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AMATEUR COMPUTER SOCIETY

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### IT'S SUBSCRIPTION RENEWAL TIME

The money has finally run out, and so this is the last issue in this series of ACS Newsletters. For a new subscription, please send in \$3.00 (\$3.50 if you live in Italy, Japan or Switzerland).

If your name is Fronek, Gantner, Gruner, Hanson, Harrold, Haynes, Pfeiffer, Sundstrom, Van Ornum, Young or Zuccaro, you don't need to send any more money now, as you're already paid up, by virtue of previous contributions.

As of this issue, there are 91 ACS members, in 27 states and 5 countries. I hope most of you will continue to be members, because the more of you there are, the more issues there will be in the new series of Newsletters.

Along with your renewal checks, please send me a few words about what you intend to do with your computer when it's finished.

One of the first Newsletters in the new series will be a roundup of the basic circuits used in ACS computers. So, if you buy ICs, please let me know in your renewal letter what make and types you use for lamp drivers, memory drivers, flip-flops and gates. If you build your own, please send schematics of these circuits.

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### IBM SMS CARDS

According to IBM Industrial Products, there are about 3800 different SMS circuit cards. Some of the cards are used in several pre-360

machines; others are in families of cards used in only one computer or group of computers, such as the 1400 series.

There is no list of code numbers and corresponding circuit types for these cards, according to IBM. The tabs are broken off because they are gold-plated, and Federal law requires that the gold be recovered, even though there is only a few cents' worth on each board.

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### SAVE THE MOSFETS

Walk across a rug, touch an unmounted MOSFET, and it's shot. Even less electrostatic potential than that is enough to destroy a MOS field-effect transistor. To get around this problem, some vendors ship MOSFETs with the leads soldered together, or shorted with a piece of metal foil.

That's fine until you're ready to mount the transistor in a circuit. But when you separate the leads for assembly, you can wreck the transistor by building up static charges.

Page 66 of the Dec, EEE shows how some NASA engineers use a loop of flexible nickel wire, attached to a music-wire spring, which is slipped over the transistor case and then around all the transistor leads, shorting them together and allowing them to be handled without damage to the transistor. The device is removed after the transistor is soldered into a circuit. If there's enough space, it can be removed and used again, but the wire can be cut and replaced if necessary.

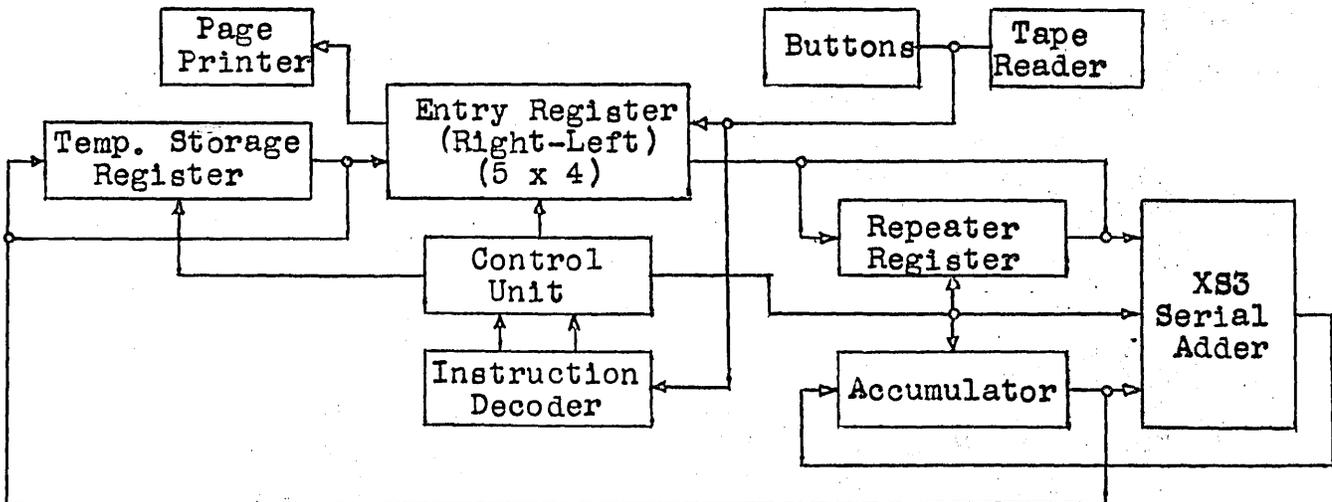
## AN XS3 COMPUTER

Don Tarbell, who was last mentioned in the August 1968 Newsletter (page 5) writes that his computer uses the excess-3 code, and its 4 registers are each 5 digits by 4 bits. Clock speed is 10 Kc at this time, but will probably be speeded up to 100 Kc or 1 Mc later on. He is using mainly the Motorola MC700P line of ICs.

Don's computer at this time consists of the processor, a Teletype tape reader, TTY tape punch/printer, Western Union page printer, and two code-conversion boxes. It has add, subtract and hardware multiply, and will soon have a hardware divide. He can run programs from the paper-tape reader or from a magnetic-tape recorder. A 4K memory will soon be added to the system.

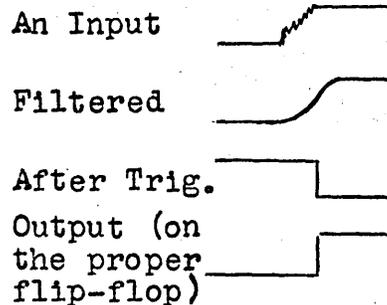
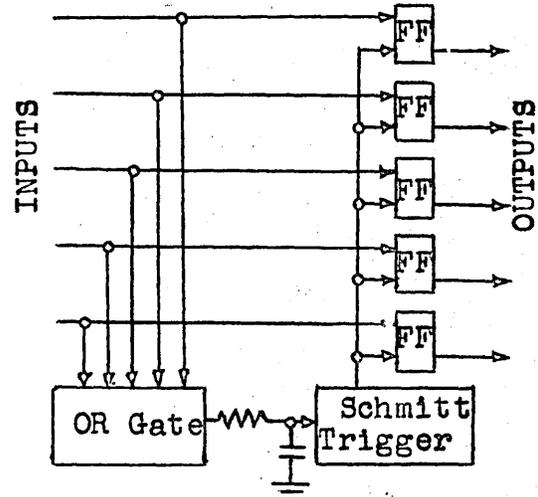
His sources of hardware are Allied Radio, Airwork Gulf, Lafayette Radio, Ampex Computer Products, Western Union, and friends. All the schematics came from his own design, or from fragmentary sources.

Here is a block diagram of Don's computer; most of the lines are actually several wires, and most of the junction points are 4-line digital switches:



The instruction set at this time is: 0,1,2,3,4,5,6,7,8,9, ADD, SUBTRACT, ENT MULT, MULT, STORE, RECALL, SHIFT, STOP, SHIFT IF POSITIVE, RESUME, COPY INPUT, RUN, PRINT OUTPUT.

Following is a solution Don had for the problem of filtering five inputs that were full of contact bounce from buttons or tape reader.



Don says his present problems are:

(1) Find suitable drivers and sense amplifiers for a memory that requires 190-ma drive current and has min. 30 mv output to 200 ohms.

(2) Understand how present-day computer compilers and assemblers perform translation functions.

(3) Find equal and plus signs for his printer.

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#### P-S AND S-P CONVERTERS FOR TTY

Back in the May 1968 ACS Newsletter, a member noted that someone should design parallel-serial and vice-versa converters for TTY from ICs, and which he believes a "good number of ACS members could use."

Jim Haynes writes that there are two such items in existence. One is a set of boards for 5-level TTY intended for amateur radio use for selective calling, and produced by Harold Quinn of St. Louis. But Jim didn't have Quinn's address at the time. The other item is a Teletype send-receive converter that uses ICs. Another ACS member, who is with Teletype, says the only card that seems to be applicable is one used as the sending distributor on the Model 37. However, "it would be difficult to get these cards, since production at present is needed for sets being built." The card uses 21 ICs, three of which are Motorola MC853P dual JK flip-flops, or equivalents made by ITT or Fairchild.

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#### SCRAP IBM EQUIPMENT

According to a special section on "Computer Trends" in the Dec. 9 issue (pages 44-45) of Electronic News, IBM now has a policy which says that, as of July 16, 1968, no scrap will be sold whose source of origin is IBM. The policy is said to be that such parts will be junked and melted down for salvage.

The new policy came about because of a junk dealer in Boulder, Colorado, to whom IBM was selling worn-out tape drives. The first models sold were old tube models "not worth much to anyone." Newer models, such as the 727 and 2400, began appearing, and salvage hunters had a field day, at 25 to 30 cents a pound. Competition soon sent the prices up to 35 or 50 cents. But then some people began using the surplus parts in supposedly new equipment, even selling some of it back to IBM. IBM doesn't want old parts sold to the public; they carry its label and "might compromise IBM's image."

Whether the new policy is country-wide, or applies only to tape drives, is not known at this moment.

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#### CRT NUMERIC CHARACTER GENERATOR

For those interested in CRT display, Fairchild Semiconductor has a seven-segment numeric character generator that is a MOS/LSI circuit with 150 gates on a chip.

The 3250 DIP accepts four-bit binary-coded words, and generates four deflection pulses synchronized with a serial train of video pulses that subsequently control the CRT beam. About 550 characters (the 10 numerals and a few special symbols) can be displayed at a 60-cycle refresher rate.

The 3250 DIP sells for \$60 each in quantities of 1-24, operating at -55°C to +85°C. A limited-range unit (0°C to +70°C) sells for \$42, in quantities of 1-24.

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#### NEW FREE BOOK FROM DEC

A new 425-page book, "Introduction to Programming," is available free from DEC as the latest in their Small Computer Handbook Series. It

is oriented toward the PDP-8 family of computers, of which over 3500 are in operation.

Single copies may be obtained free by writing Dept. P, Digital Equipment Corp., 146 Main St., Maynard, Mass. 01754.

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### S-P CONVERSION FOR TTY

Don Tarbell, noting that someone was looking for circuits to convert from Teletype to their computer, enclosed a circuit he uses for serial-to-parallel conversion from his Teletype tape reader. The capacitors in the schematic opposite may need to be adjusted somewhat, depending on the transistors used and the frequency desired. His unit runs at 60 words a minute.

Don says the best IC sense amplifier he's seen yet is Texas Instruments' SN7525N. This dual in-line package has two sense amplifiers in it, and costs about \$13 in single quantities. He has tested some samples, and they work OK.

When he gets his memory hooked into the computer, Don intends to work on three software packages:

- (1) A simple version of Fortran.
- (2) A compiler for solving special math problems such as higher order equations, differential equations, and many simultaneous equations.
- (3) An English conversational program to solve logical questions depending on previous input statements.

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### PRINTED CIRCUIT KIT

Kit #500 contains PC boards and all chemicals and supplies needed to manufacture printed circuits. Each kit contains two PC boards, 4-3/4 by 3-3/4 inches; a resist-ink pen; one 6-oz bottle of

resist-ink solvent; and one 1/16-inch drill bit. The kit is packed in an acrylic box which serves as a developing tray. Costs \$5.95 from Injectorall Electronics Corp., 4 North Road., Great Neck, NY 11024

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### ONE REASON FOR BUILDING A COMPUTER

One of the newest ACS members has an unusual reason for wanting to build a computer. Some years ago he had cerebral meningitis. Among other things, the accompanying fever damaged his memory considerably, both in the ability to remember things, and the memories that were already in it, back to when he was 11. As he puts it:

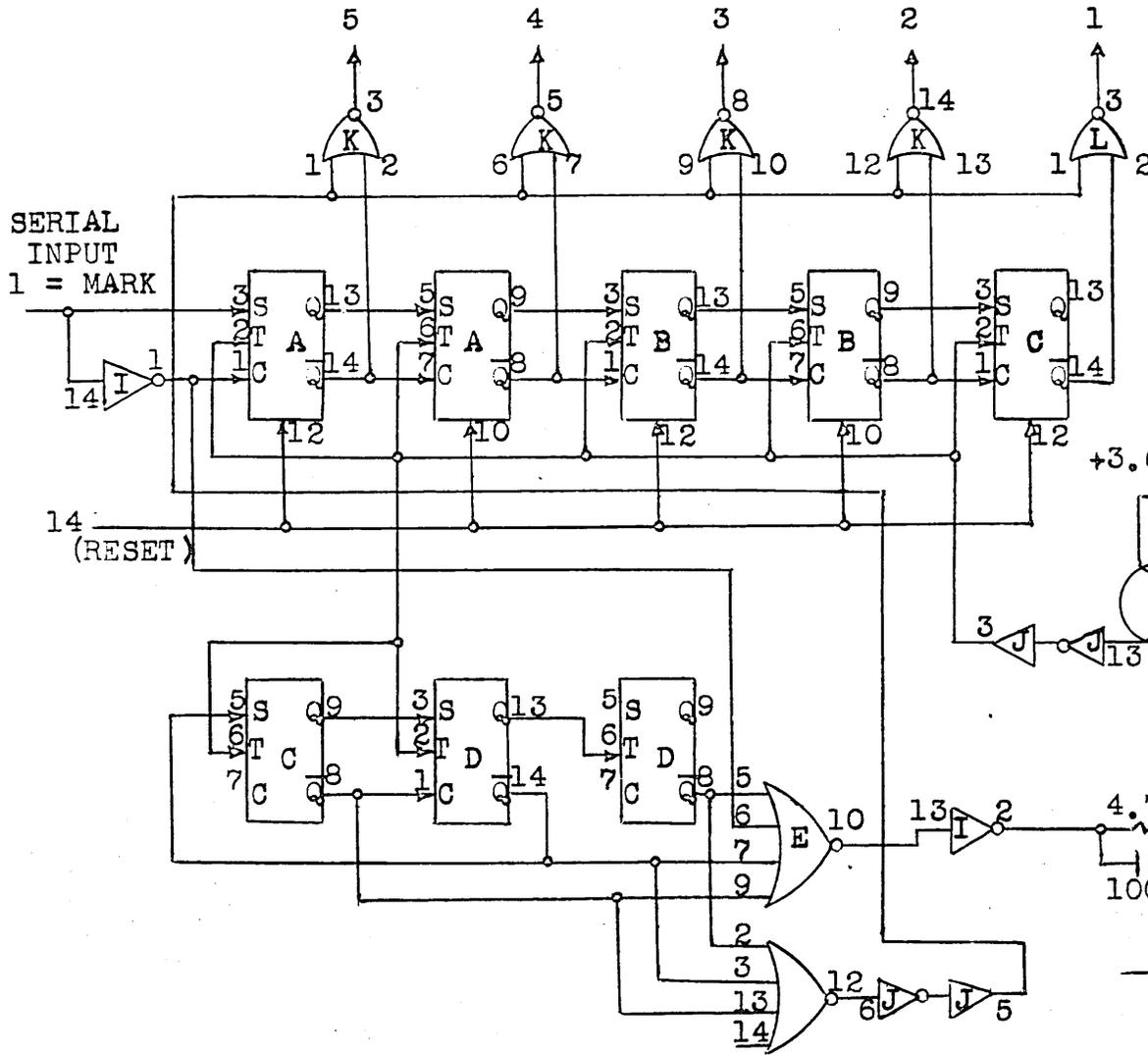
"Since I had never previously had much difficulty remembering things, it took quite a while for the new condition to be recognized. The trouble masked itself, as it were, since I couldn't keep in mind the fact that I couldn't remember things. Eventually I simply learned it."

"The first solution was to keep a journal of my activities and copies of everything I wrote (letters, orders, etc.). This worked for a while (10 years), but now I'm being driven out of the house by the mountains of accumulated paperwork. I am similarly obliged to keep all bills, receipts, canceled checks, etc., for years back. Simply finding the stuff is becoming a problem."

"So the second solution is to put it all on mag tape and let a computer keep track of it. Obviously, such a computer will be more business-type than scientific. (Of course, if it can do math problems as well, so much the better.)"

"My real problem, of course, is the computer's enormous complexity, with many different things going on simultaneously. A poor memory is

PARALLEL OUTPUTS

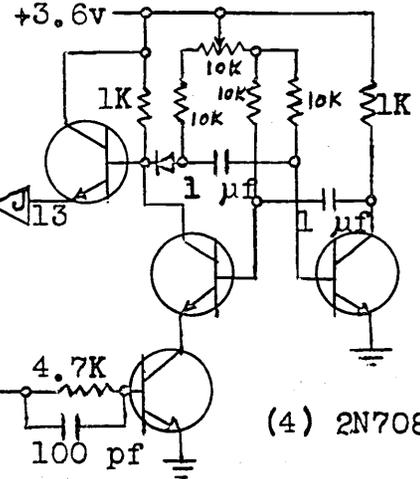


**NOTES**

A - MC790P    I - MC789P  
 B - MC790P    J - MC799P  
 C - MC790P    K - MC724P  
 D - MC790P    L - MC724P  
 E - MC725P

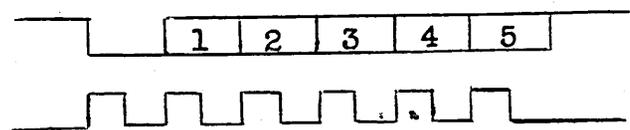
Be sure input is as clean as possible. I used a mercury-wetted relay and then an inverter with a capacitor for filtering.

For manual reset, connect 14 to SPST button to +3.6 volts.



10K pot and capacitors may be adjusted for proper frequency.

(4) 2N708



obviously a great handicap here. While I concentrate on what's going on in one area, the activity elsewhere escapes from me. For this reason, I am obliged, much more than most people, to depend on circuit diagrams. The diagram serves as a memory and I can switch my attention back and forth without any part getting away."

"But all the computers I have had anything to do with, have been far too big to get onto one circuit diagram, or even several, and I still get lost in the pages and pages of circuitry. However, it seems possible that the type of limited-scope, single-purpose computer I have in mind might be encompassed in only a few drawings that I could eventually comprehend.

"Some of the computer's functions might be of some use once it is built (such as listing), but there might also be things I could do right now that haven't occurred to me. I will appreciate anything anyone can do."

Any suggestions? He has 30 reels of one-inch instrumentation tape, two 120Kb core memories from the IBM 1620, a 32Kb core memory, and some 4Kb frames.

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### THREE LOGIC PROBES

Within several weeks of each other, three logic probes were put on the market. Because ACS members may be interested in debugging digital circuits without having to use a scope, details of the three probes are given here. Is there an ACS member who will design us a probe using the best features of all 3?

A hand-held probe for detecting the presence and polarity of digital pulses as fast as 25 nsec is available at \$89 from Pulse Monitors, Inc., 351 New Albany Road,

Moorestown, N.J. 08057.

The Digi-Probe model 1210 uses ICs, operates from a 5-volt 75-ma source, and has red and green indicator lights "to allow non-technical personnel to perform most digital circuit production-line checks with the probe, in lieu of a scope."

A second such probe is marketed by Automated Control Technology, 3452 Kenneth Dr., Palo Alto, Cal. 94303. A lamp at the end of the probe will light for logic 1 (+2.0 to +6.0 V), and remain off for logic 0 (zero to 0.8 V). High input impedance prevents upsetting flip-flops and one-shots.

Hewlett-Packard has a logic probe with a lamp at the tip that flashes for 0.1 second for a positive pulse, goes out for momentarily for a negative pulse, turns on low for a pulse train, burns brightly for a high logic state, and turns off for a low logic state.

Overload protection is from -50 to +200 V continuous; 120 V AC for 10 sec. Input impedance is 10 kohms.

Pulses as short as 30 nsec will cause a flash. Price of the HP 10525A Logic Probe is \$95.

The probes are all small: the Digi-Probe is 1" x 1½" x 2½", with the probe extending 1-3/4" beyond the case. Weight is 2½ ounces.

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### REMEMBER TO RENEW

If you'd like to subscribe to Volume II of the ACS Newsletter, please send a check or money order for \$3.00 to:

Stephen B. Gray  
Amateur Computer Society  
260 Noroton Avenue  
Darien, Conn. 06820

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ACS COMPUTER SURVEY

Serial \_\_\_ Parallel \_\_\_ Number of registers \_\_\_

Transistor types \_\_\_\_\_

Integrated-circuit types \_\_\_\_\_

Card types: IBM \_\_\_ Univac \_\_\_ Other \_\_\_\_\_

Memory type \_\_\_\_\_ Number of words in memory \_\_\_\_\_

Input \_\_\_\_\_ Output \_\_\_\_\_

Number of instructions \_\_\_\_\_ Word length \_\_\_\_\_ Clock speed \_\_\_\_\_

Add speed \_\_\_\_\_ Instruction length \_\_\_\_\_

Special features: \_\_\_\_\_

Estimated cost when complete \_\_\_\_\_ Cost so far \_\_\_\_\_

Estimated size when complete \_\_\_\_\_ Present size \_\_\_\_\_

How long working on it? \_\_\_\_\_ Fixed \_\_\_ or non-fixed \_\_\_ wiring?

In planning \_\_, begun \_\_ or completed \_\_\_\_\_?

Source of circuit schematics: Self-designed \_\_\_ Other \_\_\_\_\_

Source of system schematics: Self-designed \_\_\_ Other \_\_\_\_\_

Any other information?

Name \_\_\_\_\_ Address \_\_\_\_\_

Position \_\_\_\_\_ City, State \_\_\_\_\_

Company \_\_\_\_\_ Phone \_\_\_\_\_

Education \_\_\_\_\_ First heard of ACS from: \_\_\_\_\_

Interested in computers since 19\_\_\_\_\_