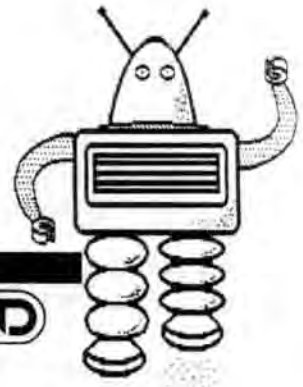


THE ROBOT COMPANION

The Newsletter of the Dallas Personal Robotics Group

April, 1990

Stan Spielbusch, Editor



MEETING MINUTES, ETC.

by Stan Spielbusch, Editor

At the March meeting, the main topic of discussion was the maze contest rules. I have listed all of the applicable rules and parameters that were discussed below.

Maze physical parameters:

Walls are 1/2" to 1" thick, 3-1/2 to 4" high.

Walls are made of unpainted wood.

Walls are placed at 18" intervals (so paths will be 17" to 17-1/2" wide).

The walls are not guaranteed to be smooth (may have bolts or other protrusions up to 1/2" each side).

Floor may be smooth (tile/concrete) or short carpet.

No lines or other tracking aids will be allowed on the floor.

It will be indoors, but there may be windows in view (light-sensors beware).

Maze configuration is 5 "cells" by 5 "cells".

Robot will start outside of the 5x5 maze (facing the maze entrance), and the "goal" will also be outside the 5x5 area.

The exit and entrance may be on any wall, (even both on the same wall), and will be 1 cell wide each.

There will only be 1 exit, but multiple path solutions are possible.

Contest operation:

There will be 3 maze runs per contestant.

Tentative time limit is 10 minutes per run. (If this proves to be too short for every entry, it will be adjusted.)

Two prizes will be given, both will be a \$25 gift certificate to Radio Shack and an appropriate plaque.

Prize #1 is for the best time for the first run.

Prize #2 is for the best of the three runs.

If less than 3 contestants enter, then prize #1 will be cancelled.

One or two practice sessions will be held at meetings before the contest (June and July).

Contest regulations:

No human assistance during runs.

No human reprogramming between runs.

Battery changes and other repairs are allowed between runs (but not during a run).

The robot must go through the maze, not around or over it.

Robots (and humans) cannot modify the maze to their advantage.

Any further rules will be announced when available.

MY HOME IS A ROBOT

by Ed Rivers

By the time this appears in print, we should be just about settled down in our new home. Since we were buying the house new, and were going to be able to select our own options, we chose to have the house wired for a custom intercom/security system. Instead of buying a stock intercom system, I decided to design my own and interface my Tandy PC to it. After thinking about the project for awhile, I came up with the following criteria:

a) The intercom should be available in as many rooms as possible, and any room should be able to talk to any other room. Rooms not involved in the conversation would not be disturbed.

b) Doors would be monitored, so the system would know when someone went in or out. The system would also be able to detect a door left open (like the garage door).

c) AM/FM Radio output will be available to any intercom station. In addition, the system would be able to mute the radio in the computer room if (1) computer 'hot' key pressed, (2) telephone rings, (3) intercom call received.

d) Two pushbuttons would be available at each intercom station to allow the entry of commands to the system via a binary code. An entry of 0010, for example, would request the intercom. Entering 0111 would then select the Kitchen as destination.

e) Heath's HV-2000 speech synthesizer interface would allow the computer to 'talk' to any station.

f) Heath's CP290 BSR X10 controller would allow the computer to control the lights in the house.

g) Motion detectors and window sensors would provide additional inputs for security monitoring.

h) Each station would have an LED indicator and a photocell. The indicator could be used to signal whose turn it is to speak when the intercom is being used. The photocell can help monitor rooms in which lights are on.

i) The system should be able to intercept the doorbell.

The computer room was chosen as the master station (#1). Twelve other stations were selected as remotes. Eight conductor wire was installed by Ranger American, a specialist in security systems and intercoms that the builder uses frequently. They also installed the door and window sensors. All wires were run to the computer room and left hanging out of the wall. Fox Electric, the electrical contractor, ran the doorbell wire from the doorbell button to the computer room, and then to the doorbell.

So far, the hardest part of this project has been locating suitable speakers for the ten indoor substations. I'm looking for 5" speakers with good-looking front grills that do not have buttons or volume controls. They must install over an electrical box cutout in the wall.

Next month, I'll talk about more about the hardware/software setup and general progress of the project.

BUILD A SIMPLE HOME BREW ROBOT

by Brian Vaceluke

The uBOT -- PART 1

Almost everyone in DPRG has at one time or another wished that they could build a homebrew robot if only they had the time, money, or resources. With this article, I hope to inspire a few people. The uBOT (pronounced Micro-BOT) is a simple, inexpensive home brew robot. It can be hooked to either a PC or dumb terminal by its built in RS-232 interface. It also has built in speech capability, an obstacle sensor, and a real time clock. It takes about twenty five evenings to build and it costs around eighty dollars.

Its body is salvaged from Radio Shack's Robie Junior Robot, or possibly some other child's toy such as Milton Bradley's Big-Trak. The electronics in the toy are removed and replaced with a computer and sensor board (the robot logic board). However, a very ambitious person could build a custom body and drive train.

In this three part article I will talk about building and testing the computer portion of the robot logic board, building and testing the sensor portion of the robot logic board, and installing the board in the body and running some sample software. This month is dedicated to building and testing the computer portion of the robot logic board.

The robot logic board is home made. Its CPU is a derivative of the 8052AH BASIC (a single chip microcomputer with built in BASIC interpreter and serial port). The 8052AH BASIC costs \$25 at some electronic parts houses, and it draws a little over 100 mA. I decided to suck the BASIC from the 8052AH BASIC and burn it into a 27C64 EPROM which is used in conjunction with an 80C32 (a CMOS version of the 8052 without the on board program ROM.) The combination costs about \$10 and draws approximately 30 mA. The computer portion of the robot logic board consists of the above combination plus: four address decode chips, one program memory chip (U3 - may be 2Kx8, 8Kx8, or 32Kx8 of SRAM), and one socket of optional EPROM/EEPROM/SRAM/NVRAM for program storage or additional program memory (U4 - may be 2Kx8, 8Kx8, or 32Kx8 of SRAM or NVRAM, 8Kx8, 16Kx8, or 32Kx8 of EPROM, 2Kx8 or 8Kx8 of EEPROM). The sensor portion of the robot logic board consists of an SPO256-AL2 speech chip and speaker amplifier, a general purpose I/O chip (the 82C55), and two motor driver chips. The total cost to build is about \$50.

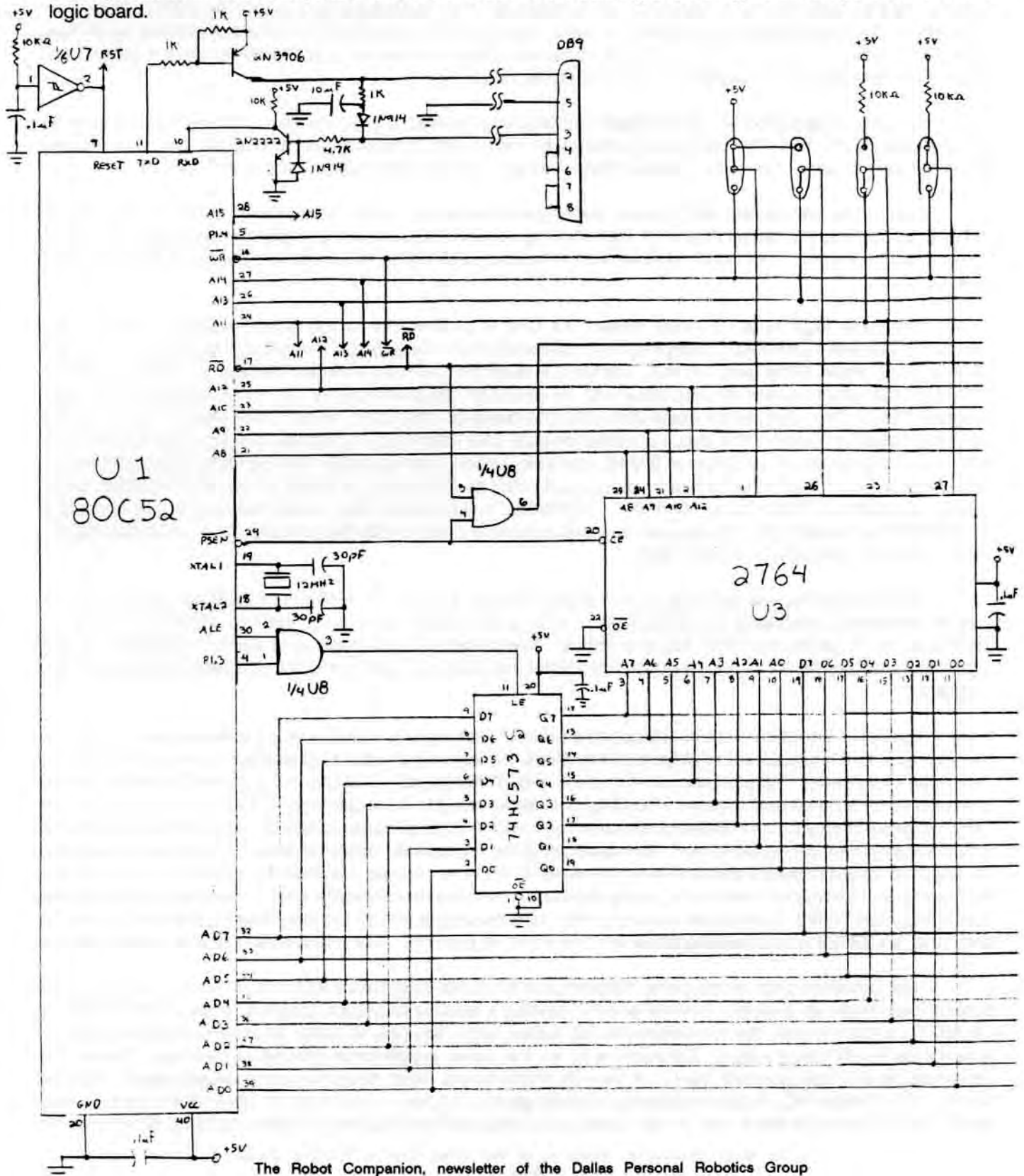
The SPO256-AL2 (as part of a surplus speech board), the 80C32 or 8052AH BASIC can be gotten from Tanner Electronics. Alternately, the SPO256-AL2 can be gotten from Radio Shack. The RAM, EEPROM, and blank EPROM's can be gotten from B.G. Micro or Tanner Electronics. If you send me a blank EPROM with a self addressed stamped return package and you are a DPRG member, I will gladly program your EPROM with the BASIC program.

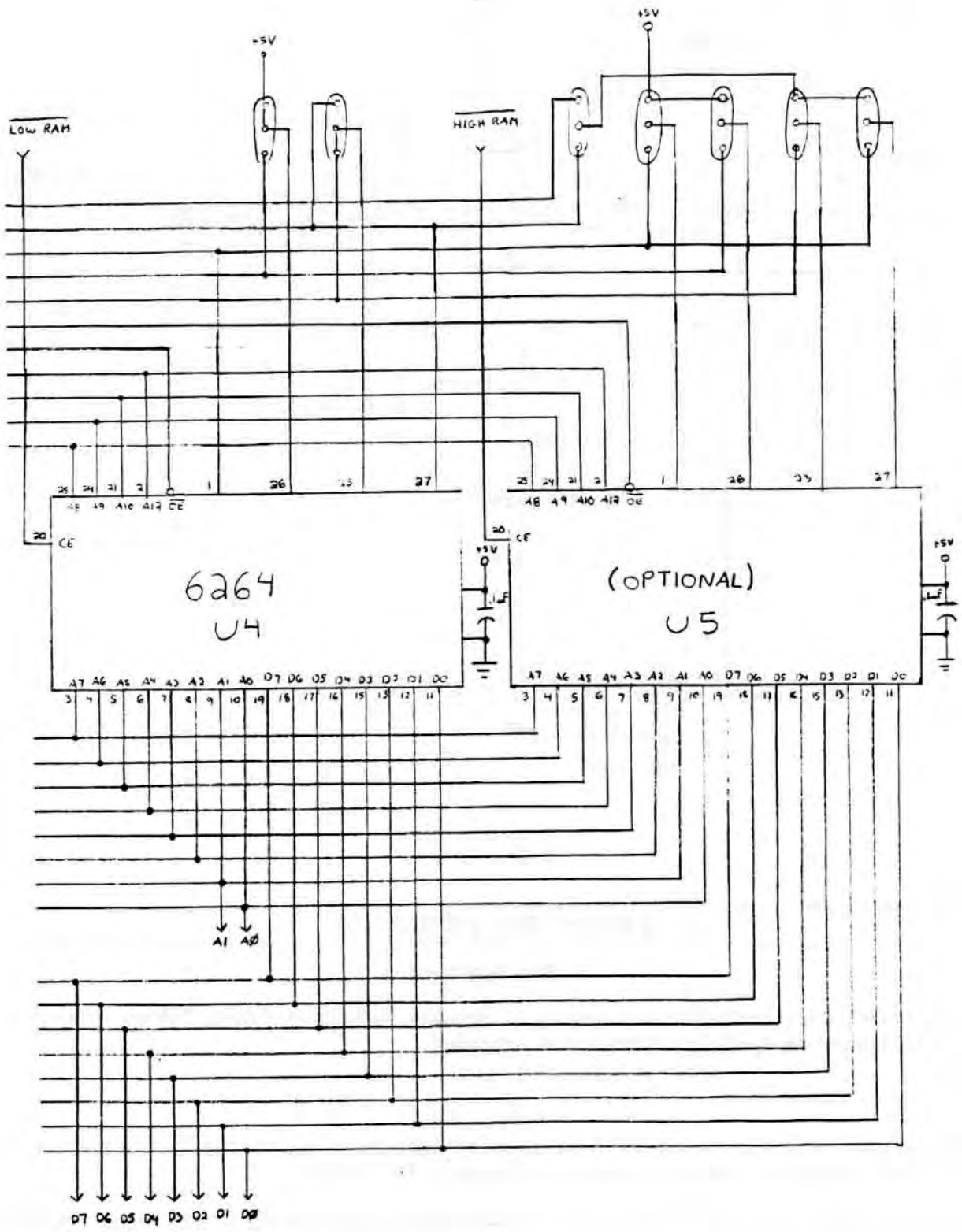
The robot logic board is wire-wrapped for ease of prototyping. When wiring this board it is important to pay attention to the pinouts of the chips and transistors. Ninety nine percent of all problems encountered will be caused by miss-wiring. Wire all sockets with the IC's NOT INSTALLED. It is best to keep the IC's stored in their protective foam or tin foil until needed since they are very sensitive to static electricity. When you do have to touch them, make sure that you have discharged yourself on to some large grounded piece of metal such as a sink faucet first. Wire all power pins, ground pins, and decoupling capacitors first. Keep the decoupling capacitors as close as possible to the intended chip and keep the wires as short as possible between the capacitor leads and the intended pins. Then apply power to the empty board and check the sockets from the top to see that the appropriate pins have power (in the appropriate polarity). Next wire the crystal and its two associated capacitors to pins 18 and 19 of the 80C32 socket keeping these wires as short as possible. Now wire the rest of the computer portion.

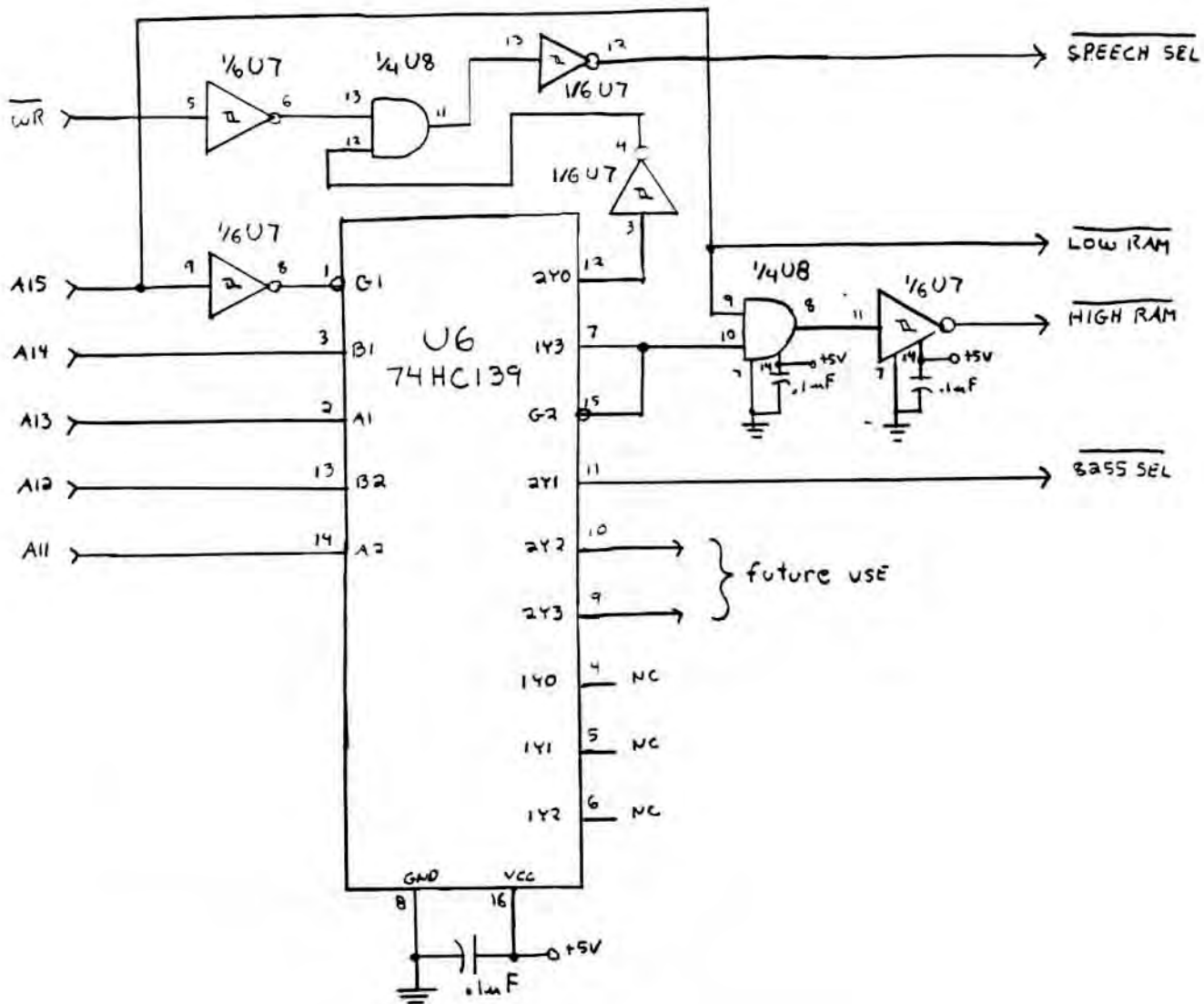
Now install the chips in the computer portion of the robot logic board and check that all jumpers are set accordingly. Hook up a dumb terminal or a PC running a terminal emulation program such as PROCOMM or CROSSTALK to the board. Set the terminal for full duplex, eight data bits, no parity, and one stop bit at 300 baud. Now locate a +5V power supply. Connect the (-) on the power supply to the ground on the board. Turn on the power supply and now connect the (+) to the +5V on the board. Wait about two seconds and press the space bar on the terminal or PC. A sign-on message should appear. If it doesn't, don't panic. Mine didn't the first time either. Feel the chips to see if one is hot. Check its wiring again and replace this chip. Recheck all of the wiring

again. Once the board is working you may increase the baud rate. It is possible to go up to 9600 baud. The space bar that you press after start up tells the CPU what baud rate your terminal is set for.

A good source of reference is the 8052AH BASIC User's Manual. Alternately, you may call me at (214) 298-9954 during evenings. If you do decide to build this project you will be rewarded with a strong sense of accomplishment when it's completed. Good luck. Next month: building and testing the sensor portion of the robot logic board.







FROM THE LIBRARY

by Stan Spielbusch

Walter Glod has submitted a disk containing an interesting-looking set of demo routines. I haven't had a chance to try them out yet, so I'll give a better report next month.

If you have a program to submit, put it on an MS-DOS format disk and bring it to the meeting or send to: Stan Spielbusch, 2404 Via Barcelona, Carrollton, TX 75006.

We currently have 6 disks in the library -- HERO 1 BASIC, HERO 2000 BASIC, HERO 1 Assembler, Loren Heiny's Eyesight program, Loren Heiny's Sonar mapper/SWORLD, and Brian Vaceluke's Homenav.

If you want a copy of a disk, send \$3.00 per disk to Stan Spielbusch (address above), or bring a blank, formatted disk to the meeting and trade with me (or pay \$2.00).

CLUB INFORMATION

The Dallas Personal Robotics Group is a non-profit organization of individuals interested in learning about personal robots, sharing ideas, working on projects, and informing the public about the world of personal robotics. We are open to anyone who has an interest in personal robotics, whether or not they currently have a robot, and whether or not they have any knowledge of robotics.

To become a member and receive the newsletter, have access to program library, and be involved in our monthly clubs and user's labs, simply fill out the form below, and send it with \$10.00 to Stan Spielbusch, Treasurer (address below).

If you are interested, but not sure you want to be a member, feel free to visit our meetings. If you like, we can send you a sample issue of the newsletter.

Tentative Meeting Schedule (1990)

Apr 14 May 12 Jun 9

Meeting times and location: 1:30 P.M. at the Dallas Infomart.

Club officers:

President: Brian Vaceluke (214) 298-9954 Vice-president: Victor Sturm
Treasurer and Secretary: Stan Spielbusch (214) 418-8934

Back Issues

Back issues are now available in four sets. Each set is \$8.00, plus \$2.00 postage and handling if ordering by mail. Set 1: From the start of the club in 1984 through 1986. Set 2: 1987. Set 3: 1988. Set 4: 1989. Issues from 1990 are \$0.50 each, plus \$0.25 p&h. Contact Stan Spielbusch, Editor, 2404 Via Barcelona, Carrollton, TX 75006.

MEMBERSHIP APPLICATION

Dallas Personal Robotics Group
c/o Stan Spielbusch 2404 Via Barcelona Carrollton, TX 75006

Check one: () Renewal () New Member () Info Change () Sample issue request

NAME (please print) _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

HOME PHONE () _____ - _____ WORK PHONE () _____ - _____

TYPE OF ROBOT (if any) _____

TYPE OF COMPUTER (if any) _____ MODEM: _____ BAUD _____

Do you want the above information available to other members? _____

(We do not sell our mailing list to businesses, but it is available free to all club members.)