

# TTPUG *magazine*

May, 1984

\$2.95

The official publication for the world's largest international Commodore users group

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Randy Robot—  
the robot with a VIC 20 heart!



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# BECKER'S BABY

## - The Million Dollar Superchild Has A VIC Heart

photos by R. Portolese



Randy with creator Becker.

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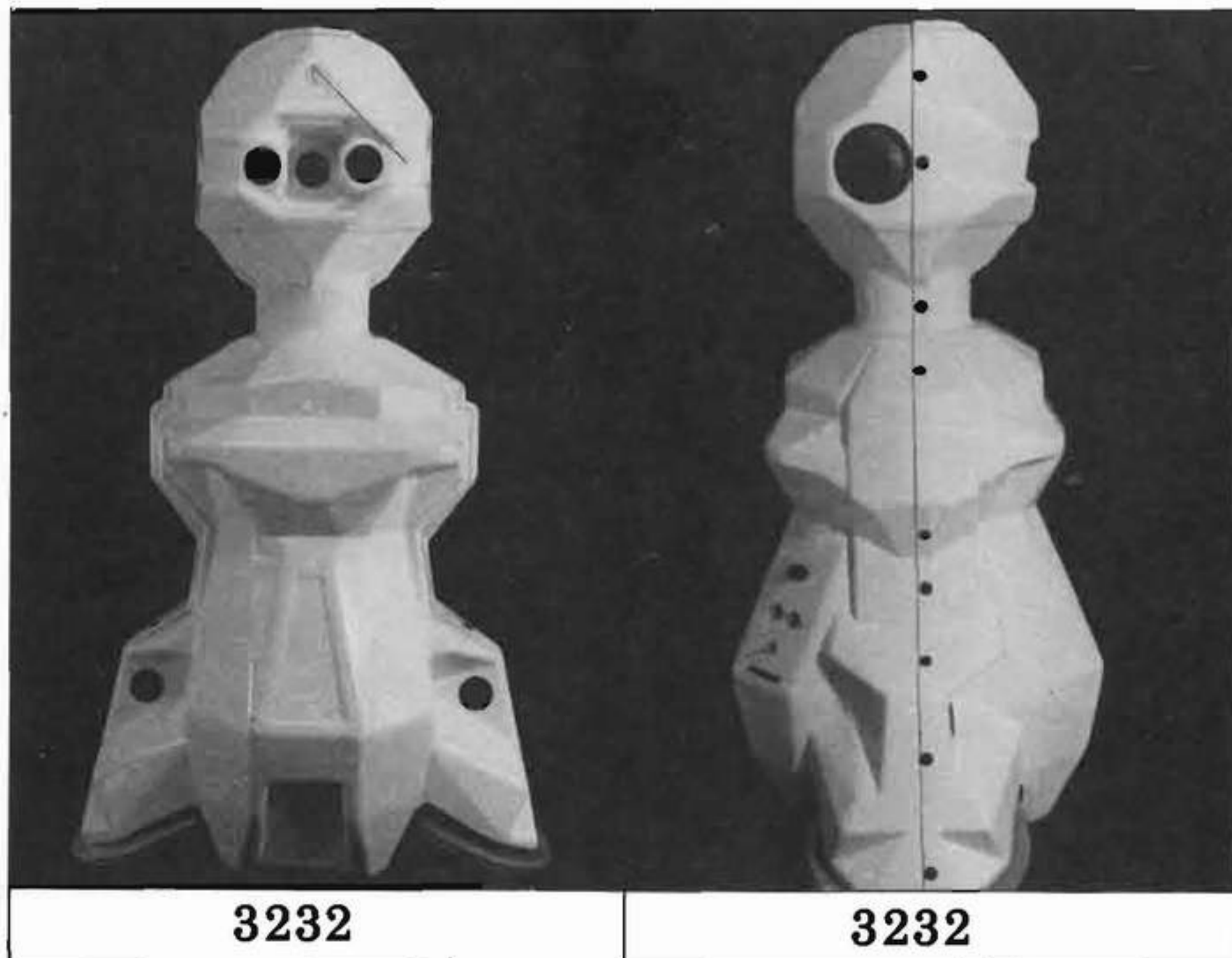
Flash Gordon outwitted them, Superman scattered their components throughout the Universe. Everybody knows our Super-heroes won the battle but now we're discovering they lost the war. According to a recent Industry, Trade and Commerce prediction the Robot population of America will, by 1988, number between five and eight million. However, using a recent industrial show as a yardstick, it would be easy to scoff at the forecast. Several "user friendly", robots were on view at the show but with only three arms and a handful of plug in voice boxes between them, the "invasion" took on all the aspects of a social visit from Fred Karno's army. Obviously the robots need a champion and it seems they have found one in a bright little chap called Randy. Equipped with a VIC 20 "heart", drastically modified by a number of Eproms and some additional memory (32k in ROM plus 32k of RAM), he has so many "smarts" available that Superman will need a lot more than Krypton in the next encounter.

The telephone at Jack Becker's house competes with the door bell and, whilst nobody has yet asked "Is Randy home?", it's Becker's creation most of the callers are interested in. The Chicago-born, Toronto-based inventor, who has an incredible background in radio, a Masters degree in electronics, a degree in Psychology and considerable exposure to frontier science whilst holding a high level technical post with the

U.S Government, is a TPUG member with an avid interest in Robotics and a considerable amount of practical experience complementing his technical know-how. A long time radio control enthusiast, he was commissioned by Walt Disney to produce 29 robots for Disneyland in 1967. Three years later he made 31 more when Disney World opened, and Heathkit's "Hero" was a computerized version of a Becker prototype. But, as he insists I mention, he has known rejection. In 1978, when he offered an early version of Randy to Atari, he was rejected because his robot was "ahead of its time".

Becker takes that remark very seriously. "Robotics is more than just technology", he says. "Consumers have a resentment associated with the childhood educational concept of avoiding strangers, and most of us have a natural instinct to compete. It is essential that design follows an ugly, toy-like format to gain acceptance; it can be introduced only in small doses". "A robot with humanoid form, superior intellect and greater physical ability is at this stage unacceptable by our society".

As far as Randy's appearance is concerned, the builder has adhered rigidly to his concept. The white ABS plastic shell is simple and almost featureless, a red bow tie adds a child-like quality but it's all a facade. Hidden behind the shell its VIC 20 central processing unit controls so much innovation that Becker would be modest in claiming that he had "re-invented the wheel". Instead he quotes names that include Ari Burman and Gord Goebel who spent hours designing an arm with three sensors and the ability to lift 30 pounds, Paul Shields, who burned a considerable amount of midnight oil to come up with some machine language routines that, combined with Jim Butterfield know-how, helped create a unique form of artificial intelligence. "It took countless hours of unpaid dedication from these and others." Becker emphasises, "Each time we modified something it created bugs and each time we fixed bugs we created more bugs. It also took money. I estimate "Randy" has cost me about



*continued overleaf*





50% of what the Million Dollar man was appraised at !"

There has been some income. An innovative sonar module design sent out for manufacture brought in a six figure cheque plus royalties to follow from the company who had been asked to produce the item. Randy's sonar now works at the bottom of an oil well drill shaft scanning rock formations half a mile below the earth's surface. It not only sees the rock formation in darkness but is able to photograph it with sound.

One of the most challenging problems in robotics is the reproduction of human speech. An extremely simplified introduction to this would explain that plurals are illogical. The plural of "dog" is "dogs" but the plural of "man" is "men". Some 87% of words are spelled phonetically but 13% are not. Words change completely. "A boy" is correct but "a olive" is not. If one considers that English has 40 primary phonemes (the smallest elements of spoken sound), sixteen vowel sounds 24 consonants and that all sounds can be changed by accents or regional dialects, then everything seems as rational as Lewis Carroll's "Jabberwocky".

Becker feels that in this field his team has made its most significant improvement. "We used the number one voice recognition board and found ourselves totally unsatisfied. We had only 80 words in the vocabulary that could be recognized and translated into subsequent action. It accepted only one programmer's voice at a time. We became impatient with having to run through the 80 words four times and finally getting an 80% response average in use. The solution was a 16 bit Nippon microprocessor upgraded to 32k of ROM and 64k of RAM plus a different method of tackling the prob-

lem. Our own unit accepts instructions from eight different voices, can handle vocal ranges of soprano to bass, it accepts dialects, accents and volume changes and has the additional phonemes that allow programming in any language. The unit gives us 80% response rate when it takes commands from 8 different voices, and 100% from a single voice. We achieve these results from a single instruction set and we have no restrictions on the number of commands other than the storage space available for them".

The voice synthesizer shows a similar concern for perfection. "It's smaller, a Z 80 with 32K of ROM and 8K in RAM, but nothing on the market comes remotely close to it," Becker explained. "We've placed 1290 words in the vocabulary but another 60,000 can be added. The additional entries can be made in



the owner's voice and, by using phonemes and a word memory bank simultaneously, the synthesizer can handle the abrupt cut-offs encountered in Spanish, the lilt of an Irish voice and the different sounds one perceives between an Oriental conversation and a Texan one".

Randy has a built in motion detector that is multidirectionally effective within a hundred feet. It can classify human, animal and inanimate objects at a similar range. Randy can also hear a finger snap at that distance and be programmed to investigate anything unusual. "Tell Randy to go look at something, and that's exactly what he will do", said Becker. "He has 180 degree vision and a photographic memory bank plus a sonic memory bank that separates you from an inanimate object. If you pass his scrutiny he can greet you by name. Alternatively he will request a password. Ignore him and you will be followed and photo-

graphed at 30 frames per second whilst his alternate processor will be telephoning the local police station to complain about you".

The "alternate processor", another piece of wizardry from Becker's fertile imagination, includes a radio telephone link on a small circuit board which is interfaced with the command, logic and voice modules and, with over 200 channels available, there's a lot of scope for the robot controlling external devices. A few channels would be pre-committed to the police and fire station and an "incoming" line permits the robot to monitor and handle telephone messages received.

Enthused by the response he has encountered, Becker has recently opened a plant with an anticipated first year's run set at 10,000 units. Five hundred are committed to an Arizona businessman who has already handed a sizeable chunk of money over to secure the deal and, with a string of promotional appearances, Randy is likely to be around for a long time.

The future of Robotics? Becker smiled and, asking me to hold out my hand, placed a few items on the palm of it. . . I had a double sided disc drive holding a million bytes and measuring 4 inches by 4 inches and about an inch in thickness. . . I had a 1.2mm television camera that could see 180 degrees and had 8 built in ROM chips which produced digital pictures one could store directly on the drive (it was a 1 inch cylinder that was about 2 inches long). . . I had a 6 inch by 3 inch TV monitor that was about a quarter inch thick. . . finally, like a mischievous schoolboy, Jack Becker answered my question by quoting the lines from the Million Dollar man Television show. . ."We have the technology. . .", he said. Indeed you have, Jack Becker. *TPUG*

