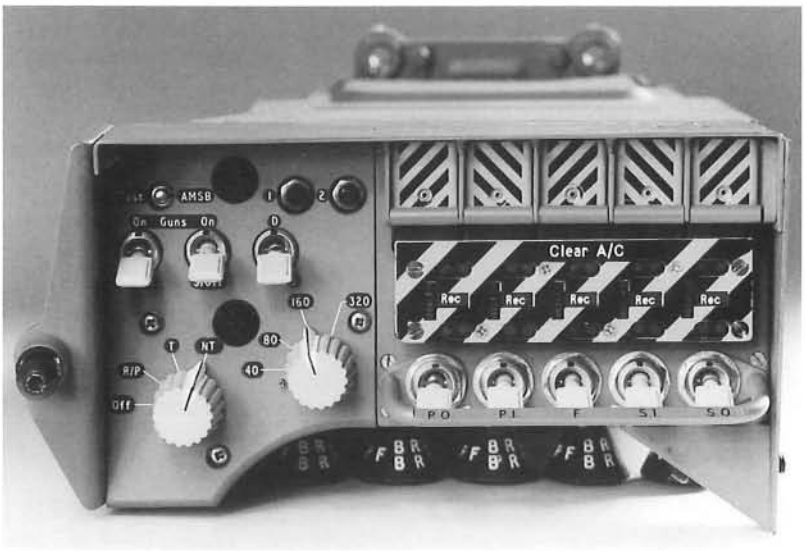
GEC-Marconi Electronic Systems

Weapon Control Systems, Harrier & Jaguar Applications



■ *All controls on one panel*

■ *Balance of aircraft maintained automatically*

■ *Selection errors are minimised by discrimination between valid and faulty selections*

GEC-Marconi Radar and Defence Systems-Electronic Systems Division (GMRDS-ESD) have been concerned with the design, development and production of Weapon Control systems for aircraft since 1965. Advanced electronic and digital techniques have been employed resulting in a reduction of costs and a very great increase in system reliability and safety.

Prior to the advent of the GMRDS-ESD weapon control systems. which have been developed in conjunction with the weapons department of the Defence Research Agency (Farnborough), weapon release systems fitted to strike aircraft consisted of a variety of switches distributed at random about the cockpit. This method made it extremely difficult to release weapons in sequence while preserving aerodynamic balance.

The GMRDS-ESD weapon control systems comprise a single cockpit-mounted unit containing all the aircraft armament selector switches with the controls ergonomically arranged to minimise the possibility of selection errors. In addition, the control logic ensures that neither selection error nor systems failure can endanger the aircraft and that the balance of the aircraft is maintained automatically. The removal of all control circuits from the store pylons ensures that the integrity of the system is maintained in the event of local battle damage.

In addition to significantly reducing the pilot's workload, the systems have a further advantage in utilising a minimum amount of wiring between the weapon control panel and pylons, which make the systems adaptable to the requirements of all modern strike aircraft.

The Harrier weapon control system

The weapon payload of the Harrier is distributed between the fuselage and wing pylons and it is clearly of the utmost importance that the balance between wings should be maintained as bombs are dropped, particularly during low level attacks. The GMRDS-ESD system calculates and executes a dropping order which maintains aircraft balance under all conditions.

Separate jettison switches enable stores to be jettisoned from individual pylons. In emergency a "clear aircraft" switch can be used to jettison the entire payload in a single salvo. All pilot-operated controls carry their own illumination and all can be operated by a gloved hand. Vital switches are guarded against inadvertent operation.

The design concept of this equipment, which employs solid-state circuitry, is such that no single fault can cause the unscheduled release of a weapon or disable the jettison facility. The latter facility is duplicated to each pylon and overrides other considerations such as balance.

GEC-Marconi

This system, which has proved much more versatile and reliable than previous systems, is capable of adaption to a wide range of strike aircraft. It is fully compatible with the weapon aiming computer fitted in the Harrier and, although a self-contained system in its own right, it can operate in the automatic mode under computer executive control. In the Harrier trainer, a monitor unit is fitted in the rear cockpit which duplicates the front cockpit jettison facilities as well as enabling the control panel to be monitored.

Harrier W.C.S.

Unit size
Height 4½ in x Width 8¼ in x Depth 12⅝ in

Monitor size
Height 4½ in x Width 8¼ in x Depth 6⅝ in

Weights
Unit 10¼ lb, Monitor 5¼ lb

Power supply
23.5 to 28.5 V d.c. 5A steady

Transient current
55A max.

Temperature
-40°C to +50°C

Operating capacity

5 pylons providing signals for bomb fusing

Range of stores on each pylon

Single or twin bombs, flares

One or two rocket launchers light series bomb carriers

Two gun pods. Fuel tanks

Guided weapons when the aircraft is suitably wired

Individual pylon jettison or clear aircraft jettison

Jaguar weapon control system

The GMRDS-ESD weapon control system fitted to the Jaguar employs the same advanced solid state technology and digital techniques, and is a further development of that fitted to the Harrier providing the same safety features.

In the single-seat version of the aircraft the system is divided into two main items. These are, the main unit which houses the control logic and the cockpit-mounted control unit which carries the indicator lamps, pilot-operated armament selection switches and the individual jettison switches. In the two-seat version a monitor unit is fitted in the rear cockpit for training purposes.

As well as including all the functions of the Harrier equipment, the Jaguar system provides increased reliability by an even wider use of solid state logic, includes fully duplicated facilities for the release and jettison of each individual store, dispenses with the necessity for auto-selector switches on tandem store carriers and provides a more advanced method of rocket firing control. It is fully compatible with the Nav/Attack computer fitted to the Jaguar and, although self-contained, is also capable of operating under computer executive control.

Jaguar W.C.S.

Control unit
Height 6 in x Width 5¾ in x Depth 6³⁄₁₆ in

Main unit
Height 6⅛ in x Width 13¾ in x Depth 16¾ in

Monitor
Height 3⅛ in x Width 5¾ in x Depth 5⅛ in

Weights
Control unit 3 lb 14 oz, Main unit 32 lb,
Monitor 1 lb 4 oz

Power supply
21 to 29V d.c. 2.2A steady

Transient current
150A max.

Temperature
-40°C to +70°C

Capacity

5 pylons providing signals for fusing where necessary

Range of stores for each pylon

Single or twin bombs, flares

One or two rocket launchers or light series bomb carriers

Recce pod, fuel tanks, air-to-air missile and guided weapons when the aircraft is suitably wired
Individual pylon jettison or clear aircraft jettison

GEC-Marconi

Radar and Defence Systems

Electronic Systems Division
Browns Lane, The Airport, Portsmouth, Hampshire, PO3 5PH.
Telex: 869442 MARDEF G
Tel: (+44) 01705 226000 Fax: (+44) 01705 226001
e-mail: charles.andrews@gecm.com

USA
GEC-Marconi Office, 1111 Jefferson Davis Highway, Crystal Gateway North, Suite 800, Arlington, Virginia 22202, USA Tel: 1(703) 4166582 Fax: 1(703) 4160135

Weapon Control Systems, Harrier & Jaguar Applications

ESD Publication No. ESD/058.08.96