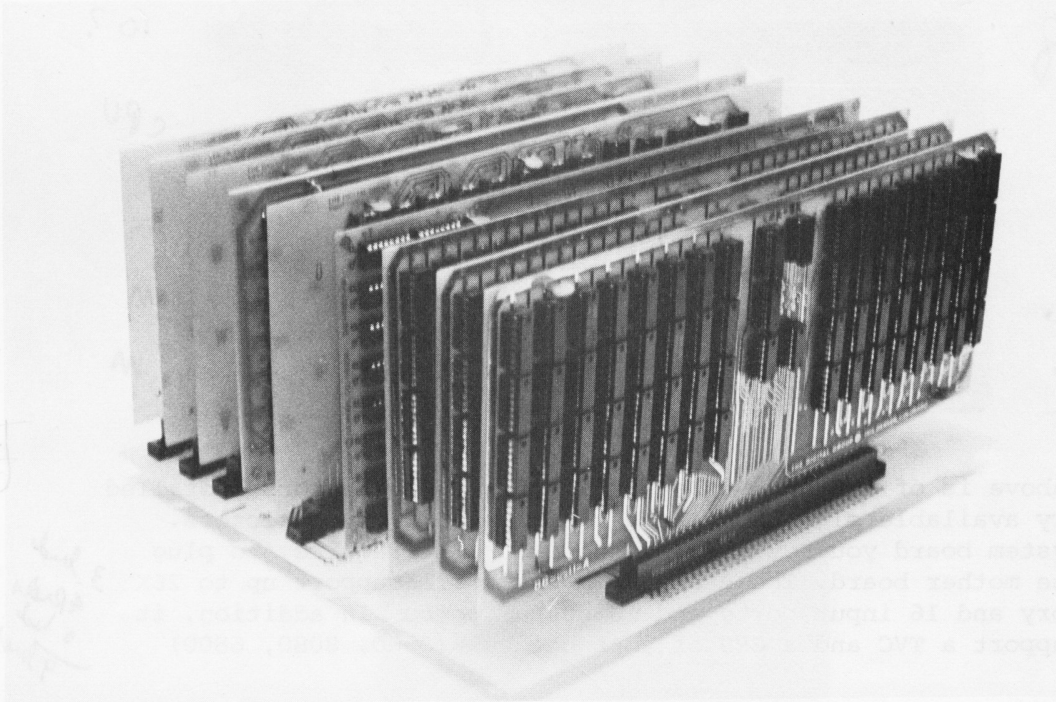Standard Mother Board fully populated

This flyer is intended to give you an overview of the products we now have available. We also hope to give you an idea of what we consider important in designing effective computer systems. All the items mentioned in this flyer are currently available and shipping times are from one to four weeks after receipt of your order. New products will be announced in our upcoming flyer #6. We will be offering nearly everything needed for a complete system.

You may have noticed our new phone number at the bottom of the page. This number is for placing phone orders or discovering the status of a previous order. For anything of this nature dial:

861-1686   area code (303)

The former number of 320-3900 is still good for technical questions on our systems. Feel free to call.
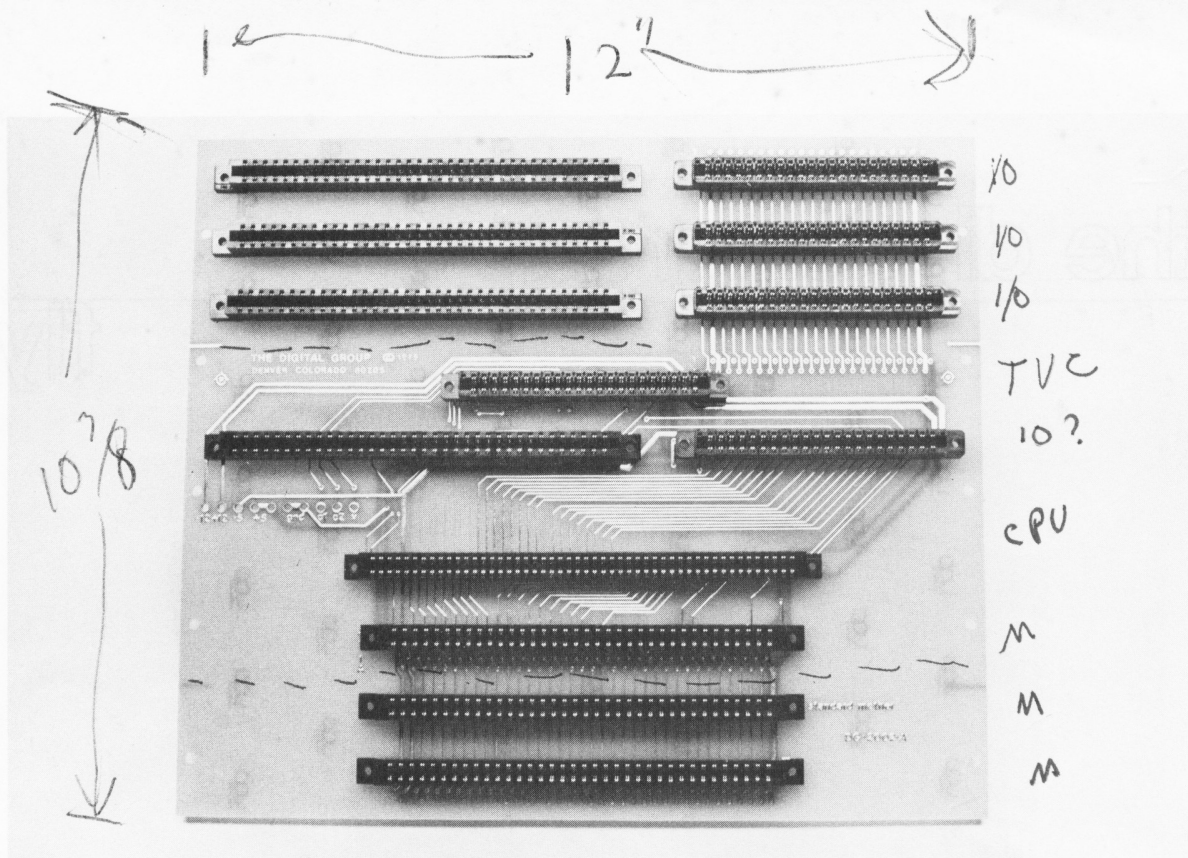
Photo above is of a Standard Mother Board with connectors installed
in every available slot. Mother boards come without connectors.
Each system board you buy has the connectors it requires to plug
into the mother board. The Standard Mother will support up to 26K
of memory and 16 input ports and 16 output ports. In addition, it
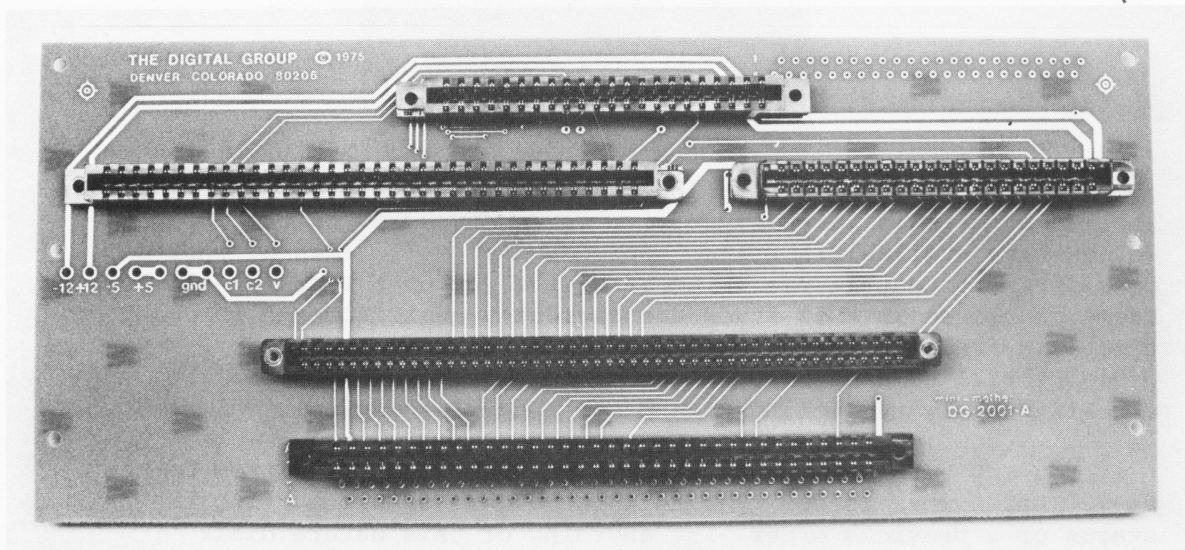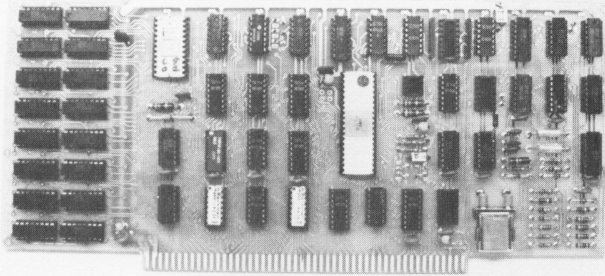will support a TVC and a CPU of your choice. (6500, 8080, 6800)

Photo above is of a Mini-Mother. This mother board will support 10K
of memory and one I/O card and a TVC. You can also plug in one of
three CPU's now available. Again, the connectors come with the cards
that plug into the mother board. Wirewrap connectors are used so that
you can wirewrap to the underside of the board.

6800 CPU

This board also has 2K of RAM onboard. It has DMA capability, crystal controlled clock, bootstrap loader in PROM, and interchangibility with our other two CPU cards.

TVC

This board is a combination of a video interface on the left and a cassette interface on the right. The video interface supports 512 characters on a standard monitor or modified T.V. set. The cassette interface is used in conjunction with any reasonable audio cassette tape player.
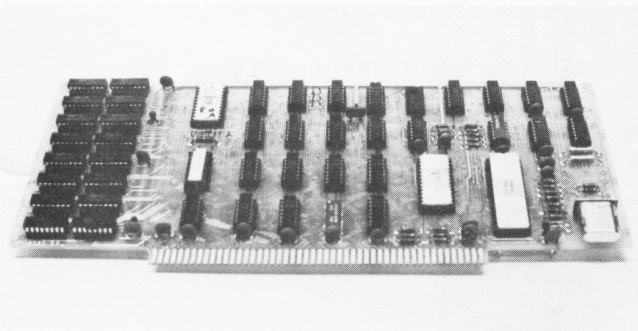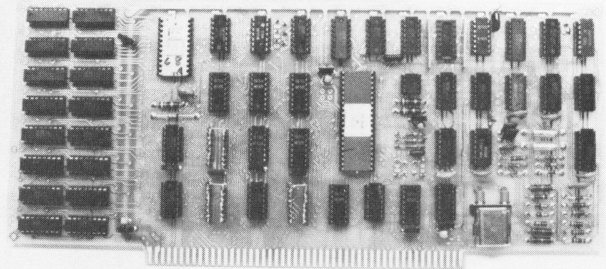

6502 CPU

This board includes such features as 2K of RAM, DMA capability, crystal controlled clock, bootstrap loader for cassette on a 1702 PROM and single stepping capability. The 6502 and our other two CPU's will plug into our mother boards.

8080 CPU

Our most popular CPU board has 2K of RAM onboard, single stepping, DMA capability, crystal controlled clock, 1702 PROM programmed for bootstrap load and uses the 8224 and 8228 support chips.

I/O

This board provides four input ports and four output ports. The output ports are latched and the adressing for the ports will accommodate memory mapped I/O or the scheme used by the 8080 CPU.

the digital group inc.
po box 6528, denver, colorado 80206   (303) 861-1686
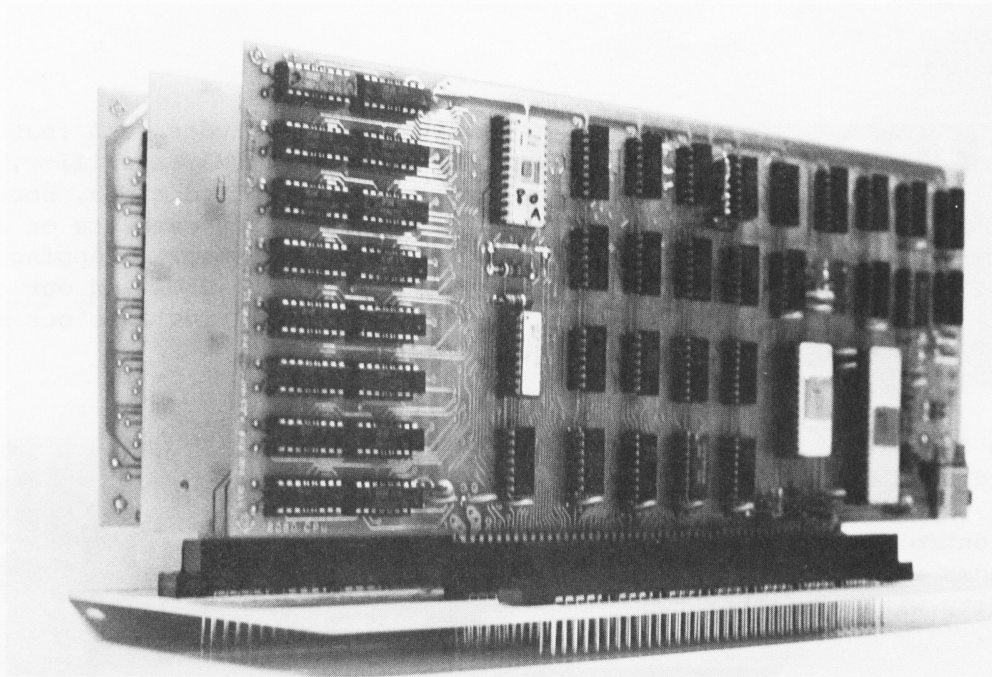
Mini-Mother with 8080 CPU

The front card in this photo is an 8080 CPU card. Behind it is an I/O board and behind the I/O board is a TVC card. This particular configuration is a 3-board system.
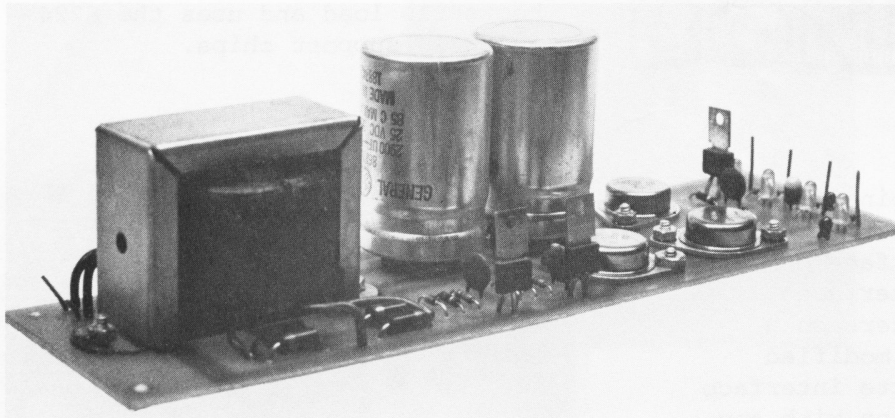
At left is a PWR-0 board. This board provides +12V,-12V, and -5V.

To the right: a method of connecting the external world to an I/O card. The molex connector slips onto the wire-wrap pins of the connector. Note: in the photo at the very top of the page you can see the wirewrap pins on the underside of the Mini-Mother.
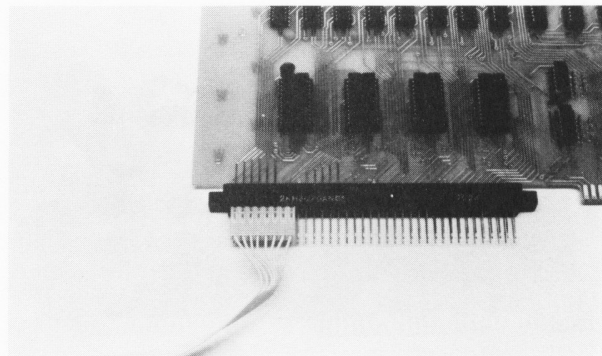
SYSTEM PHILOSOPHY - or - Why we are doing what we're doing

We feel that the Digital Group Systems represent by far and away the most significant systems for computer hobbyists available today. We would like to discuss why our systems offer major advantages to the serious hobbyist.

CHANGE

If there is one constant that is already evident in this hobby, it is constant change. You are about to invest (or already have invested) a significant amount of money in a microcomputer system. That system should be able to easily adapt itself to new microprocessors by different manufacturers and take advantage of new technologies with higher levels of integration. Otherwise, no sooner do you make your investment than another faster, cheaper, better, enhanced micro chip comes out and you have to start over - or live locked-in to an obsolete design. That can be very frustrating.

The Digital Group Systems are designed specifically to easily adapt to change. The designs are also tailored for maximum flexibility in hobbyist support. We hope to demonstrate by specific area why the Digital Group Systems are the best choice for the hobbyist with the following discussions.

INVESTMENT

Most kit manufacturers continually emphasize their CPU's cost and features. However, the major portion of your investment is not spent on the CPU and CPU support circuitry. The major portion of investment is spent on memory, interfaces, software, and peripherals. This ratio will continue to swing even more heavily away from the CPU as CPU chip prices continue their rapid decline.

What does that mean? If you purchase a CPU that quickly becomes obsolete (as they all will) and you fully invest in memory and peripherals specifically tailored only for that CPU, you risk having your entire investment become totally obsolete.

The Digital Group Systems are designed to be independent of the manufacturer's CPU chip design. Complete system compatability is maintained at the CPU card level. All memory, input/output, and peripherals are completely independent of the CPU selected. With the Digital Group Systems, you may now select from CPUs from three different manufacturers. We are offering:

Intel/AMD 8080A
Motorola 6800
MOS Technology 6501/6502

With the Digital Group Systems, you can change from an 8080 to a 6800 by literally unplugging the 8080 card and plugging in the 6800 card. Switch on power, read in the 6800 operating system cassette and you have changed your system to a 6800. The same is also true for the MOS Technology 6501 or 6502. Your major investment in memory and peripherals has been protected at a minimal additional cost and effort.

Each of the CPU's is completely interchangeable at the CPU card level with any other. Other CPU's will be available from us in the near future. Each CPU chip has specific strengths and weaknesses. Your selection of a CPU will, of course, depend upon your application's requirements. As your requirements change, alternative CPU's may prove more attractive. The beauty of the Digital Group Systems is that you can change your mind.

As an added bonus, the hobbyist is also able to take advantage of nifty applications written on another manufacturer's

machine with minimal software conversion (mostly I/O device reassignments). Total software conversion can be avoided. This approach will continue to become more attractive as CPU costs drop.

Hobbyist Kit Orientation

Another fact that has surfaced in this hobby is that there is a phenominal variety of kit builders out there with vastly different abilities and resources available to them. Having a single option of being allowed only to purchase a full kit of parts or an assembled unit does not fully address many hobbyist's needs.

The Digital Group has always believed that, as an option, the experimenter should be able to purchase partial kits. This allows the advanced experimenter or engineer to take advantage of:

1. Surplus parts savings (as a trade-off for his time spent debugging those parts).
2. Using what he already has on hand.
3. Allowing conversion from other CPU systems without repurchasing every component.
4. Getting use out of a manufacturer's evaluation chip set.
5. Unbundling the power supply and cabinet for custom designs.
6. Different TV screen sizes and keyboard layouts.
7. Different cabinet preferences.

Our partial kit prices are available on request by letter or over the phone. We are not able to offer completely bare board systems but are usually more than willing to meet you halfway. Naturally, any kit announced as a bare board (I/O, Memory) will continue to be available as a bare board for those that desire it.

Quality

Why is quality so important? The Digital Group insists on the highest quality in all of its products. Manufacturers will shave corners to keep costs down. With the average electronics kit product, that approach is usually acceptable to the purchaser. However, the corner shaving approach is totally unacceptable for the Microcomputer-hobbyist. What you are building is a real honest-to-God computer system. There are literally thousands of parts and interconnections in the system - any single failure can bring the system down. If quality shortcuts have been made, reliability is reduced. The experimenter may end up spending most of his time debugging and fixing his computer rather than using it to develop and run applications.

The Digital Group's level of quality is reflected in what we supply in all our kits:

PC Boards-
  FR-4 heat-resistant epoxy base material (superior to G-10)
  Double sided boards with plated-through holes
  Gold plated connector fingers
  All circuits solder-fused (a special plating process which enhances solderability and reliability)
Connectors-
  Wire-wrap only - gold plated
Integrated Circuits-
  Distributor or Factory prime IC's
Parts-
  Resistors are 5% or better
  Capacitors are 10% or better
  Bypass capacitors are distributor/factory prime
  Trimpots are sealed type
Sockets-
  Every IC is socketed

Maintenance

Every computer system will eventually go down. It is at that point that the maintenance design features become very important. The Digital Group Systems are specifically designed for ease of maintenance.

Pluggable Boards:
Every Digital Group System board is a plug-in board. The board plugs into a

connector on one side. Bolt-together
boards are very inconvenient to main-
tain. Ribbon cables and dip plugs
going every which-way from all sides
of each PC board also contribute to
maintenance problems.

IC Sockets:
Every Digital Group kit contains a
socket for each IC - not just the
expensive ones. Even though the
socket may be almost expensive as
the IC, when you need to replace a
7400 gate you don't want to risk
destroying a double-sided PC board
trying to unsolder the IC.

Standard Parts:
Standard parts and common IC's are
used throughout. Custom IC's,
"selected" IC's, or single-source
parts have been avoided wherever
possible to avoid part replacement
availability problems.

HARDWARE APPROACHES - THE WAY WE
VIEW IT

CPU Variations

Each microprocessor CPU that the
Digital Group offers has various
strengths and weaknesses. All can
accomplish any given application.
However, there is no single micro-
processor that is "best" for every-
thing. The differences occur in
the amount of storage used, the
time required to produce a given
result, and various system features.
Proper CPU selection is solely
dependent on application require-
ments.

8080A:
The 8080A is a register-oriented
general purpose microprocessor.
It is the most popular microprocessor
on the market today and therefore
enjoys the highest level of currently
available support. If the application
can be processed mostly within its
internal registers, it is very fast.

6800:
The 6800 is a memory-oriented general
purpose microprocessor. Almost all
operations involve transfers to and from
memory. It has a sophisticated bus-
oriented architecture. The instruction
set is very comprehensive - similar to
a PDP-11. Support from many sources is
rapidly becoming available to the hobbyist.
Difficult to interface a full-function
front panel.

6501/6502:
Newest of the current microprocessors
with an architecture very similar to the
6800 with a slightly smaller instruction
set. The 6500 excells at data handling
applications. Uses the 6800's bus
structure. Adds a front-panel capability
for single-stepping.

Obviously, the foregoing comments are
only intended to give the briefest high-
lights. For further comparisons, we
would recommend the series on Micro-
processor Benchmarking in EDN magazine
which began in the April 20, 1975 issue.
EDN is usually available at large public
libraries or college engineering libraries
and has carried an extensive series of
articles on microprocessors.

System Base Comparisons

There have been a number of approaches to
hobbyist microprocessor design. Each has
something to recommend it. We are presenting
our analysis of four basic system bases.
There are, of course, variations among
systems, but we still feel the comments are
valid.

Toggle Switches and LED Bit lamps:
The first hobbyist microprocessor designs
were based on toggle switch input and LED
bit lamp readouts. Programs were small or
took hours to enter and were lost when
power was switched off.

Numeric Keyboard and 7-Segment Readout:
this system base represents the first level
of improvement. Each byte entered requires
2-3 key depressions rather than 8 toggle

switch flips. The 7-segment readout eliminates the requirement for the user to interpret pure binary. However, only one character and address at a time is displayed - the coding interrelationships are available only byte by byte. Operator effort for analysis is proportionally high.

Teletype:
Teletype based systems represent the next level of improvement and offer some significant advantages. They usually have some form of monitor in ROM (ex- Motorola's MIKBUG, etc.) which allows the operator to type in code and helps isolate him from errors. The total program is printed out in hard copy. In addition, paper tape is usually available to provide an economical media for program storage and exchange.

There are some tradeoffs however. New teletypes cost $1000 and up. Teletypes are electro-mechanical devices which require significant maintenance - used surplus teletypes are the worst offenders. The input/output speed is usually around 10 characters per second - a dump of 1K bytes in octal can take almost 7 minutes. And creates a great deal of irritating noise. In addition, paper tape is a damage-prone and bulky media.

Video and Cassette:
The latest improvement has been the movement to using a TV set as an output display, a full alphanumeric keyboard for input, and an audio cassette for program storage and exchange. Video-based systems provide full user to system interaction at minimal cost. The speed of system response is practically instantaneous. Operations may be performed in almost complete silence. Reliability is enhanced as electro-mechanical mechanisms are limited to the keyboard and cassette recorder. Data media

storage density is much higher - you can store over 2000 feet of paper tape on one side of a single C-90 audio cassette.

The cost/performance tradeoffs with the Digital Group's video-based systems represent what we feel is the best performance at the most reasonable cost. Even a commercial system with a new commercial monitor, high quality cassette recorder, and a new keyboard could be assembled for less than $400 in additional cost. If the hobbyist supplies a modified TV set as the monitor (ref BYTE #2), a moderate quality cassette recorder, and a like-new surplus keyboard, he should be able to get going for around $100 in additional cost. All interfaces and operating system software are supplied as standard with each Digital Group system.

Front Panels

Front panels have offered three major features to users - allowed forced loading or changing of memory to get going, limited display of information, and the ability to single step through instructions.

The Digital Group System does not require a front panel. All instructions needed to "get going" are contained in an EROM Bootstrap loader. Loading or changing of memory is supported by two major TV-oriented functions - Keyboard Program and Storage Dump. Each may be accessed or called from the other interactively. Addresses may be set or reset to allow operations or visibility at any time. Instructions are keyed in through the keyboard with the preceding 10 addresses and contents visible in a push-up stack. Storage Dump displays 96 bytes of storage and addresses in Octal or Hexadecimal (system dependent) on the screen at a time. Pages are directly selectable or may be advanced serially by depressing the space bar on the keyboard. A full screen update occurs in less than 1/30 of a second.

In addition, a storage dump trap may be inserted in the instructions to catch and display all registers, flags, and storage contents at any specific point in a program

execution. This has proven to be a very powerful debugging tool for software development.

However, the bus-structure of the Digital Group Systems will support a plug-in front panel as an option for those who feel that their needs require one. A schematic for a basic front panel which will plug into any available memory space is included in the Digital Group's system manual.

Digital Group Video-Based System Operation

Initiating operation on a basic Digital Group System consists of 4 steps:
1. Place a system cassette or saved program cassette in the audio cassette recorder and depress play.
2. Turn system power on.
3. After the cassette is read in, select an application code from the list displayed on the TV monitor.
4. Enter the code on the keyboard and the application begins operation.

Digital Group Video-Based Operating System

Each Digital Group System is supplied with a standard operating system on cassette for video-based operations. The functions supplied are:

1. Read Cassette
2. Write Cassette
3. Program from Keyboard*
4. Dump Storage*
5. TV Monitor Functional
   Support Routines

   *These functions may be supplied in either Octal or Hexadecimal-depends on system selected.

The storage requirement for the Operating System is 1.5K.

In addition, system maintenance routines will be included or made available. The first of these is a memory checker routine which will test all possible single bit patterns and display any failing memory IC's board location on the monitor. This routine is designed to keep running until interrupted. After all the possible single bit combinations have been tested without error, an alpha symbol is displayed and execution continues. Therefore memory may be tested for extended periods of time and the number of successful tests is indicated by the number of alphas on the monitor.

WARRANTY/SERVICE POLICY

The Digital Group has now formalized its limited warranty and service policy. We are trying to accomplish two things -- we want Digital Group kit purchasers to be satisfied and we want to help if you get in trouble.

Debugging a computer and/or its peripherals and components is a time-consuming task - especially if you are unfamiliar with the circuit. The kit supplier should be much more familiar with the circuit and be able to debug it much more effectively.

However, before we detail our limited warranties, a few terms should be defined:

    Service Charge: Fix-it fee usually established at announcement. Covers all labor involved tracking down problems and correcting them. Applies to out-of-warranty kits. Also applies to units if the unit goes down and the purchaser wishes us to fix the problem. Service charges (fix-it-fee) should be sent with the kit for repair.

    Parts Charges: Any user parts found to be defective and replaced. Also applies to parts out-of-warranty.

    Postage: You pay the postage back to us, we pay the postage back to you.

The Digital Group reserves the right to change any warranty policy or term and also the right to send hopeless basket-cases back to the purchaser (returning service charges).

DIGITAL GROUP LIMITED WARRANTY

1. Digital Group assembled and tested units - all parts and labor are warranted for 90 days after receipt of unit. Warranty not valid for user-caused problems - parts and service charges will apply.

2. Full parts kits - All Digital Group supplied parts are warranted for 90 days on an exchange basis. Service charge for labor will apply if the entire kit is sent back for repair. User-caused problems are chargeable for both parts and service.

3. Partial kits or parts - All Digital Group supplied parts are warranted for 90 days on an exchange basis. Full service charge will apply if kit sent back for repair. User caused problems are chargeable for both parts and services.

4. Modified Kits - Warranty applies only to unmodified portions and those portions unaffected by any modifications.

DIGITAL GROUP PRODUCTS:

Order Code	Description	Kit	Assembled*
8080-3BD	3 Board 8080 system with 2K RAM	$425.00	$645.00
8080-4BD	4 Board 8080 system with 10K RAM	625.00	895.00
6500-3BD	3 Board 6501/2 system w 2K RAM	375.00	595.00
6500-4BD	4 Board 6501/2 system w 10K RAM	575.00	845.00
6800-3BD	3 Board 6800 system with 2K RAM	425.00	645.00
6800-4BD	4 Board 6800 system with 10K RAM	625.00	895.00

*assembled units have assembled & tested PC Boards only.

Notes: A Standard Motherboard may be substituted with any system
        for an additional $15.00

        Other configurations and short kits are available -
        prices on request

CPU cards alone:

8080-CPU	Complete 8080A CPU card (2K RAM)	249.00	345.00
6500-CPU	Complete 6500 CPU card (2K RAM)	195.00	295.00
6800-CPU	Complete 6800 CPU card (2K RAM)	249.00	345.00

Memory

MEM-8	8K 500 nanosecond memory	225.00	295.00
MEM-8B	8K 300 nanosecond low-power mem.	275.00	345.00
MEM-4	4K 500 ns memory w all parts on 8K board	140.00	-
MEM-1	1K 500 ns memory w all parts on 8K board	75.00	-
MEM-Ø	8K memory kit less all 2102's	50.00	-
MEM-C	PC Board and connector	36.00	-
MEM-PC	PC Board only	30.00	-

Input/Output

IO-F	Complete I/O card	65.00	95.00
IO-PC	PC Board only	30.00	-

TV Readout and Cassette Interface

TVC-F	Complete 512 character TV Interface and Cassette Interface	130.00	195.00

Card Connectors

22-WW	22-pin dual readout wire-wrap		4.00
36-WW	36-pin dual readout wire-wrap		6.00
50-WW	50-pin dual readout wire-wrap		7.00

DIGITAL GROUP PRODUCTS (cont'd):

Order Code	Description	Kit	Assembled

Mother Boards:

Order Code	Description	Kit	Assembled
MB-1	Mini-Mother	$30.00	-
MB-2	Standard Mother	45.00	-
MB-3	Memory Expansion	25.00	-
MB-4	Input/Output/Peripheral Exp.	40.00	-
MB-5	MOM (MB-1 + MB-3 + MB-4)	85.00	-

Note: connectors are supplied with individual kits, not with mother boards.

Power Supplies - all 4 voltages:

Order Code	Description	Kit	Assembled
PWR-6	5V @ 6A oem power supply & PWR-∅	95.00	125.00
PWR-12	5V @ 12A " " " " PWR-∅	135.00	165.00
PWR-18	5V @ 18A " " " " PWR-∅	175.00	205.00

Note: Over-Voltage-Protection (OVP) is standard on all voltages.

Low-Current 3 Voltage Power Supply Kit:

Order Code	Description	Kit	Assembled
PWR-∅	-5V @ 1A, +12V @1A, -12V @1A	45.00	60.00

Extender Cards:

Order Code	Description	Kit	Assembled
EXT-3	3 card extender card set	55.00	75.00
EXT-50	50-pin extender card only	25.00	35.00
EXT-36	36-pin extender card only	25.00	35.00
EXT-22	22-pin extender card only	15.00	27.50

Prototype Boards:

Order Code	Description	Kit	Assembled
PROT-IO	Prototype w/w I/O board with 22 and 36-pin connector fingers		30.00
PROT-IOC	Same with connectors		38.50
PROT-MEM	Prototype w/w memory board with 36-pin connector fingers		30.00
PROT-MEMC	Same with connector		35.00

Interface Connectors:

Order Code	Description	Kit	Assembled
CAB-2	Molex connector kit with cable & connectors	35.00	-
CAB-1	CAB-2 with assembly tool	43.95	-

Video Monitor:

Order Code	Description	Kit	Assembled
MON-9	9" High Bandwidth B&W Monitor		175.00

DIGITAL GROUP SYSTEMS - STandard Features, one board at a time

CPU's: (Figures 1 & 2)

 Choice of 8080A, 6800, 6501/6502 which are interchangeable at the CPU card level.

 8080A (Intel/AMD):
  2K bytes 500ns Static RAM
  256 bytes EPROM Bootstrap loader (1702A)
  Direct Memory Access (DMA)
  8-level Hardware Vectored Priority Interrupt
  Data bus lines drive 30 TTL loads
  Can use 8080 plain (older design) without change

 6800 (Motorola/AMI):
  Features the same as with 8080A except Interrupt structure is 11-level
  software vectored priority interrupt

 6501/6502 (MOS Technology):
  Features the same as with 8080A except Interrupt structure is 11-level
  software vectored priority interrupt

Input/Output:

 Four 8-bit Input Ports
 Four 8-bit latching Output Ports
 16 bits of port addressing - supports memory oriented port structures (6800/6500)

TV Readout and Cassette Interface:

 TV Readout:
  Winking or stable cursor under software control
  512 characters
  16 lines by 32 characters
  7 x 9 character matrix (effective 7 by 13)
  Full 128 character set - ASCII
  Upper and Lower case Alphabet
  Math Symbols
  Direct Video Output

 Cassette Interface:
  Uses standard unmodified audio Cassette Recorder
  Extremely reliable FSK recording technique
  Standard wide-shift teletype frequencies
  Operates at 1100 bits per second - loads 1K in 11 seconds

8K Static RAM (500 nanosecond 2102's):

 No wait states on any standard Digital Group System
 Static RAM used for ease of maintenance
 Buffered address lines
 Applies only 1/20 TTL load to bus lines
 Address decoding covers full 64K range (addresses beginning at 0K, 8K, etc.)
 Power consumption = 2A of 5V per 8K

<u>8K Fast, Low-Power Static RAM</u> (300 nanosecond 91L02C):

Same features as preceding
Power consumption: 1 Amp per 8K
Uses AMD 91L02C chips for best combination of speed and power consumption
Additional cost is $50.00 per 8K
Note: Extra speed is not required for any current Digital Group CPU

MOTHER BOARDS

Mini-Mother

Each Mini-Mother provides space for:

    1 CPU card with 2K RAM
    1 Input/Output card
    1 TV Readout and Cassette Interface
    1 8K RAM Board

10K, etc

Size: 5 3/8" deep by 12" wide
Power: A fully populated Mini-Mother will require about 4 1/2 Amps from
        the +5V supply (other currents minimal) with standard devices.

Standard Mother

Each Standard Mother provides space for:

    1 CPU card with 2K RAM
    1 TV Readout and Cassette Interface
    4 Input/Output cards or Peripheral Interfaces
    3 Memory cards or 2 Memory cards and 1 Front Panel (24K additional RAM
      or 16K RAM and Front Panel)

26K

~~Size~~: 10 3/8" deep by 12" wide
Power: A fully populated Standard Mother will require about 10 1/2 Amps from
        the +5V supply (other currents minimal) with standard devices. Total
        current requirements will depend on peripheral interface requirements.

Note: For a $15 charge, the Standard Mother may be substituted in any 3 or 4
        board system package.

Memory Expansion Mother Board

The Memory Expansion card attaches to either the Mini-Mother or the Standard Mother.
It provides space for 5 more Memory cards (40K RAM) or 4 more Memory cards (32K RAM)
and a front panel. 5 1/2" deep by 12" wide.

Input/Output Expansion Mother Board

The Input/Output Expansion card attaches to either the Mini-Mother or the Standard
Mother. It provides space for 10 more Input/Output or Peripheral Interface cards.
10 3/8" deep by 12" wide.

Note: Expansion Mother Boards may be cut to length to fit custom requirements. They may then be reattached via jumpers for later expansion if required.

MOM

MOM is a 3-board combination of the Mini-Mother, Memory Expansion, and Input/Output Expansion. It has total space for:

    1 - CPU card with 2K RAM
   11 - Input/Output cards or Peripheral Interfaces
    1 - TV Readout & Cassette Interface
    6 - Memory cards (48K) - a Front Panel may be substituted for any single memory card.

DIGITAL GROUP SYSTEMS - General Information

3-Board System (& Mini-Mother)

The Digital Group Systems basic configuration for any CPU consists of:

    1 - CPU card with 2K RAM
    1 - Input/Output card with 4 ports in and 4 ports out
    1 - TV Readout and Cassette Interface
    1 - Mini-Mother

which is referred to as the 3-Board System. The Mini-Mother has one additional space which can hold an additional 8K Memory card or a Front Panel. Note: The TV Readout requires an output port, a keyboard will require an input port, and the Cassette Interface requires the Least Significant Bit on an input and an output port. This leaves 2 7/8 input and output ports uncommitted. No interconnecting wiring is required for the TV Readout or Cassette Interface.

4-Board System (& Mini-Mother)

The 3-Board configuration may also be supplied with the additional 8K Memory (for a total of 10K of RAM) which is referred to as the 4-Board System.

Additional Requirements

To make a Digital Group System fully operational, you need only add the following items:

    1. Power supply (+5V, -5V, +12V, -12V recommended)
    2. ASCII Keyboard (full 128 character ASCII recommended)
    3. Audio Cassette Recorder
    4. Video Monitor or modified TV set
    5. Miscellaneous hardware and cables

Some of these items are currently available from the Digital Group and we expect to add more in the very near future.

ACCESSORIES

Extender Card Set:

Each 3-Card Extender Card set provides the following:

       1 - 22-pin extender card and connector on .156" centers
       1 - 36-pin extender card and connector on .156" centers
       1 - 50-pin extender card and connector on .125" centers

All cards are double sided dual position extenders. Each card is also available separately. Overall card height with connector mounted is 7 1/8". Fingers are gold-plated. There is space between the board and the wire-wrap connector pins to attach test leads (small alligator clips, KLEPS leads, etc.).

Molex Interconnection Kit:

Each Molex interconnection kit contains the following:

      10 each of the following female bodies:
          2, 4, 8, 10, 12 position
      400 crimp-on type pins
      10 feet flexible heavy-duty flat cable (stranded wire)-
          62 wires wide

                              CAB-2 Kit price $35.00

The Molex-type crimp tool is also available for an additional $8.95 with the above kit   CAB-1 Kit with tool price $43.95

Individual Molex parts may be purchased from the following schedule:

Bodies -	2 position	15¢ each
	4 "	17¢ "
	8 "	20¢ "
	10 "	30¢ "
	12 "	38¢ "

Pin Clips $2.95/100

Crimp tool $8.95 + 1.00 postage & handling

Wire - 62 wide $1.25/foot

Prototype Cards

Two types of wire-wrap prototyping cards are available. The first is designed for custom input/output/peripheral devices. It contains space for up to 65 14 or 16 pin dips plus 12 22-24 pin or 8 40 pin IC's plus some discretes. The second is for custom memory/front panel devices and may contain up to 60 14 or 16 pin devices or 36 22 pin (.4" width) devices plus an additional 3 columns for IC's of .4" through .6" width devices - 9 24-pin or 6 40-pin. Power and ground planes are provided and are connected to IC sockets via w/w or stick-on jumpers.

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