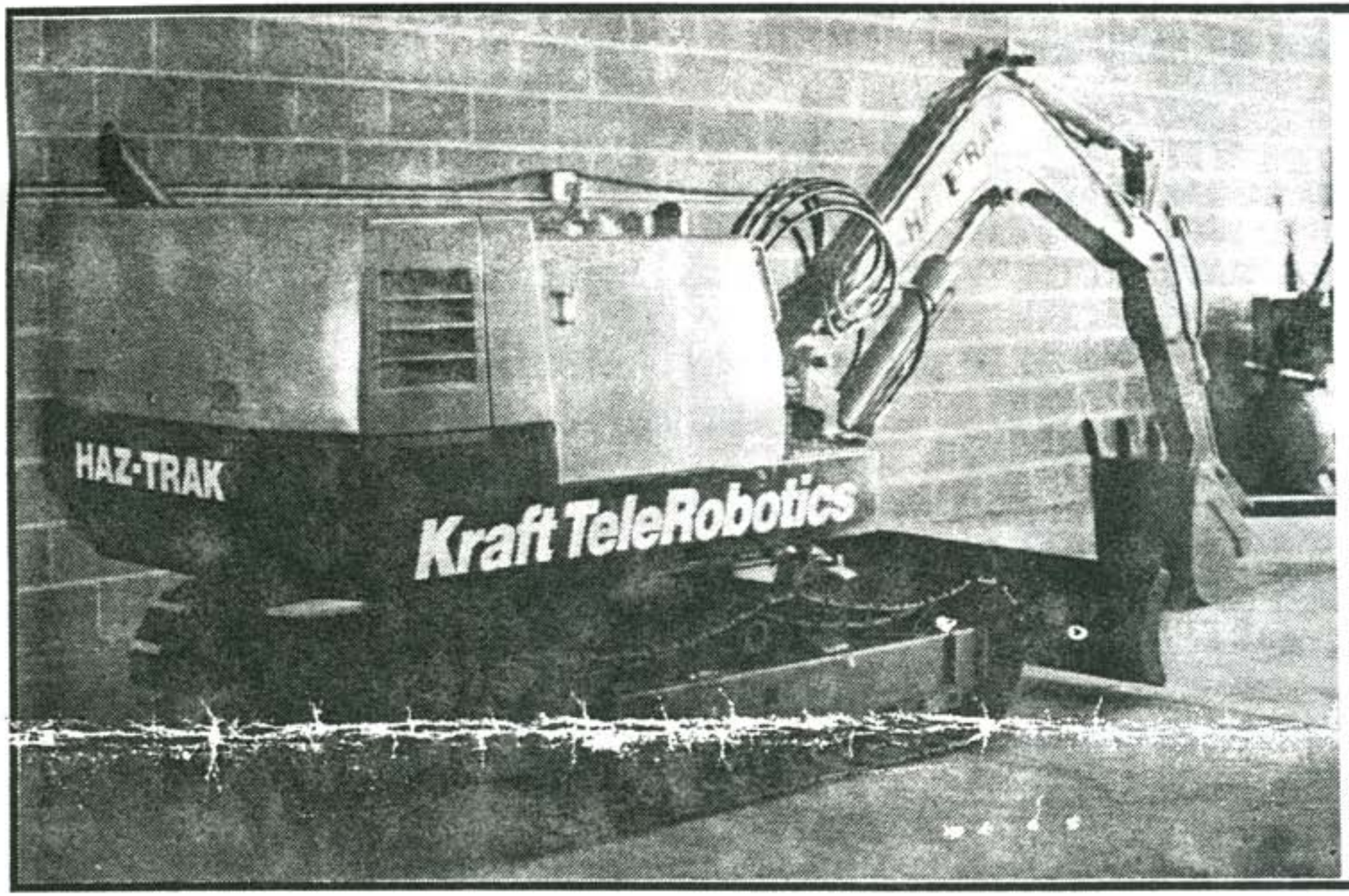

Kraft HAZ-TRAK Robot System,
See P. 2

MILITARY ROBOTICS™

BQM-147A, con't from p. 1

for the first quarter of FY 1994.

RFP DUE IN JANUARY

After months of waiting, contractors are expecting the RFP for 210 BQM-147A UAVs (with all options) in mid January. Although the UAV JPO has been very quiet on the subject, the RFP is expected to contain plans for building the familiar Exdrone system according to a printed plan. Besides the EW package, the Army will receive the VLC UAV for reconnaissance applications.

The build-to-print plans are expected to be part of a classified technical data package which will be made available for access by interested contractors. The package will be located at the Marine Corps UAV Project Office at Quantico, Va.

KRAFT INTRODUCES NEW EXCAVATING ROBOT WITH FORCE FEEDBACK

Kraft TeleRobotics of Overland Park, Ks., has announced that it has adapted its bilateral force feedback technology for remote control of a hydraulically powered excavator and material handling system called HAZ-TRAK. The primary markets for the system are the Department of Energy and the Department of Defense. The company is building a system for an unnamed customer. The basic cost is $350,000 to $500,000.

The system uses a master control scheme where 1 hand controller oversees all of the system's functions. In this method, 1 operator could control 2 vehicles. The tracked excavator has a 360° turret, and the arm currently has 4° of freedom. Harbur said that the company can add roll and yaw dimensions to the manipulator.

The current HAZ-TRAK vehicle is a 7000 pound John Deere excavator, although the system can be scaled up to a 70 ton system, according to Steve Harbur, director of product development at Kraft. Vehicle locomotion is provided by 2 independently controllable hydraulic motors, each driving a single track. The system can maneuver and work in soft ground conditions, according to the company. HAZ-TRAK also carries a hydraulically-actuated dozer blade which can be used for grading, backfilling, and leveling of the vehicle on sloped surfaces.

The basic physical characteristics of the current vehicle include: over-all height of 7 feet 10 inches, over-all width of 4 feet 11 inches, and over-all length of 15 feet 5 inches with the arm folded. With a bucket attachment, the arm has a maximum dumping height of 9 feet 3 inches, and a maximum reach at ground level of 15 feet 1 inch. Maximum digging depth is 8 feet 8 inches. The vehicle has a maximum speed of 2 mph from its 4-stroke, liquid-cooled diesel engine.

The system is equipped with a viewing system designed to provide the operator with camera perspective for remote operation of the vehicle and its arm. The basic viewing system includes 2 fixed color cameras for peripheral vision, and a single pan and tilt-mounted color work camera with auto iris, auto focus and zoom.

Control electronics are housed in an environmental enclosure located in the cab area. Modular design of the electronics simplifies installation and removal of equipment when movement is restricted, according to Kraft. The system's master controller is a Kraft KMC 9100-MC hand controller. This is a compact, 6 degree of freedom force-reflecting master for bilateral control of the excavator arm. Operating as a position-controlled, closed loop servo

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system, movements introduced at the control arm by the operator are duplicated by the slave excavator arm.

Force-feedback may be very useful in tasks where an operator must be careful to avoid damaging objects handled by the manipulator. For example, the arm can be fitted with a grasping end effector for grabbing drums containing hazardous materials

IAI/TRW DELIVER FIRST SHORT-RANGE UAV

Israel Aircraft Industries Ltd. (IAI) and TRW delivered to the U.S. government in the second week of December its first fuselage and engine for the short-range unmanned air vehicle (UAV) program. Evaluations of the system will begin in March 1991. McDonnell Douglas/ Developmental Sciences Corp., the other team competing in the program, has not yet delivered any hardware, according to the UAV Joint Program Office (JPO).

The IAI/TRW airframe was accepted in Israel by representative of the UAV JPO. The Norton engine was delivered by IAI to the Naval Air Propulsion Center (NAPC) in Trenton, NJ. The engine has completed altitude tests and calibration in Israel and will undergo additional endurance and altitude tests at NAPC to ensure that it meets all of the program's requirements, according to IAI.

IAI SELLS SEARCHER UAVS

IAI has announced sales of its high-endurance Searcher UAV to the Israeli Air Force and the Israeli Defense Forces Intelligence Corps. The unspecified number of drones will replace the Scout and Mastiff UAVs operated by those military forces. In addition, IAI has announced the sale of an unknown number of Searchers to an unidentified Middle Eastern nation.

MARTIN BUILDING WHEELED MARS ROVER

Martin Marietta Astronautics Group in Denver, Co., the company that built the 6-legged Walking Beam Mars rover, is now constructing a new 4-wheeled roving robot for planetary exploration. Using about $300,000 of its own funding, the company is preparing to assemble a 2-body articulated robot which uses unique conical shape double-hubbed wheels, which is like having 2 wheels side by side, according to Wendell Chun, a field engineer for Martin Marietta. A flight version of the rover could cost $100 million, he added.

The robot is 5 feet long, 2.5 feet wide, and its wheels are 26 inches in diameter. It weighs 40 pounds. The vehicle will carry the same sensor package as the Walking Beam: a laser scanner, 2 video cameras in front, and a proximity sensor for obstacle avoidance. Currently, the system is remotely controlled, but the company plans to use its Autonomous Land Vehicle (ALV) technology to upgrade the system to make it autonomous. The system's manipulator is an 8 degree-of-freedom Scarab pick and place system. Current plans call for the rover to be launched to Mars in 1998.

ALV CONTRACT AWARDED

Martin Marietta expects to receive a $500,000 Defense Advanced Research Projects Agency (DARPA)/Army Tank-Automotive Command contract for use of the ALV as a test-bed for advanced teleoperated/autonomous vehicle technology. A parallel contract was recently awarded to Carnegie Mellon University for mobile robotics research in the area of supervised intelligent navigation.

INTELLIGENT VEHICLES AND HIGHWAYS MAY COST $35 BILLION

Over the next 20 years, a $35 billion investment will give the United States an extensive system of intelligent vehicles and highways (IVHS), according to an organization called Mobility 2000. The money would come from federal, state, and local governments, industry, and citizens. Among the technologies that the group is studying are advanced traffic management systems (ATMS - automatic traffic control), advanced driver information systems

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