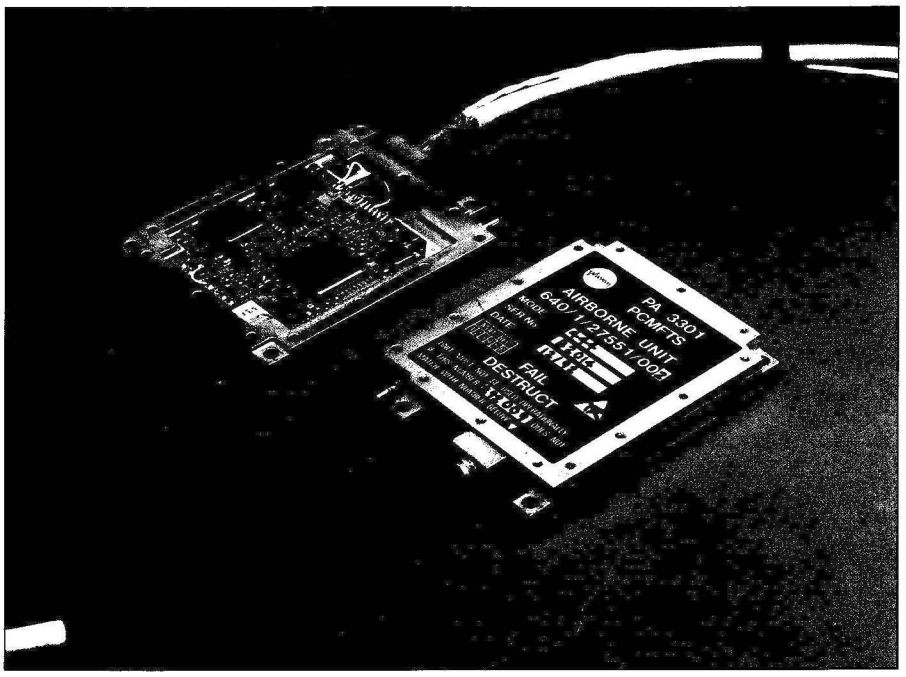
# PCM FLIGHT TERMINATION RECEIVER

- **Robust design for missiles and remote targets**
- **Six simultaneous command channels available**
- **Ruggedised for extreme missile environment**
- **All solid state, hybrid construction**
- **Pulse coded modulation format**
- **Lightweight, 245 gms (0.541lb)**
- **Small size, 45cc (2.75 cu in)**
- **Telemetry interface**




**PA3301 PCM Receiver**

**In response to UK Ministry of Defence (MoD) requirements, GEC-Marconi Defence Systems, Electronic Systems Division (GMDS-ESD) have developed the PA3301 Pulse Code Modulation (PCM) Flight Termination Receiver (FTR). The PA3301 is robust, competitively priced and is designed to provide an attractive alternative to the larger and heavier receivers currently in service. The chosen PCM format reflects UK MoD requirements for multiple vehicle command (such as salvo firing) and high resistance to interference. The PA3301 significantly enhances the safe break-up of missiles and remote targets on Trial Ranges.**

The airborne FTR, used together with the ground based transmitter and the PA3305 PCM Transmission Controller, forms part of a high integrity Flight Termination System. The Receiver can be situated either inside a missile or attached externally to the skin. It accepts a constant stream of data from the ground station; the data is either constant 'prohibit' signals or 'fire' signals when termination is necessary.

Flight Termination is implemented when missiles violate established safety criteria or exceed pre-established Range limits.

GMDS-ESD also provide a Ground Test Set, the PA3306, and a Transmission Controller, PA3305. The PA3306 Ground Test Set is used to confirm the operation of the PA3301 Receiver prior to flight or for revalidation purposes. Its role is to monitor the outputs of the Receiver and measure responses to an RF input signal.

The Transmission Controller, PA3305, is an integral part of the Range's command system and it encodes the signals for transmission to the airborne Receiver. It also monitors its own operation, checks the integrity of the transmitted signal and reports faults to the Range Safety Control Officer. The PA3305, with a suitable interface, allows a Trials Range ground station that can independently control up to six airborne units simultaneously.

PA 3301


**Electronic Systems Division**

(A Division of GEC-Marconi Defence Systems Limited)

# PCM FLIGHT TERMINATION GROUND TEST SET

- **Checks all functions of Airborne Flight Termination Unit (PA3301)**
- **Provides electronically isolated power supplies for the Airborne Unit under test**
- **Menu driven test operations**
- **Alphanumeric dot matrix display shows test menus and test results**
- **Buffered test points/connectors available at the front panel for ease to access**
- **Serial port enables communication with Ground Test Set via a CCITTX24 or RS232C interface**
- **Ruggedised for ease of transport**

**PA 3306**


**PA3306 PCM Ground Test Set**

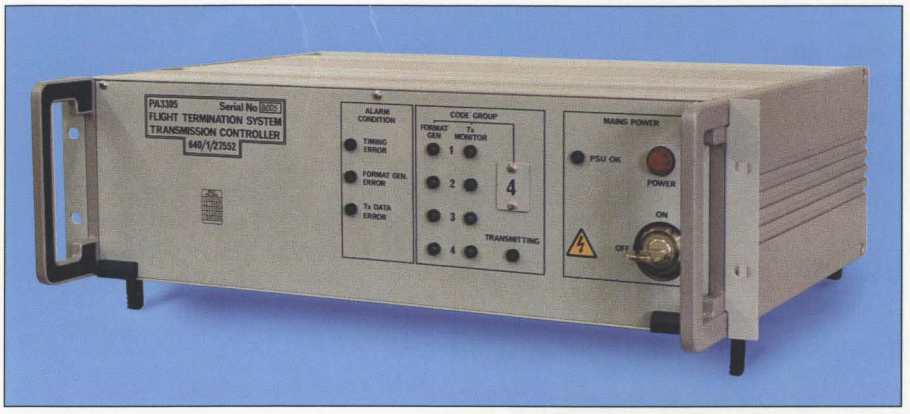
**The PA3306 Ground Test Set provides a facility to comprehensively check all functions of the PA3301 PCM Flight Termination Receiver Unit prior to flight or for revalidation purposes. Check-out of an airborne Receiver Unit command circuitry is accomplished by monitoring responses to an internally generated FSK modulated RF signal. Data content and other characteristics of the signal are automatically selected by the test routine and could be either an airborne Flight Termination Receiver Unit data word or a pseudo-random data stream.**

The PA3306 provides a stabilised, electrically isolated power source for the airborne Receiver Unit under test and monitors voltage and current parameters of DC signals required by the airborne Receiver Unit. Test operations are menu driven and manually controlled by a keypad. Test results are displayed via LED indicators and as messages on an alphanumeric dot matrix display.

LED indicators monitor logic levels of telemetry signals and show the status of the PA3306, airborne Transmitter Unit and airborne Receiver Unit power supply.

Although intended to be operated in a fixed laboratory environment, the PA3306 is ruggedised to enable easy transportation.

# PCM FLIGHT TERMINATION TRANSMISSION CONTROLLER



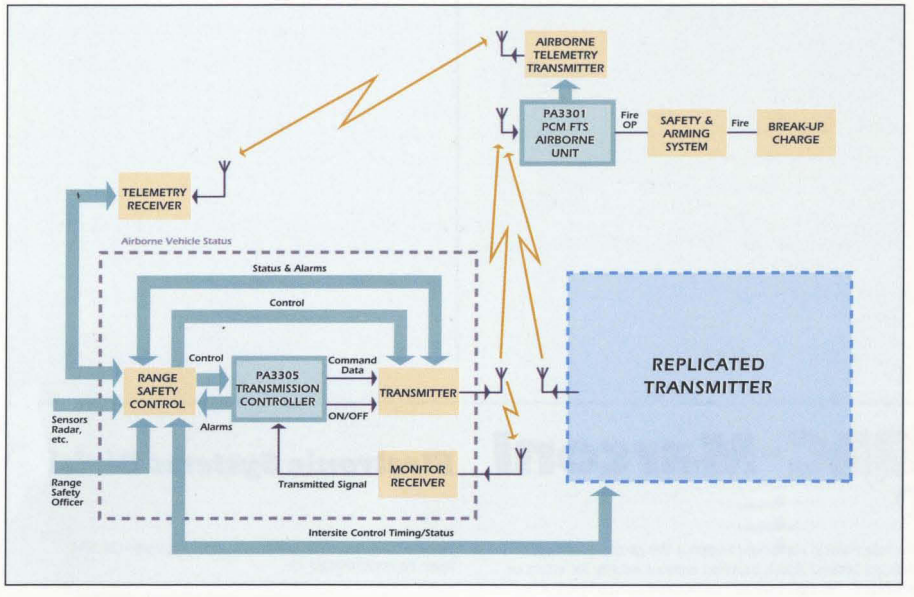

PA3305 PCM Transmission Controller

**The PA3305 Transmission Controller is an integral part of the Range's command system and encodes the signals for transmission to the airborne Receiver Unit. It also monitors its own operation, checks the integrity of the transmitted signal and reports faults back to the Range Safety Control via a series of alarms. In complexity, the PA3305 may be considered as a sub-set of the PA3306 Ground Test Set in that the PA3306 includes the PA3305 features.**

The PA3305 Transmission Controller provides the interface between the ground station's Executive Controller, which takes the Trial Safety Officer's instruction, and the transmitter(s) which radiate commands to the airborne vehicle. One PA3305 is associated with each transmitter and data flow between the two is made via RS422 balanced lines.

A ground station can employ either one or two transmitter sites, two being used to combat signal fading and gaps in coverage down to very low levels as required, for example, for sea skimming missiles.

For Range safety purposes, the PA3305 also repeats back to the Executive Controller the control inputs so that they can be cross-checked. It also verifies, via a monitor receiver, that the transmitted signal is the true command; any differences or loss of integrity will raise an alarm.




PCM overall system operation

- **Generates the serial PCM commands formats**
- **Generates PROHIBIT or FIRE commands for each of up to six airborne Receiver Units**
- **Monitors and verifies the transmitted data**
- **Generates self test modes**
- **Provides tamper-proof operation:**
  (a) Remotely controlled via electrical interfaces
  (b) No accessible manual controls
  (c) Status indicators for quick confidence checks
- **Provides UHF link on/off control**
- **Provides emergency 'TRANSMISSION STOP' control**

**PA 3305**

# Technical Data

## PA3301 Flight Termination Receiver

| | |
|---|---|
| PCM Modulation | NRZ Binary FSK |
| Carrier Frequency range | 400MHz to 450MHz |
| IF Bandwidth | 38KHz |
| Dynamic Range | 110db without performance degradation |
| Command Channels | 6 |
| Command states | PROHIBIT or FIRE |
| Operational Mode | FAIL DESTRUCT or FAIL INERT |
| "FIRE" Interface | POWER FET |
| Weight | 245gms (0.54lb) |
| Volume 45cc | (72mm x 59mm x10.5mm) (2.83in x 2.32in x 0.41in) |
| Vibration | $0.6g^2/Hz$ (50 to 4500 Hz) |
| Shock (Operational) | 100g for 8 m.sec |
| Acceleration | 100g linear, in any direction |
| Safety | 1 in $10^6$ FAIL DESTRUCT |
| Shelf Life | 5 YEARS MINIMUM (0°C to 30°C AMBIENT) |

## PA3306 Flight Termination Ground Test Set

| | |
|---|---|
| Size | 476mm wide x 190mm high x 370mm deep (18.7in x 7.5in x 14.6in) |
| Weight | 19kg max (41.9lbs) |

### Environmental Data

Operating Temperature Range: +15°C to +40°C in a fixed ground laboratory environment

### Electrical Power Requirements

| | |
|---|---|
| Voltage | 240V, 50Hz, Single Phase |
| Power Consumption | Not exceeding 200W |

Stabilised Power Supply

Power requirements for the airborne Receiver Unit under test are provided by an integral stabilised power supply.

## PA3305 Flight Termination Transmission Controller

Rack mounted in standard 19in rack (482mm), 375mm (14.76in) deep including front panel handles, 130mm (5.12in) high.

| | |
|---|---|
| Power Dissipation | 40W max (176 to 264V AC) |
| Weight | 8kg (17.6lbs) |
| Temperature | 0°C to +50°C operating -20°C to +70°C storage |
| Humidity | 95% non-condensing |
| Shock | 25mm (0.98in) drop of any one edge onto a hard wooden surface |
| Vibration | Vibration profile as per MIL-STD-810D for 20min |
| MTBF | Greater than 21,000 hours |

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