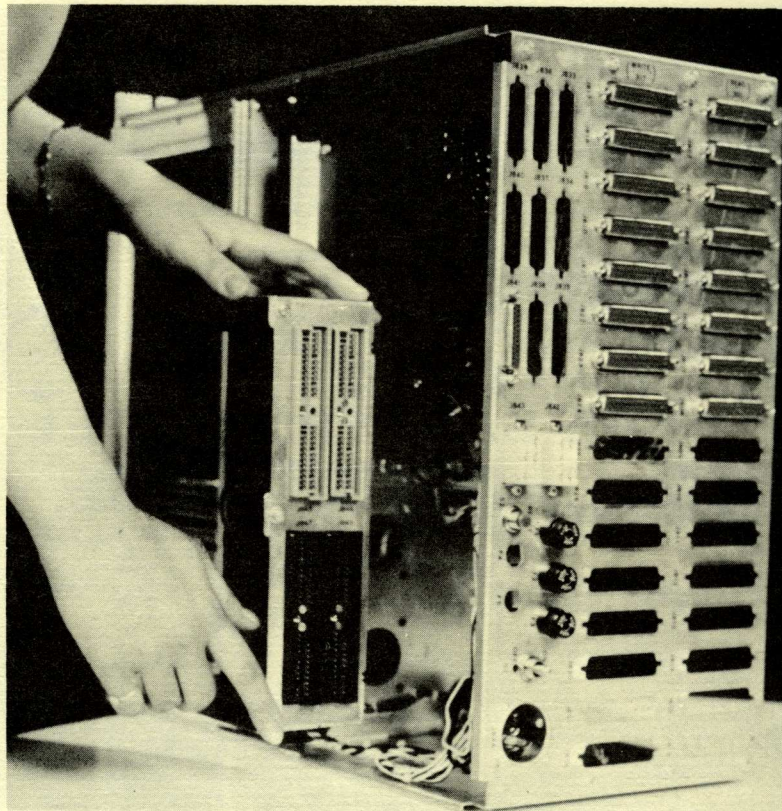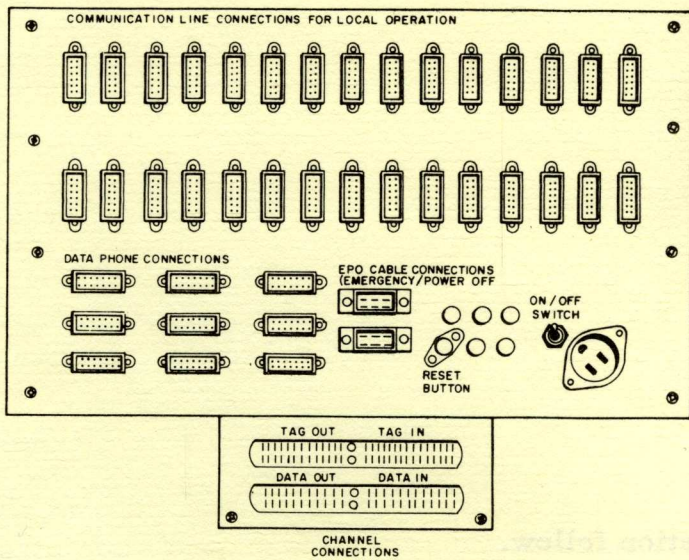
This back view features tag and data line channel connections and communication line connections for local and remote operation.

SA

WHY ?

THE SANDERS MODEL 731

The answers to this important question follow.

This interface provides complete IBM System 360 compatibility for:

● Models 30, 40, 44, 50 and 65

● Local and remote mode at varying transmission speeds

● The latest release of IBM supported Access Methods and Operating Systems without modification to IBM software.

● Replaces IBM 2701 Data Adapter Unit which can only maintain two full-duplex communication lines at a major cost reduction per line.

SA △

*T.M. Sanders Associates, Inc.

MODEL 731-O
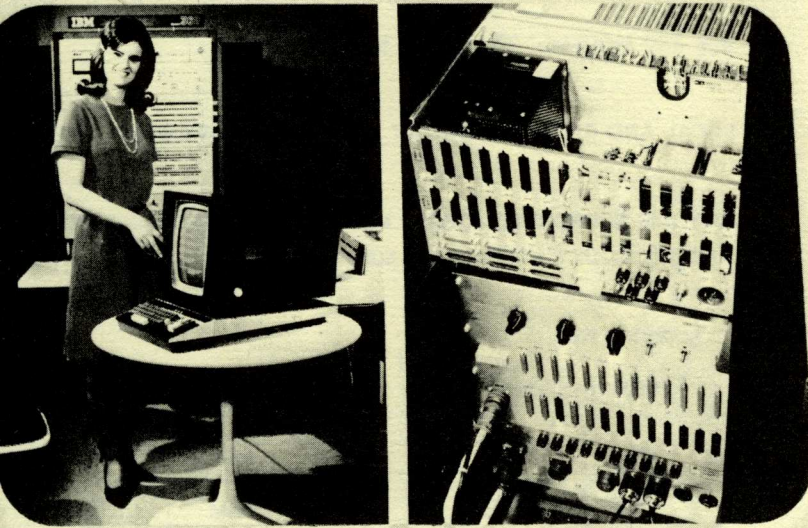
LOCAL TRANSMISSION

DATA COMMUNICATIONS BUFFER

Local Transmission

If high speed local transmission capabilities are required, the Sanders 731 MOD O Data Communications Buffer is designed and engineered to fill your needs. It is a very compact unit measuring only 20 × 17.5 × 12 inches.

SA ▲

Features

FEATURES OF THE
LOCAL DATA COMMUNICATIONS BUFFER

- BURST MODE OPERATION
- BIT PARALLEL
- BYTE SERIAL
- TRANSMISSION AT 47.5 CHARACTERS PER SECOND (AVE)
- FROM 1 TO 8 PARALLEL TRANSMISSIONS ADAPTERS
- EMPLOYS VERTICAL AND LONGITUDENAL CHECKING (VRC & LRC)

360 SERIES

| USER PROGRAM |
| ACCESS METHOD |
| OPERATING SUPERVISOR |

MODEL 731-0 DCB	SELECTOR CHANNEL
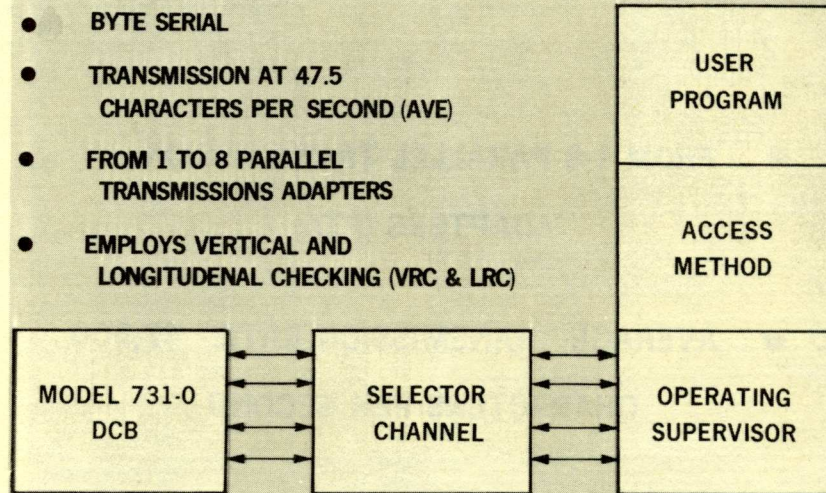
The 731 MOD O is intended for use on the selector channel and operates in burst mode at an average transmission rate of 47.5K characters per second. The 731 MOD O is shown terminating the channel but it can be located at any position on the channel as it handles I/O lines with standard channel control responses.

SA ▲

SANDERS 731-0 DCB
LINE ADAPTER OPTIONS

- FROM 1-8 PARALLEL TRANSMISSION

    ADAPTERS (PTA)

- AVERAGE TRANSMISSION RATE: 47,500

    CHARACTERS PER SECOND

The Model O is capable of sustaining eight communication lines con-
nected by means of Parallel Transmission adapters. The average
transmission rate is 47,500 characters per second.

SA ▲

SANDERS 720 COMMUNICATION SYSTEM
CONFIGURATION FOR LOCAL CONNECTION
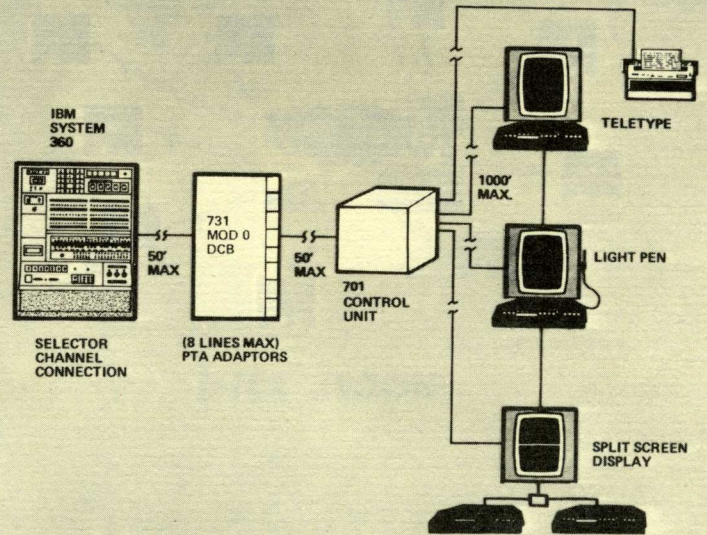
A typical configuration for local operation for the Sanders 720 Display
System. Some peripheral options are also shown. The light pen will
rapidly position the cursor anywhere on the screen and the split screen
option enables two operators, each with separate keyboard, to operate
the display independent of one another.

DATA COMMUNICATIONS BUFFER
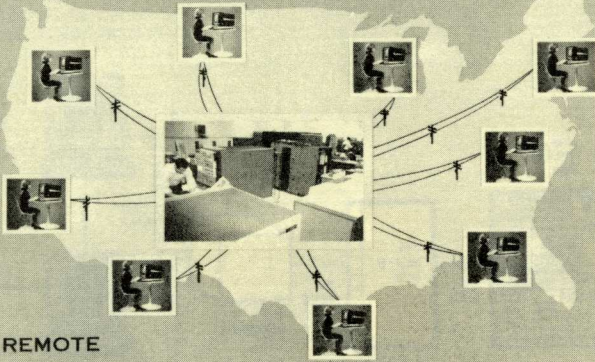
REMOTE
TRANSMISSION

MODEL 731-1

Remote Transmission

The Sanders Model 731-1 D.C.B. is used to interface remote 620/720 Communications Systems to IBM system 360 computers.

SA ▲*

FEATURES
OF THE
REMOTE DATA COMMUNICATIONS BUFFER

- OPERATES IN CHARACTER MULTIPLEX MODE
- BIT SERIAL TRANSMISSION
- MULTIPLEX 1 TO 8 DEVICES
- EMPLOYS VERTICAL AND LONGITUDINAL
  (VRC & LRC)

360 SERIES

| USER PROGRAM |
| ACCESS METHOD |
| OPERATING SUPERVISOR |

MODEL 731-1 D.C.B. ←→ MULTIPLEXOR CHANNEL ←→ (360 SERIES blocks)
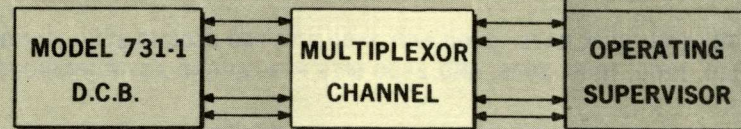
This unit is attached to the IBM Multiplexor channel and operates at various transmission speeds from 110 bits per second to 2400 bits per second.

SA △ *

SANDERS 731-1 DCB

LINE ADAPTER OPTIONS

(ANY MIX OF 1-8)

ASYNCHRONOUS MODEM ADAPTERS (AMA)

TRANSMISSION RATE: 110, 1200, 1800, 2000, AND 2400 BITS PER SECOND

OR

SYNCHRONOUS MODEM ADAPTERS (SMA)

TRANSMISSION RATE: 2000 AND 2400 BITS PER SECOND

OR

SERIAL TRANSMISSION ADAPTERS (STA)

TRANSMISSION RATE: 2000 AND 2400 BITS PER SECOND SYNCHRONOUS
110, 1200, 1800, 2000, AND 2400 BITS PER SECOND ASYNCHRONOUS

NOTE: THIS ADAPTER PROVIDES FOR DIRECT CABLE
CONNECTION TO THE 720 DISPLAY

* COMPATABLE WITH COMMON CARRIER DATA SETS AND MODEMS

The Model 1 houses up to eight transmission line adapters. Three types
of adapters are available offering a variety of data transmission speeds
and any mix is allowable.

The Serial Transmission Adapter allows for direct cable connection
between the display system and the computer interface without the use
of a data set.

SA △

**SANDERS 720 COMMUNICATIONS SYSTEM
CONFIGURATION FOR REMOTE CONNECTION**
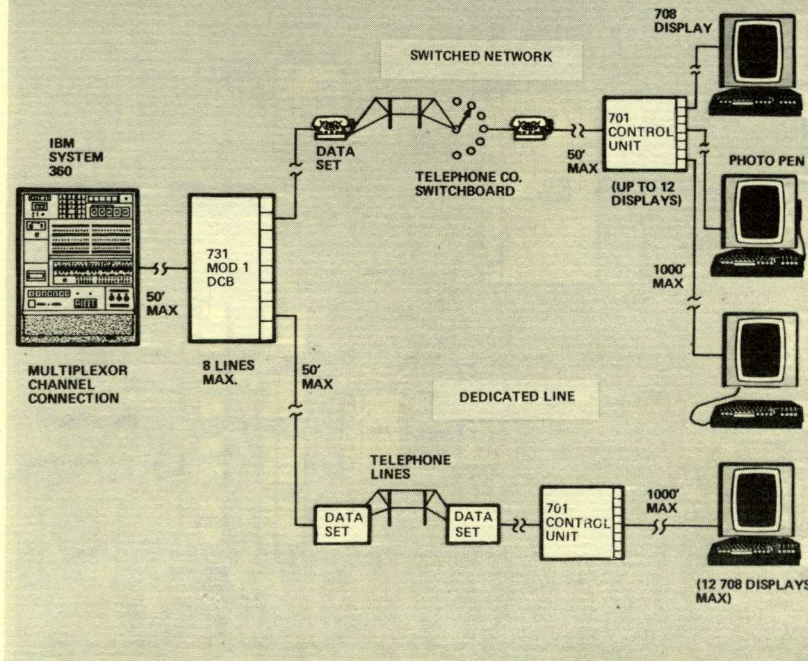
Typical system configurations for remote multi-drop and dedicated
line environments. Components shown here will be discussed as this
presentation develops.

SA

SANDERS 720 COMMUNICATIONS SYSTEM CONFIGURATION FOR REMOTE CONNECTION
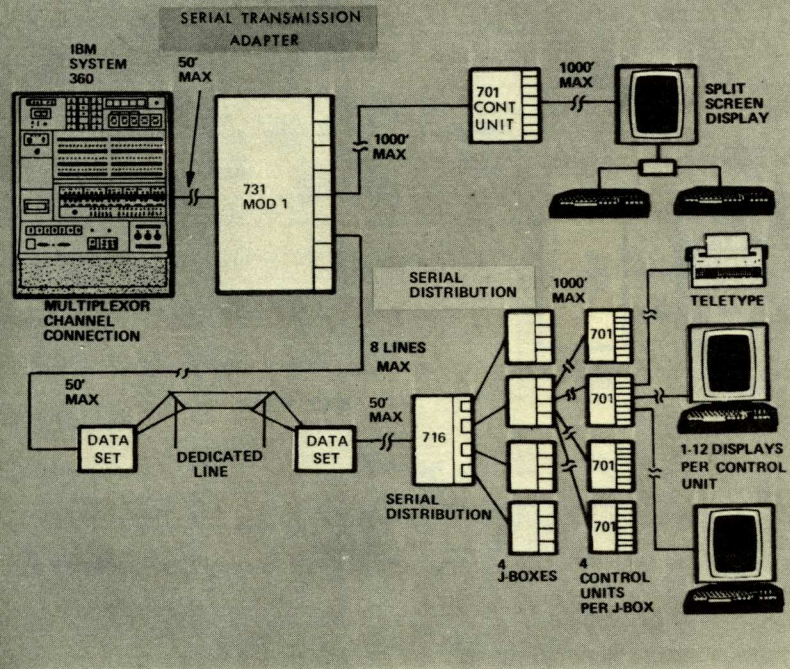
Systems Configuration for remote communication systems using the Sanders Serial Transmission adapter and the Sanders 716 Serial Distributor.
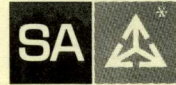
part III

701
CONTROL
UNIT

FOR SANDERS
720 DISPLAY SYSTEM

The Control Unit cabinet has room
for the 701 and associated power
supply as well as the 731 Data
Communication Buffer. Features
seen in the back view are detailed
in diagram below.

21"

FRONT   BACK
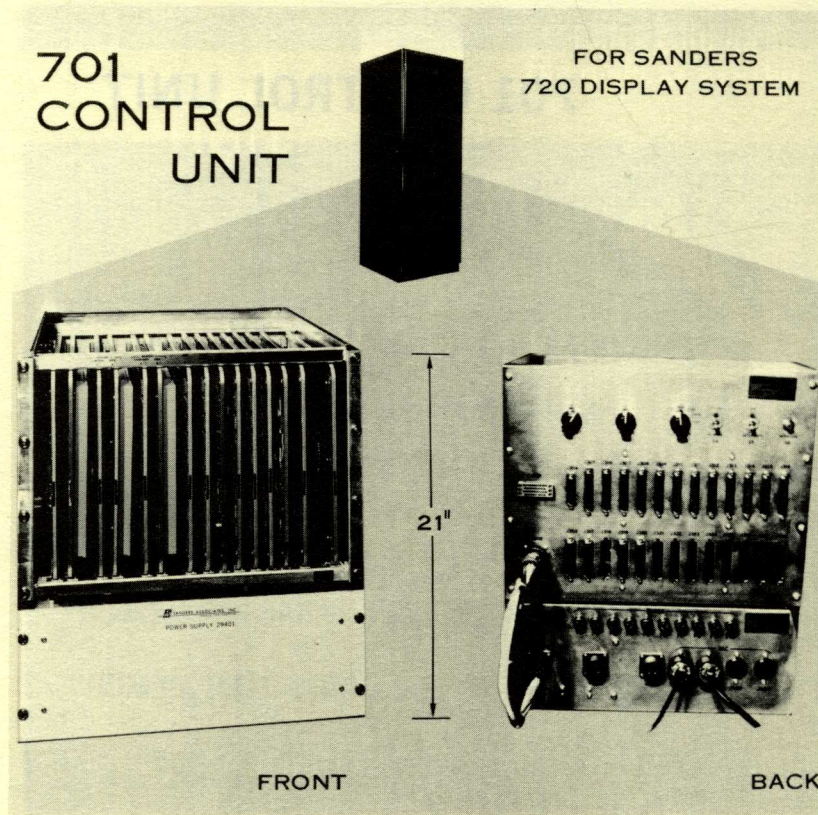
Back Panel - 701 Control Unit

MEMORY
DISPLAY
CONFIGURATION

RATE
SELECTION
SWITCH

DIRECT
RESPONSE
OR POLL
SEQUENCE
OPTION   INTERRUPT
                OPTION

I/O
CLEAR

MEMORIES   DISPLAYS   SERIAL   LOCAL   ON   INITIALIZE
1 2 3   1 2 4   RATE   REMOTE   OFF
                                1800 2000   INTERRUPT
                                1200 2400
                                110 EXT
S1   S2   S3   S4   S5   S6

MEMORY No 1
DISPLAYS
1 THRU 4

MEMORY No 3
DISPLAYS
1 THRU 4

DATA
PHONE
CONNECTION

J304   J305 J306 J307 J308   J309 J310 J311 J312   J313 J314 J315 J316

LOCAL
CONNECTION
DATA LINE

MEMORY No 2
DISPLAYS
1 THRU 4

J303 J317 J318 J319 J321   J321 J322 J323 J324   J325 J326 J327 J328

HARD COPY
OPTION
ONLY

FUTURE
EXPANSION

FUZES

POWER
SWITCH

VAC

SA   ▲*

*T.M. Sanders Associates, Inc.

25

701 CONTROL UNIT

PROVIDES ALL COMMAND AND
CONTROL FUNCTIONS TO HANDLE UP
TO 12 DISPLAYS:

3 DISPLAYS WITH 1024 CHARACTERS MEMORY

6 DISPLAYS WITH 512 CHARACTER MEMORY

12 DISPLAY WITH 256 CHARACTER MEMORY

The 701 CU provides control functions for the 720 Communication
System.

UP TO THREE DELAY LINE MEMORIES

EDIT LOGIC FOR

- FORMAT TYPE & TYPE MODES
- OPERATION OF FUNCTION CHARACTERS

I/O LOGIC FOR

- SENDING BLOCK
- SENDING PAGE

The 701 Control Unit contains up to 3 magnetrostrictive delay line memories each of which may be subdivided between 4 displays.

SA ▲
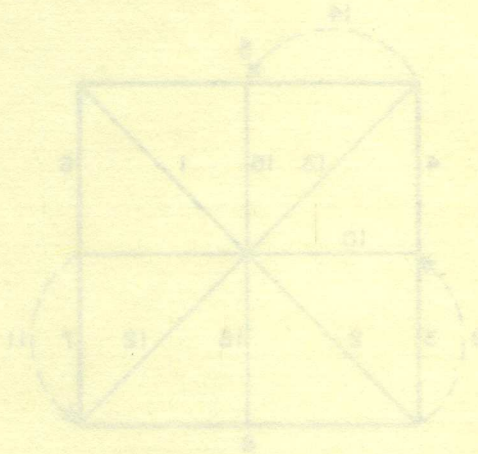
708 A/N DISPLAY

THIS IS A SAMPLE SCREEN PRESENTATION SHOWING
THE MODEL 720 DATA DISPLAY SYSTEMS ABILITY TO
DISPLAY TEXT AND TABULAR PAGES WITH UP TO 1024
CHARACTERS AND SYMBOLS.

MARGINS AND   TABS MAY BE SET
INDIVIDUALLY FOR EACH LINE   ON A
PAGE   TO ESTABLISH   INDENTS,
COLUMNS, FORMS, ETC.

VERTICALLY ORIENTED DISPLAYS SUCH AS THIS ONE CAN
PRESENT CHARACTERS IN ANY OF 2048 LOCATIONS
ARRANGED IN 40 LINES WITH 52 CHARACTERS PER LINE.

HORIZONTALLY ORIENTED DISPLAYS CAN PRESENT
CHARACTERS IN ANY OF 2048 LOCATIONS ARRANGED IN
32 LINES WITH 64 CHARACTERS PER LINE.

THE REPERTOIRE OF CHARACTERS IS:

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
1 2 3 4 5 6 7 8 9 0

Each character on the Sanders 708 Display, the entry/retrieval device for the Sanders 720 System, is created in 21.5 microseconds by a 16 stroke racetrack character generator.
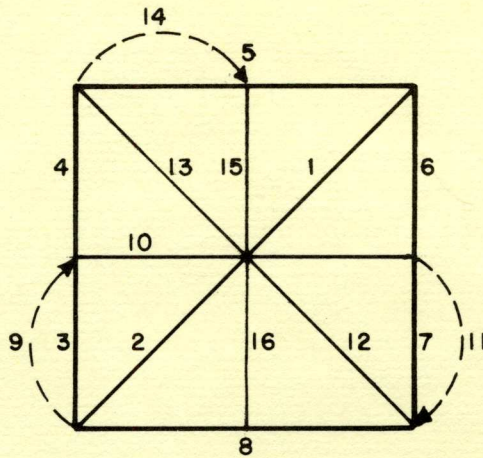
Sanders 720 Display System 16 Stroke Racetrack

708 DISPLAY

- **2048 DISPLAYABLE POSITIONS**
- **P31 (GREEN) PHOSPHOR**

OPTIONS

SCREEN ORENTATION	CHARA/LINE	NO LINES
VERTICAL	52	40
HORIZONTAL	64	32
HORIZONTAL	84	32

Various line sizes are available with the 708 display and each of the 2048 screen positions is a displayable position.

MEMORY SAVE

EMPLOYMENT APPLICATION

NAME: _ _ _ _ _ _ _
ADDRESS: _ _ _ _ _ _
CITY: _ _ _ _ _   STATE: _ _ _ _ _ _
AGE: _ _ _ _ _   OCCUPATION: _ _ _ _ _ _
TEL: _ _ _ _ _ _   SALARY: _ _ _ _

PREVIOUS EMPLOYER:

1 _ _ _ _ _ _ _
2 _ _ _ _ _ _ _
3 _ _ _ _ _ _ _

REFERENCES:

If one feature of the Sanders 620/720 display systems could be considered the outstanding one MEMORY SAVE would be that feature. It makes it possible to display the 1024, 768 (620 system), 512 or 256 characters in memory over any of the 2048 displayable screen positions, providing the best means for efficient message presentation. There is little or no line and space restriction and it is possible to display up to 50% more data in most formats than that displayed by competitive displays which do not have the MEMORY SAVE feature and use a fixed raster scan. With the Sanders Terminal:

● a horizontal tab takes up one position in memory and moves the cursor four places to the right on the screen;

● a carriage return takes one position and moves the cursor to the left of the screen and down one line;

● a vertical tab occupies one position in memory and moves the cursor to the left and down four lines.

These features save many memory positions when setting up a format and allow Sanders great flexibility in the display of data. With a fixed raster display there is a one-to-one relationship between memory and screen positions and to move the cursor down four lines, for formating pu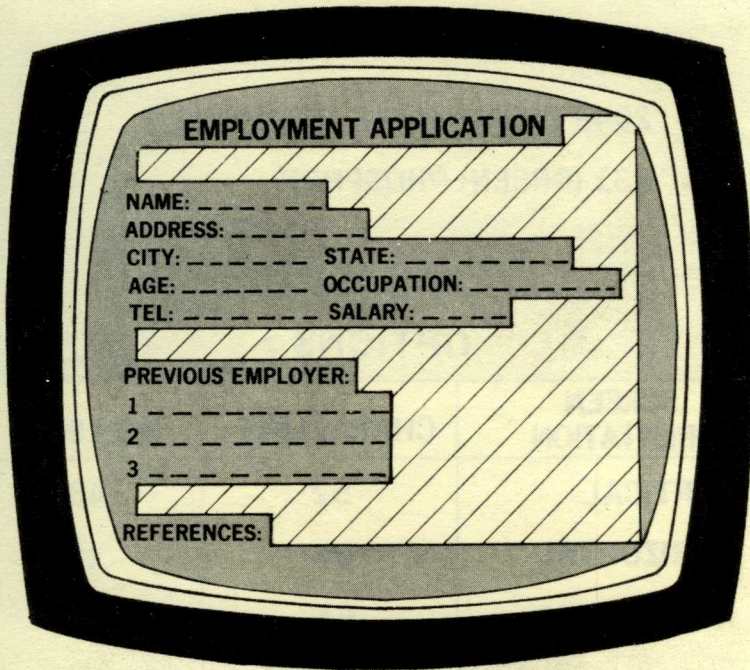rposes, when there are 64 characters per line, necessarily requires the loss of 256 memory positions which will be blank. A vertical tab achieves the same result with a Sanders Display and only one memory position is used – a saving of 255 positions!

Above is a graphic illustration of the advantages of Memory Save, an exclusive Sanders feature. The shaded area represents the amount of memory space lost with a fixed raster display each time a new line is required. It can easily be seen that a high percentage of memory is necessarily blank if a readable, aesthetically appealing, format is to be presented. Not so with Sanders!

SA

GENERAL DATA FLOW

720 COMMUNICATION SYSTEM

360

MEMORY EDIT & I/O LOGIC

CRT TRANSLATION SECTION

ANALOG

OPERATOR

ENGLISH ALPHANUMERICS

720 DATA DISPLAY SYSTEM

701 – CONTROL UNIT
708 – DATA DISPLAY TUBE
7242- KEYBOARD

720 Communication System
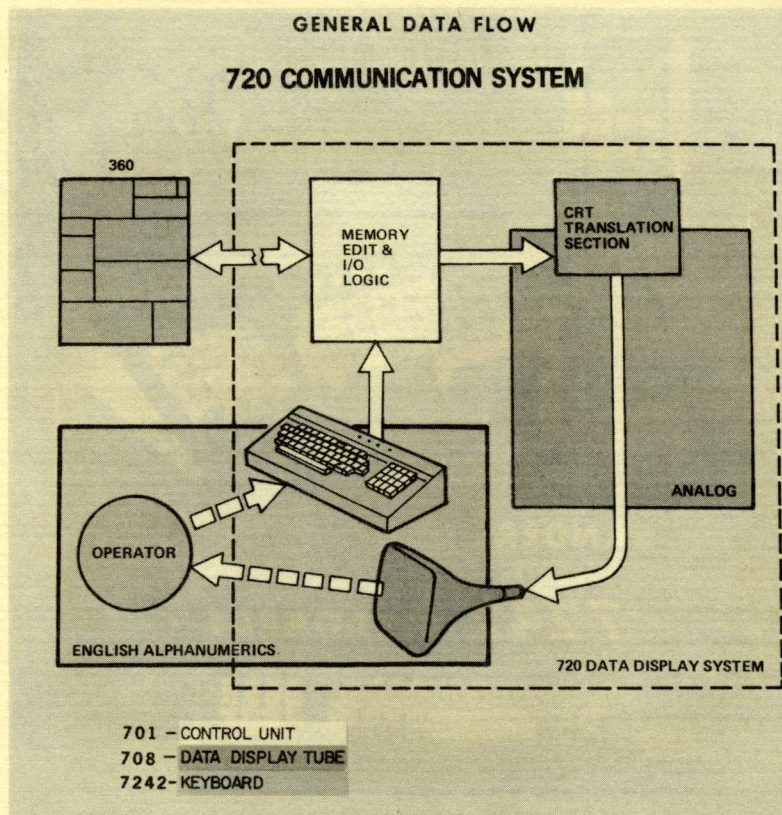
This figure shows the general data flow in the 720 Communication
System. Both digital and analog internal circuitry is employed.
Input/output, editing and storage functions are implemented by the
former while analog circuitry in the cathode-ray tube translation
section converts ASCII code to analog voltages and currents which
drive the CRT. These signals cause the English alphanumeric
equivalent of the ASCII coded characters which are stored in mem-
ory, to be displayed on the screen.

SA ◬

*T.M. Sanders Associates, Inc.

31
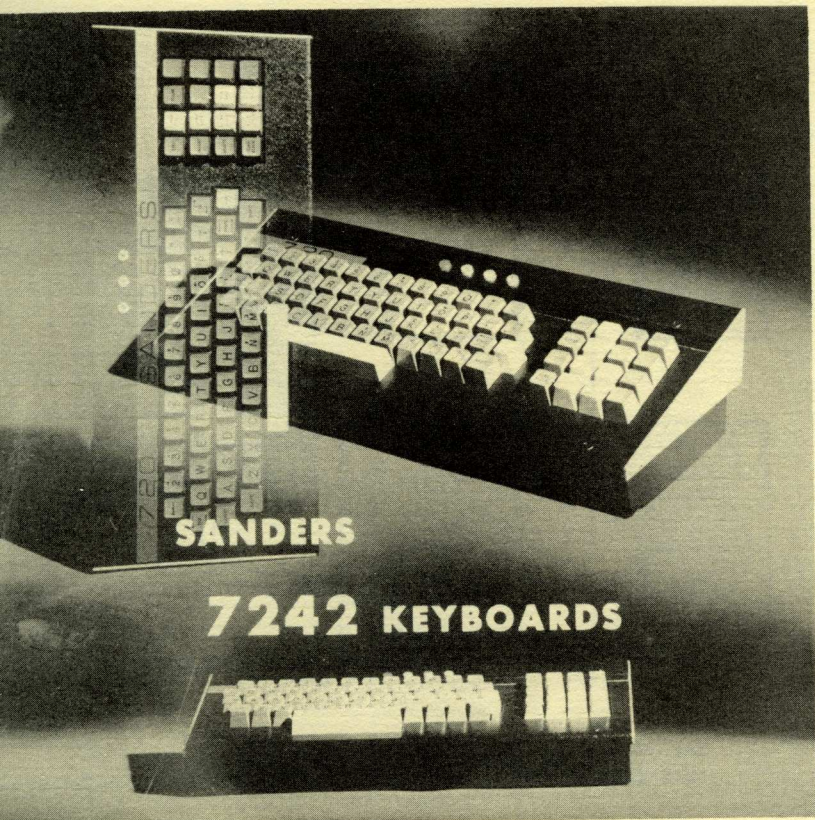
Operator commands are initiated from the keyboard which generates
a 7 bit ASCII output code for all alphanumeric, edit, and special func-
tion keys.

Using the keyboard, it is possible to move the cursor to (address) any
of 3 kinds of memory sequents - blocks, lines, and fields. This can
also be achieved under program control.

- A <u>block</u> is any data delimited by (or between) two successive
  Home characters.

- A <u>line</u> is any data delimited by successive Home, Vertical Tab,
  or Carriage Return characters.

- A <u>field</u> is any data delimited by successive Home, Vertical Tab,
  Carriage Return or Horizontal Tab characters.

Transmission of the proper addressing sequence to the 720 from the
computer causes the cursor to seek out a particular block, a particular
line within the block and even a particular field within the line. An
operator cannot cross block-boundaries hence indicative and format
information is protected.

MODEL 7242 KEYBOARD FEATURES

- VERY RELIABLE , HALF-STROKE, MICRO SWITCH KEYS

- ELECTRONIC INTERLOCK AND ROLL-OFF FOR HIGH SPEED KEYING

- 64 ALPHANUMERIC CHARACTER KEYS

- 12 EDIT AND I/O FUNCTION KEYS

The fast and efficient Sanders keyboards evolved from a major research and development effort.

SA ▲*

SANDERS KEYBOARD FAMILY

OPTIONS

STANDARD TYPEWRITER STYLE

KEYPUNCH STYLE

ADDING MACHINE STYLE

The typewriter style keyboard has proved most popular. However, the keypunch style with the numeric keys located in positions similar to that of an IBM "029" keypunch makes it possible for keypunch operators to rapidly learn the use of the equipment. The adding machine style keyboard has the numeric keys set-up in a block similar to that of a 10 key adding machine and greatly facilitates the high speed entry of numeric information.

SA △

Hard-Copy!

HARDCOPY REQUIREMENTS?
SANDERS HAS MANY SOLUTIONS.
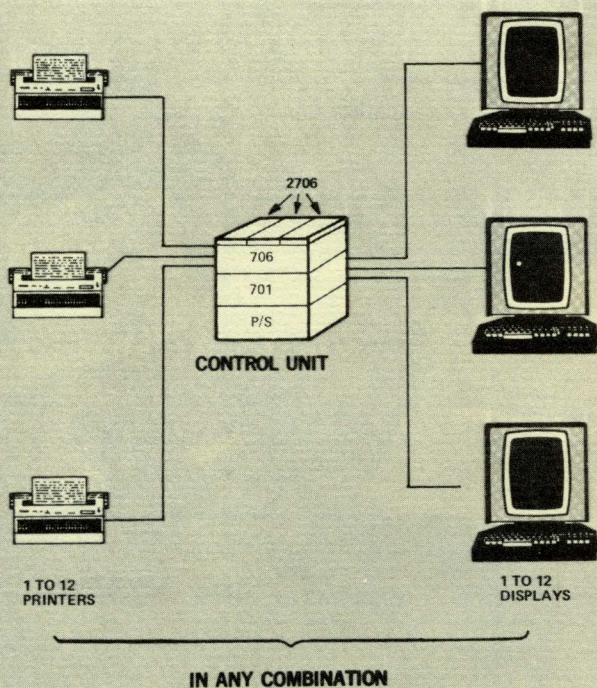
Hard-copy needs are met with either Teletype or faster Kleinschmidt*
printers in a variety of configurations.

*Sanders 620 Communication System Only.

*T.M. Sanders Associates, Inc.

706 HARD COPY ADAPTER & 2706 CHANNEL MULTIPLEXOR

706 HARD COPY ADAPTER & 2706 CHANNEL MULTIPLEXOR

2706

706
701
P/S

CONTROL UNIT

1 TO 12
PRINTERS

1 TO 12
DISPLAYS

IN ANY COMBINATION

Flexibility

Hard-copy peripherals offered by Sanders Associates provide the ability to copy the screen image onto paper at a remote terminal.

A 706 hard-copy adapter from one to three 2706 channel multiplexor are required. Each multiplexer will route output to from one to twelve printers. With twelve printers, four teletypes on each 2706 would be the optimum configuration as each 2706 operates independently and associated printers are serviced individually in a hard wired sequence. NOTE: The Display keyboard is locked when its associated Teletype is printing.

Hard-copy can originate and be routed in several ways to provide the greatest possible flexibility.

Display Initiated:

(1)   From the display to the printer directly

(2)   From the display to the computer where the Hard-Copy Macro*is used to serialize multi-block formats, then back to the display, then printer, or directly to the printer; (see no. 2 below)

(3)   From the display to the printer then to the computer.

Computer Initiated:

(1)   From the computer to the display then to the printer if the Sanders 620 System is employed.

(2)   From the computer to the printer directly with the Dedicated Buffer Option. See page 37.

*See description of this Macro under First Level Support.

SA

°T.M. Sanders Associates, Inc.

DEDICATED BUFFER OPTION

SIMULTANEOUS USE OF DISPLAYS AND PRINTERS

Computer Initiated Hard-Copy

- 3 PRINTERS PER CONTROL UNIT

- 1024 OR 512 CHARACTER BUFFER MEMORIES

This method is used when there is a need for on-line high volume printing capabilities. Simultaneous use of the display and printers is possible and buffering of hard-copy output is under computer control allowing for maximum system through-put.

SA ◭ *

HARD-COPY PRINTER OPTIONS

MODEL 33 TELETYPE - LIMITED DUTY CYCLE

MODEL 35 TELETYPE - HEAVY DUTY CYCLE

FRICTION ON SPROCKET FEED FOR BOTH
   TYPE 33 & 35 PRINTERS

64 OR 84 CHARACTERS/LINE

A motor-controller and time-delay, to switch off the Teletype motor
when the unit is not in use, is a standard feature of the limited duty
Model 33 Teletype and on the heavy duty Model 35 Teletype.

Why the 720 System?

ADVANTAGES

OF THE 720 DATA DISPLAY SYSTEM

- MEMORY SAVE-DATA DISPLAYABLE
  OVER 2048 POSITIONS

- UNIQUE COLLECTION OF EDITING CAPABILITIES

- 3 MEMORY SIZES: 1024, 512, OR 256 CHARACTERS

- ABILITY TO ADDRESS ANY OF THREE KINDS OF MEMORY SEGMENTS
  BLOCKS, LINES, AND FIELDS INDIVIDUALLY

- RESTRICTION OF OPERATORS TO SPECIFIC WORK AREAS
  FOR FORMAT PROTECTION

The preceding discussion on the features of the components which
make up the Sanders 720 Data Display System illustrate the capa-
bilities, flexibility, and unique qualities of the Sanders product
line.

SA △*

*T.M. Sanders Associates, Inc.

SANDERS
620 STAND ALONE SYSTEM

part IV

Introducing the Sanders 620
Stand Alone System.

The Sanders 620 Data Display is a compact, portable, stand alone
alphanumeric display built to satisfy requirements expressed in a
comprehensive market survey.

SA △*

*T.M. Sanders Associates, Inc.

40

620 STAND-ALONE SYSTEM

I/O, EDITING, MEMORY, POWER SUPPLY
AND DISPLAY FUNCTIONS CONTAINED
WITHIN DESK TOP TERMINAL

768 CHARACTER MEMORY

64 CHARACTERS PER LINE · 32 LINES

ASYNCHRONOUS TRANSMISSION
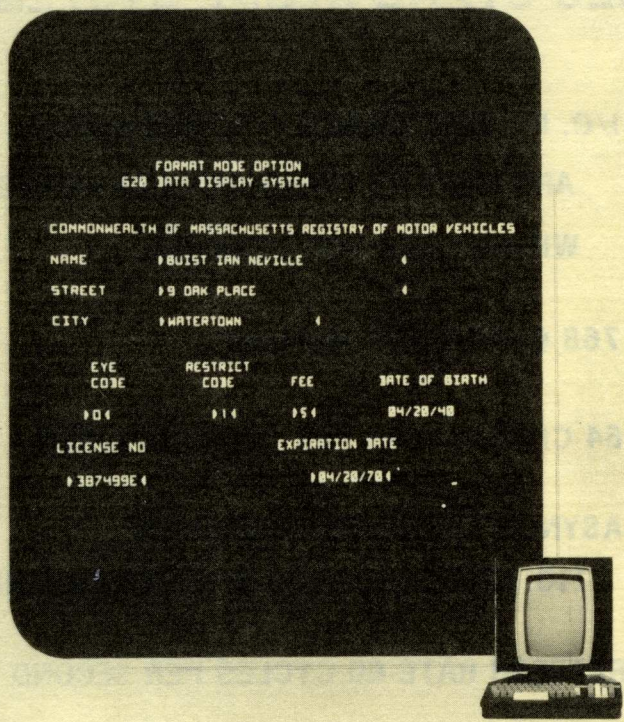110, 1200, AND 1800 BITS PER SECOND

REFRESH RATE 60 CYCLES PER SECOND

Compact circuitry and electronic packaging enable the elimination of
the 701 Control Unit as I/O and editing features, memory, power sup-
ply, and display functions are contained in an attractive compact desk
top terminal. In addition this system has many of the features of the
Multi-Terminal 720 Communication System.

SA ▲

```
                FORMAT MODE OPTION
                620 DATA DISPLAY SYSTEM

COMMONWEALTH OF MASSACHUSETTS REGISTRY OF MOTOR VEHICLES
NAME        ▶BUIST IAN NEVILLE           ◀
STREET      ▶9 OAK PLACE                 ◀
CITY        ▶WATERTOWN        ◀

    EYE           RESTRICT
    CODE            CODE        FEE        DATE OF BIRTH
   ▶O◀            ▶1◀         ▶5◀         04/28/48
LICENSE NO                 EXPIRATION DATE

▶387499E◀                  ▶04/28/70◀
```

Sanders 620 System with Format
Mode Option.

The format mode operation permits you to employ two separate
superimposed data fields on the screen - one fixed and the other
variable. Delta characters are used to define the segments of the
variable field and when the format is retrieved, the cursor is
located in the first alphanumeric position of the variable field.
Only data contained between deltas will be transmitted to the com-
puter if operating in the format mode.

620 OPTIONS

• **HORIZONTAL AND VERTICAL TABS**

• **FORMAT MODE - TWO BLOCKS**

• **SYNCHRONOUS TRANSMISSION**
  2000, 2400 BITS PER SECOND

• **HARD COPY**

• **KEY PUNCH STYLE KEYBOARD AND DISPLAY**

Horizontal and vertical Tabs permit the better utilization of the
memory save feature, previously explained on page 30.

SANDERS 620 COMMUNICATIONS SYSTEM CONFIGURATION
FOR REMOTE CONNECTION
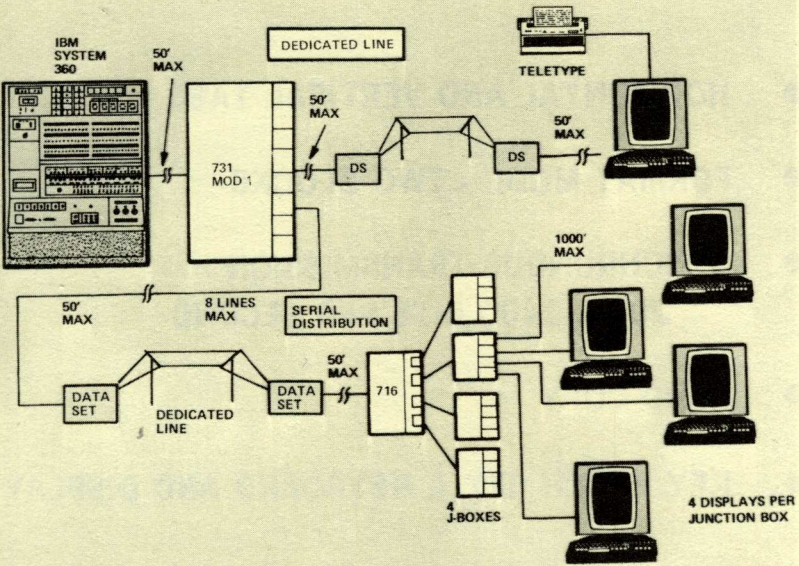
Two typical equipment configurations for remote transmission are shown here. Use of the Sanders 716 Serial Distributor allows the use of 16 displays on one telephone line.

LOW COST, HIGH RELIABILITY

STAND-ALONE

**COMPATABILITY - INTERFACES WITH MOST
MODERN DIGITAL COMPUTERS
CONTAINING DATASET ADAPTER INTERFACES**

**MEMORY SAVE - 768 CHARACTERS
CAN BE POSITIONED IN ANY
OF 2048 SCREEN POSITIONS**

**RESTRICTION OF OPERATOR
TO SPECIFIC WORK AREAS FOR FORMAT PROTECTION**

Why the 620 System?

The 620 Data Display is a desk-top stand alone system and does not require a Control Unit of any kind connecting directly to a data phone thus doing away with equipment racks and extensive cabling. The size of the terminal allows it to be located anywhere and moved with relative ease. The low cost and high capabilities of this display make it the most competitive in industry.

The outstanding advantages of the exclusive memory save feature have been explained in the discussion of the Sanders 720 System. This feature allows the positioning of 768 characters in memory, over 2048 screen positions.

An operator is restricted to operation within a variable data block bounded by delta characters when the format option is used. This eliminates the accidental destruction of unchanging inductive information.

SA ▲

SYSTEMS SUPPORT

- ● SANDERS SUPPLIES
    FIRST LEVEL SUPPORT TO LATEST IBM RELEASE
    OF TELEPROCESSING ACCESS METHODS

- ● CONSULTATION ON:
    ACCESS METHODS
    SYSTEM REQUIREMENTS
    SYSTEM UPGRADING

- ● CUSTOMER EDUCATION IN THE USE AND FUNCTION
    OF SANDERS DISPLAY SYSTEMS

System and Software Support

The user is responsible for defining his own communication system and writing the message processing programs for his particular application. Sanders supplies software support to the latest IBM release of the teleprocessing access method chosen by the user. Consultation and customer education are also provided.

SA △

part V

FIRST
LEVEL
SUPPORT

First level support consists of a manual which provides detailed
information for problem programmers, systems analysts, and
systems programmers who wish to use the first-level software
support. This is provided by Sanders as back-up for its Data
Display Systems interfaced with IBM system 360 computers.

SA ▲*

CONTENTS OF FIRST LEVEL SUPPORT MANUAL

SUPPORT FOR I/O PROCESSING WITH THE FOLLOWING ACCESS METHODS AND OPERATING SYSTEM

LOCAL

OS	DOS
GPS	BTAM

REMOTE

OS	DOS
BTAM QTAM	BTAM QTAM

The manual covers two areas of support, the first being I/O processing which is concerned with the various methods of transmitting data from the CPU to the terminal and the terminal to the CPU without regard to the information content of the data. I/O processing support consists of increasing the capabilities of the standard IBM supported teleprocessing and graphic access methods to recognize the Sanders display terminals as distinct entities and to provide the same complement of access-method facilities that is provided for IBM supported devices.

The following list contains that I/O Processing routines and macros (distributed in card deck form).

	Routine	Function
1.	Device Dependent Modules (DDM)	To replace IBM DDM's or add 720/620 DDM's to 360 library (DDM-a reference table which is used by specific read/write routines to communicate with devices such as display terminals).
2.	Translation tables and "TABLES" macro	ASCII/EBCDIC, EBCDIC/ASCII translate table for Sanders display character set. The "TABLES" macro provides user access to the translate tables.
3.	DOPEN routine and "DOPEN" macro	To allow Sanders displays (files) to be opened properly in a mixed network (2260's and 720's/620's) for remote systems using BTAM or QTAM).

SA

The second area of support is for message data processing. This consists of a series of character manipulating routines and macro instructions to facilitate: general purpose editing, reformatting of message data for hard copy and the generation of control characters for positioning message data on the display screen. As such, they are optional for the user; they are not required as part of Sanders software interface to IBM 360 Systems but rather serve as additional aids for user programming of Sanders Displays.

SUPPORT FOR MESSAGE DATA PROCESSING

THE FOLLOWING AIDS ARE AVAILABLE TO USER PROGRAMMERS

EDIT MOVE	MACRO	INSTRUCTION
HARD COPY	MACRO	INSTRUCTION
POSITION	MACRO	INSTRUCTION

The following is a list of the Message Data Processing Routines and Macros which are distributed in card deck form.

|	Routine	Function
1.	"EDITMOVE"	To provide substitutions, insertions, and deletions of characters in I/O messages based on recognition of user specified characters in the message stream, i.e., can be used to strip format control characters in DISPLAY-TO-CPU messages.
2.	"POSITION"	To facilitate generation of format control characters necessary to positioning data in a specific area of the display screen, i.e., generates required format characters in front of data which is to be displayed in specified blocks, lines, and fields.
3.	"HARD-COPY"	To facilitate serial printing of multiblock display formats, i.e., aligning operator-generated variable data (page data) with heading information (form data) in order to print display message on hard-copy devices in the same format as the screen image.

SA △ *

FIRST LEVEL SUPPORT MANUAL

APPENDIX

- TABLE OF 720 CONTROL OPERATIONS

- TIMING CONSIDERATIONS FOR 720

- CONTROL OPERATIONS

- EBCDIC TO ASC11-8 TRANSLATION TABLES

- SPECIAL SYSTEM GENERATION CONSIDERATIONS

- DETAILED DESCRIPTION OF
  SANDERS FURNISHED DEVICE
  DEPENDENT MODULES

In addition to descriptions of the appropriate routines, the reference
manual contains other pertinent considerations involved in the software
interface of Sanders equipment with System 360. For example, Appen-
dices G and H are important as they concern Systems Generation con-
siderations in allowing for device table entries for Sanders displays in
both OS and DOS systems.

SA ▲

°T.M. Sanders Associates, Inc.

FIRST LEVEL SUPPORT
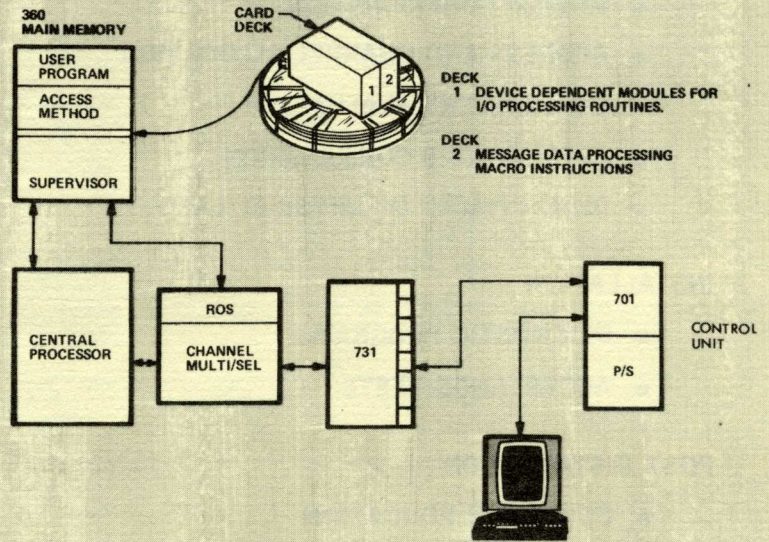
First Level Support card decks differ for OS and DOS. Each contains
the required device dependent module for I/O processing and, message
data processing macro routines. The device dependent module is a
tabular set of constants which uniquely defines the Sanders display
terminal. I/O requests via the language facilities of the IBM access
method used, cause the common read/write routines to generate
channel programs appropriate to the device to be communicated to
in accordance with the set of constant data provided in the DDM.

INSTALLATION SUPPORT

PRE-INSTALLATION

- SYSTEM CONFIGURATION
- ADDRESS AND CHANNEL ALLOCATION
- ENVIRONMENT EVALUATION
- APPLICATIONS CONSULTATION
- DEVELOPMENT OF PHYSICAL LAYOUT

INSTALLATION

- DIAGNOSTIC PROGRAMS
- ACCEPTANCE TESTS

POST INSTALLATION

- CUSTOMER EDUCATION
- CONTINUING SYSTEMS SUPPORT

Sanders highly trained System and Field Engineers are involved in all phases of Installation support making the transformation to Sanders Display systems a smooth one.

SA ▲

DIAGNOSTIC TEST ROUTINES
FOR
LOCAL & REMOTE SYSTEMS

Diagnostic test routines are available for both local (731 Stand Alone local exerciser) and Remote configurations (SSTPAK). As part of installation support they are run by Sanders and used to determine the correct functioning of Hardware modules as each routine possesses the capability of executing every meaningful combination of I/O operations for the Sanders 731 Data Communications Buffer.
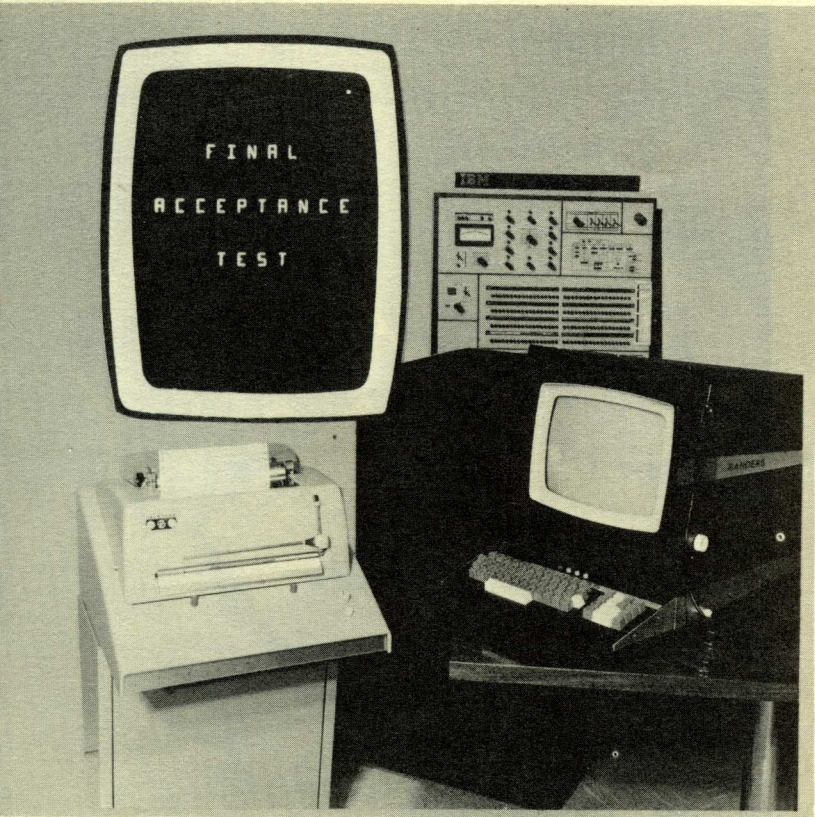
Prior to Customer sign-off the Sanders installation team demonstrates a program operating under the operating system and teleprocessing access method required to gain customer acceptance for the newly installed system.

SA ▲

part VI

WHY SANDERS?

- ADVANCED AND UNIQUE FEATURES AT COMPETATIVE COST

- CONFIGURATION FLEXIBILITY AND RELIABILITY

- COMPLETE SOFTWARE SUPPORT FOR IBM COMPATABILITY

- NATIONAL FIELD SERVICE ORGANIZATION

Memory Save, editing, high speed data transmission rates and other special features are not available in competitive equipment.

Systems can easily be tailored to individual requirements at moderate cost - per-terminal figures. Modern techniques, exhaustive production testing and a 200 hour "burn-in" test for completed components assures the reliability of Sanders equipment.

Sanders' displays are completely IBM compatible with the aid of first level support.

An extensive national sales and service organization enables Sanders Associates, Inc. to provide field service and system engineering support with the minimum of delay.
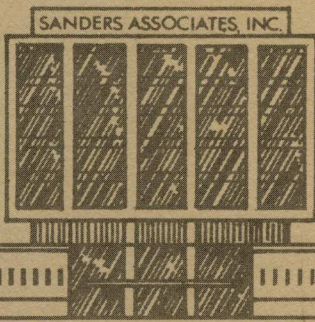
SA

This concludes a slide presentation that Sanders Data Systems
Division has been proud to make. We hope that this discussion
has been informative as we believe the Sanders Data Display
product line offers many superior features not available in
competitive equipment.

Should any further questions arise please contact the local
Sanders salesman, you will find him a most informed data
communication representative.