Pivot Points
These correspond to the 'joints' of the human arm

Connecting Wires
The connecting wires join the servo motors to the pivot points. As one wire is pulled in one direction so the other will be pushed in the opposite direction.

Servo Motors
These motors provide the power that alters the degrees of freedom of the various rods

Optional Grabber
Only one of these grabbers is actually connected to the servo. The grabber grips by pressing the moving grab against the static one

Metal Plate
The base of the arm consists of a metal plate. However, care should be taken in lifting objects as this could easily topple the Beasty over

IAN McKINNELL

Servo Motors
The standard Beasty comes equipped with three servo motors connected to an interface box. Servo motors are popular motors for robotics because of the way they provide a constant force or 'torque' corresponding to the frequency of the digital signal with which they are supplied

maintain the servos in their current position. These numbers may be altered by the user, and while the system is in Edit mode the servo motor being adjusted will move as changes are made, allowing the arm to be positioned to the user's satisfaction. Once the operator is happy with the positions of each of the motors, Return must be pressed, whereupon a new Robol line is displayed and the next series of movements can be programmed.

The arm can be made to carry out a complete sequence of movements if the F0 function key is pressed. The program can be made to run from any line by first pressing F1 followed by F0 (this runs from the start of the program) or by changing the current line number by using the cursor keys. At the end of the program, the sequence of actions will automatically repeat. Should the user wish to stop the program, a MOVE instruction must be changed to STOP.

TIMED DELAYS

While executing a series of MOVE instructions, the arm can be made to pause by incorporating a WAIT instruction, followed by a number. This works by accessing the TIMER 1 pin of the user port, generating an interrupt. As the timer works in units of 1/100th second, WAIT 100 will produce a one-second delay before the next instruction is carried out.

The action of the arm can be greatly accelerated by changing the MOVE command to JUMP. Two timing statements are also included — JDELAY and MDELAY. The Beasty has a built-in delay that occurs before each line executes. This has a default value of 20 — i.e. 1/5th second — but this value may be changed by using JDELAY for JUMP statements and MDELAY for MOVE instructions.

The Robol operating system is easy to use, and it is a simple task to program the arm to perform complex movements within a matter of minutes. The operating manual is brief but perfectly adequate, although advanced programmers may find that it gives insufficient information for more complex programming. The Beasty may be controlled from BASIC by using the Driver program; this accesses the BBC Micro's user port in much the same way as the examples we have given in our Workshop series.

Commotion has also included a short program that allows backup copies of Robol software to be made. Unfortunately, most BBC disk drives use the auxiliary power socket on the BBC Micro, so the Beasty and a disk drive cannot be connected at the same time.

However, despite such minor niggles, the Beasty is certainly a worthwhile introduction to the field of robotics. It might be said that this is a device in search of an application, as the robot arm cannot really be said to be truly useful and will probably be purchased by only the most enthusiastic hobbyists. However, it is sure to be of value in schools and colleges, where it can be used to teach students the principles of robotic control.

THE BEASTY

PRICE
£110
Interfaces connectors that plug into the user port and auxiliary supply of the BBC Micro.

SOFTWARE
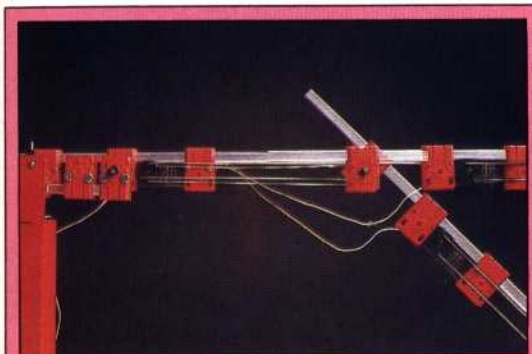Robol and driver routines available on cassette.

DOCUMENTATION
The Beasty comes with an assembly manual and a programming guide.

STRENGTHS
An easy to use and reasonably priced introduction to robotics.

WEAKNESSES
The assembly guide lacks clarity and there is a lack of obvious applications for the arm, although Commotion promised some upgrades that will widen its uses.