PART 3/1

# FUNCTIONAL ORGANIZATION OF THE DIVISION

With the exception of electrical and electronic research, all technical and design resources are directly under the control of the Chief Engineer, Mr K.O. Scott MSc., MRAeS who is responsible to the Technical Director. Mr Scott has many years of aircraft design experience within the British aerospace industry. Originally with General Aircraft he joined MLA in 1950.

Three departments namely: Design Services, Technical Services and Integrated Logistics Support (ILS) are under the control of the Chief Engineer who allocates technical and design resources to the managers of particular projects as required. The headquarters of these departments is at White Waltham but it is supported by the staff based at the design office in Bristol under the control of its Technical Manager.

## DESIGN SERVICES DEPARTMENT

The Design Services Department is managed by Mr L.D. Gurney CEng., MIMechE, MRAeS. He has been in the aviation industry since 1943, starting as a Royal Naval Air Engineer Officer prior to joining ML in 1947. Mr Gurney has 27 years design experience and 6 years as Quality Manager immediately prior to his present appointment as Design Service Manager.

The department provides a design engineering and drawing office service and monitors design standards throughout the Company.

The resources of the department include a computer aided design/draughting facility in the White Waltham and Bristol design offices, linked by data transmission lines. Both offices are equipped with graphics workstations, technical computing terminals and supporting plotting and printing peripherals. The system runs on a PRIME computer with MEDUSA software and is currently in use for 2D draughting and 3D solid modelling. There is scope for considerable upgrading in computing power, number of workstations and types of application, such as integrated CAD/CAM.

The department is structured into three main groups covering:-

(a) mechanical design

(b) electrical design

(c) drawing office

## MECHANICAL DESIGN

This group is run by the Chief Mechanical Engineer Mr J. Gregory - Hons. Diploma (College Aeronautical Engineering, London)

Mr Gregory has many years experience of design and engineering in the aircraft industry, including service as an Air Engineer Officer in the Fleet Air Arm, joining MLA in 1946.

His group provides a service to enhance mechanical design effort with emphasis on areas of major technical difficulty. The group spearheads planning for efficient design and engineering in keeping with advanced technological progress.

He is responsible for value engineering/analysis in support of projects under the control of equipment managers and project managers. Following initial informal discussions this task is completed on a formal basis using established techniques to identify and analyse function versus high cost areas and thus provide a cost effective product.

## ELECTRICAL DESIGN

This group is run by the Chief Electrical Engineer, Mr P.F. Blomfield, CEng, MIEE.

Mr Blomfield served a 5 year apprenticeship with Ultra Electric Ltd and secured additional experience in radio and television systems before joining MLA in 1952.

During his many years with MLA Mr Blomfield has had responsibility for the design and development of the Autopilot of the U120D Drone Aircraft. He was closely involved in the balloon-borne radar project with particular reference to instrumentation and lightning protection; he has been concerned with electrical subsystems of a variety of weapon release systems and the installation and operation of an extensive testing facility at the Airfield Test Site.

He has also been concerned with the testing and instrumentation of a man-carrying centrifuge and its control system. An acoustic test facility was set up and operated under his supervision during development work on aircraft helmets and their associated communications systems. He also assists and advises in the running of an electrical test house and advises in matters of electrical safety within the Company.

Recently he has been extensively involved in the electro magnetic compatibility aspects of the Company's products and the successful solution of problems arising in this area.

## DRAWING OFFICE SERVICES

This group operates under the Chief Draughtsman, Mr C.L. Scott.

Mr Scott joined the Company in 1950 as a draughtsman progressing through the design drawing office to his present position as Chief Draughtsman.

He and his staff of draughtsmen are experienced in the preparation of drawings to UK Defence Standard 05-10 and BS308.

The production drawing office is responsible for the Post Design Services activity of modification/amendment control of drawings in accordance with AvP 25, AvP 30, Admiralty Specification P134 and other special requirements.

The Chief Draughtsman is also responsible for design standardization and for packaging design and the preparation of both Service and commercial packaging instruction sheets covering items manufactured by MLA.

## TECHNICAL SERVICES DEPARTMENT

The Technical Services Department is managed by Mr R.R. Evans who has been in the aviation industry since 1964, beginning as a student apprentice with BAe Commercial Aircraft Division, during which time he gained an HND in mechanical engineering and the CEI Part II examination. He spent seven years in stress engineering and structures computer analysis and two years as a design leader with BAe Dynamics Division before joining MLA in 1978.

The department provides a total technical service and is responsible for the testing of components and systems at every stage of development, evaluation and production. It comprises about 60 qualified engineers who cover a wide range of disciplines which include aerodynamics, structures, thermodynamics, mechanics, materials (both metals and plastics), explosives, chemistry and protective treatments.

The department is structured into three main groups covering:

(a) material control

(b) structures

(c) trials and testing

Test facilities at White Waltham are described in greater detail in Part 3/3 of this document.

### MATERIAL CONTROL

The group consists of a Senior Chemist and a Material Scientist and approved Radiologist supported by back-up staff in the laboratories and test departments. The test department has three engineers approved for the assessment of weld specimens.

The airfield test site is under the supervision of a Range Officer. It is licensed for explosive development and testing by the Health and Safety Executive and provides facilities for the manufacture of power cartridges for use with the armament equipment developed by MLA. Cartridges can be tested under variable conditions of temperature and humidity. The site also provides vibration, bump and acceleration test facilities.

## INTEGRATED LOGISTICS SUPPORT DEPARTMENT

The manager of the ILS Department is Mr C.J. Roberts BSc. (Hons Maths) who after graduating from Bristol University in 1952 gained experience with de Havilland Propellers as a senior dynamicist, with Ferranti as Chief Systems Engineer and with Hawker Siddeley Dynamics as Guided Weapons Technical Sales Manager. He spent 6 years with MSDS as Subcontracts Manager before joining MLA in 1976.

The ILS Department is structured into three groups covering Logistics, Systems Engineering and Technical Publications.

### LOGISTICS

The activities of the Logistics Group include those of maintainability, safety engineering and reliability engineering.

The maintainability group provide a service in assessing the requirements of aerospace products and in refining standards and procedures to reduce in-service maintenance. The group carries out evaluation and trade-off studies to ensure minimal user investment in task skills, manpower, spares and materials, tools and support equipment commensurate with a cost-effective assurance of product serviceability and availability at specified states of readiness.

The safety engineering group is equipped to conduct formal hazard analysis, safety evaluation of failure modes and trade-off studies for a given scenario. In common with all groups in the ILS Department these services are supplied both to support the contract requirements and to be fed back to the Project Manager for embodiment within the design of the product.

Reliability engineering is carried out on a formal and methodical basis to meet two prime objectives. Firstly, to analyse system performance under operational conditions to ensure compliance with specification standards of equipment availability and mission success. Secondly, to identify any system design weakness which if not rectified, could give rise to a significant pattern and level of failure. The analytical tools used for this work include (a) failure rate prediction (b) failure modes and effects analysis (c) component stress analysis (d) comparison of field data with model predictions.

## SYSTEMS ENGINEERING

This group provides expertise and assistance to the project managers in undertaking feasibility and system studies. These are either undertaken to contract requirements in satisfaction of Ministry specifications or carried out as private venture studies to sponsor new development of equipment. A central group of this nature allows a high standard of technical appraisal to be spread throughout the many and varied interests of the Company.

## TECHNICAL PUBLICATIONS

The Publications Manager is Mr A.S.J. Whitwam who joined MLA in 1975. The department has considerable experience in the production of technical manuals, illustrated parts lists, sales leaflets and brochures, exhibition displays and, product support documentation to the high standards required by the United Kingdom Ministry of Defence and other users.

This specialist group comprises technical authors, illustrators, proof readers, printers, photographers and word processor operators who prepare publications material in support of MLA products. It is also responsible for the vetting and lodging of patent applications.

Facilities include photographic and lithoprint equipment and a Wordplex Word Processor Unit.

Mr Whitwam is also responsible for a librarian and his staff who maintain a comprehensive drawings library responsible for recording all drawings and issuing and indexing all modifications. The department has full dyeline printing facilities, and equipment for 35 mm microfilm aperture card origination, duplication and printing.

## SUPPORT EQUIPMENT

The Manager responsible for Mechanical Projects, excluding weapon systems is Mr V.A. Benning, CEng. MIMech.E. He served a comprehensive technical apprenticeship with Fairey Aviation Company before joining MLA in 1947. The range of equipment handled by his group is briefly described in the following paragraphs.

### AIRCRAFT TRACTION DEVICES

These consist of a wide range of mechanically propelled pedestrian controlled aircraft handlers, designed to be powerful but light and compact, and especially suited to manoeuvring aircraft with precision in confined spaces, such as hangars and ships decks.

Most of these handlers, which can be either diesel or electrically propelled, work on the unique principle of using a proportion of the aircraft weight resting on the driven wheels, thereby producing efficient traction without relying on the weight of the tractive device.

In some cases the device actually drives the aircraft wheels.

These handlers which are in extensive service use with the RN, RAF, USN, Swiss Air Force, etc., can handle aircraft up to 70,000 lb weight, and require a minimum of operator skill.

### RESTRAINING SYSTEMS

Associated with aircraft and equipment movements on board ship is a novel restraining system, which when positioned on the ship's deck and attached to existing strong points, enables equipment to be manoeuvred over slippery tilting surfaces with safety.

The aircraft or wheeled equipment is attached to a system of webbing strops, to which a light tension is maintained at all normal times by self-reeling spools attached to the deck strong points, thereby allowing the aircraft or equipment to be moved. Whenever the aircraft or equipment is exposed to a hazard i.e. a tilting deck, the whole system can be locked instantly thus holding secure until the hazard situation has passed, when movementcan be resumed.

This equipment is lightweight and portable; the light weight being particularly important for equipment used high above the ship's water line.

MU METER

This is a small compact, lightweight towed trailer, used for measuring and recording surface friction values on runways and highways, related to braking and skid resistance.

This equipment which works on the principle of opposed yawed wheels, is in use in more than 40 different countries, and is approved by most major authorities including CAA, BAA, FAA, and MoD.

TRACK MOUNTED DYNAMOMETER

This is another most interesting piece of equipment, designed and produced for the Military Vehicle Experimental Establishment at Chobham.

It consists of a 135 hp turbo-blown diesel powered, track mounted, travelling dynamometer for testing and evaluating the performance of various small and large type military wheels and tyres, under soft ground conditions.

The scope of this equipment is now currently being extended to cover exploration work on tractive performance of actual tank track systems.

GROUND SERVICING EQUIPMENT

A wide range of powered ground servicing trolleys are designed and developed, these include units for cabin cooling and pressurizing, cooling electronic systems during ground checking, powered hydraulic servicing rigs to enable aircraft hydraulics to be checked during ground servicing.

Also included are comparatively straightforward compressed air systems for operating air tools, and services.

Recently work has been undertaken on fuel cooling rigs to enable ground running of electronic equipment to be carried out in aircraft where the heat from this equipment is absorbed by the fuel. With the aircraft stationary on the ground, the fuel must be cooled by external support equipment.

STORE OR WEAPON HANDLING TROLLEYS

A wide range of these have been developed to provide a convenient handling facility for low mounted under-belly stores, pylon mounted stores and various other configurations, requiring mechanical loading. Special types of trolleys for handling missiles, such as Sea Skua, have been designed and developed for the RN. These conform to the "cradle to grave" concept, where they not only provide missile storage, but also the facility for loading on the aircraft.

In the former role, the suspension system had to be designed to limit the maximum 'g's to which the missile might be

exposed in the event of underwater explosion affecting the ship (i.e. 'g' attenuation from 120 'g' input, down to a maximum of 15 at the missile, has been attained).

SATELLITE LAUNCHING

MLA designed and developed the hydraulically operated main release units used in the successful launch of the European 'Ariane' space shot. These were a development of the ERU 119, originally produced by the Armaments Section.

FRICTION DRIVE

The Mechanical Section, in the past has undertaken extensive exploration work into friction drive systems, and currently is producing under contract, a lightweight, compact, highly efficient, non-backlash friction drive torque amplifier for transmitting precise, accurately monitored movement to airborne radar aerials/scanners.

INFLATABLE STRUCTURES

The section has considerable experience in producing inflatable structures, and buildings, a large number of which are still in service. Currently, the principle is being applied in part to portable Unmanned Aircraft Recovery Systems, particularly in the marine role where floatation is required in addition to cushioned landing.

WINCH GEAR

The Mechanical Section is also concerned with marine target towing winches which have been designed and developed employing the electro-hydrostatic transmission principle, being capable of paying out some 3,000 ft. of cable, and used for towing a splash target.

In addition, design and development work associated with Balloon Winches is currently undertaken for the Ministry of Defence under official contract arrangement.

## ARMAMENT EQUIPMENT

The Manager responsible for all Armament Equipment is Mr S.W. Craigie, OBE, CEng., MIMech.E, MRAeS.

Mr Craigie has served MLA since 1949, and has considerable experience in the aeronautical-mechanical engineering field, and in particular in the design, development and operational use of airborne armament system equipment.

The technology inherent in these equipments includes the expertise in precision electro-mechanical assemblies, and the accurate harnessing of gas energy in various pyrotechnically-powered devices.

### RETRACTABLE GUN-SIGHT MOUNTINGS

From the late 1940s to about 1960, all fighter aircraft from the Meteor to the early versions of the Javelin, were fitted with MLA retractable gun-sight mountings. The mounting was an electro-mechanical assembly located over the instrument panel and just below the windscreen. Situated in this critical position its role was to house the gun-sight assembly below the forward field of view, and forward of the pilot's ejection envelope. When actuated, the mounting was electrically powered to the erect position which presented the gun-sight to the pilot's eyes, accurately aligned with the gun aiming point. Many of these assemblies are still in use with some overseas Air Forces using aircraft such as the Hunter.

### SIMULATED RADAR DISPLAY

Prior to the availability of low cost electronically functioned radar simulators, there was a need to provide a training aid for radar operating teams. MLA designed and supplied a simulator device to both the RAF and Army. The design used a combination of mechanical drives, to represent the scan line and to drive a pair of slides with intersecting clear lines, with an ultra-violet light source and an optical projection system to a fluorescent coating on the viewing screen.

The presentation to the user was, at that time, an adequate representation of a series of echoes which moved in a realistic manner.

### EJECTOR RELEASE UNITS AND WEAPON CARRIERS

In conjunction with the Royal Aircraft Establishment, MLA has developed a wide range of Ejector Release Units (ERUs), and Weapon Carriers for the Ministry of Defence and other customers. These systems are recognized by international repute as being the lightest and most reliable units in the world, as testified by their adoption for the Air Forces of nine different countries.

Initial designs were of the single suspension type and were used on aircraft from Meteor to Hunter. Store suspension systems were then standardized to house two suspension lugs at either 14 or 30 inch centres. All designs are now to this standard.

Each ERU is a complete weapons suspension release system suitable for mounting in a pylon or bomb bay. A single unit will carry one of a range of different stores. The units retain the stores on twin suspension hooks which have positively locked release mechanisms. When store-release is required, an electrical signal ignites power cartridges contained within a central breech which trips the release mechanism and the store is ejected under the thrust of ejector rams. All the twin suspension ERUs provide for a differential acceleration on the two rams as required by the different stores in order to obtain the necessary pitch attitude of the store on release. In addition to the suspension of the store, provision is also made for the store to be crutched or sway-braced to locate it in the roll sense.

In addition to supplying this equipment for virtually all RAF aircraft, many thousands of ERUs have been exported to other Air Forces. New designs of ERU are also offered during competitive tendering to foreign government requirements. An example of this, is the successful contract award from McDonnell Douglas for the design and development of an ERU to be used at all pylon stations of the AV8B aircraft.

Weapons carriers are designed to mount a multiplicity of stores. They comprise a stiff structure and fairings which are compatible with suspension from wing or fuselage pylons of modern high-speed strike aircraft. The requisite number of ERU fuzing and selector electrical systems are embodied.

EJECTOR GUNS AND SPECIAL RELEASE UNITS

A number of ejector systems using the proven MLA power-cartridge technology have been developed for other uses such as:

(a) Ejectors for jettisoning over-wing fuel tanks where the ejector units are thrown clear of the aircraft with the fuel tank, thus leaving a clean wing surface after jettisoning is completed.

(b) Ejector guns for ejecting drogue parachutes clear of the aircraft tail in anti-spin parachute installations.

(c) Release units which provide for the attachment and release of the brake parachutes for aircraft such as the Anglo-French Jaguar, and which incorporate all necessary safety devices.

TWO-INCH ROCKET FINS AND VENTURI

The retractable fins and propulsion venturi unit for the rocket were developed by MLA. The fins extend in unison as the rocket leaves the launch tube.

## ELECTRICAL RESEARCH DEPARTMENT

The Electrical Research Department is managed by Mr R.E. Sellwood who has been with MLA since 1946, during which time he has been responsible for the design and development of a wide range of armament electrical systems and test equipment. He maintains a direct and practical interest in this field and has acted as consultant engineer to the Ministry of Defence for electro magnetic compatibility (EMC) and radio frequency interference (RFI) studies, and also interference studies in connection with ordnance devices. He has delivered papers to many national and international symposiums and has many patents to his credit.

The department is responsible for the conception, research and initial development of forward research projects in the electrical and electronic field and for devising applications of this technology to initiate development and manufacturing projects.

The department consists of a team of electronic engineers and technicians. The team is supplemented when required by the addition of specialists in the field of aerodynamic stressing and explosive technology from the appropriate departments within the Company when interfacing in those areas is involved.

In connection with the main stream of development and research required by the Company's armament systems, the department has acquired considerable experience in the design, development and trials of the following devices:-

(a) Automatic continuity and insulation test equipment.

(b) Specialized static inverters and converters.

(c) UHF and VHF telemetry and distress beacon transmitters.

(d) Control and stabilization devices for rockets and unmanned aircraft.

(e) Miss distance assessment systems.

(f) RFI protection devices for use in ordnance systems and communication, including inductive coupling units and arrays.

(g) Solid state distributors and weapon release and fuzing control systems.

(h) Aircraft armament test vehicles.

(i) Airborne weapon response simulators.

(j) Electronic control of propelled vehicles.

In addition fundamental research and initial feasibility work is in progress in the following general fields:

(a) Low cost electro-magnetic autopilot navigation devices and guidance sensors applying microprocessor techniques.

(b) Vertical reference systems.

(c) Electronic air speed indicators.

(d) Second generation initiation systems for explosive devices.

(e) Fibre optic data and control systems.

## ELECTRICAL PRODUCTS

The Manager responsible for the development of electrical products, generally initiated through the Electrical Research Department, is Mr G. Howarth CEng., MIEE. After qualifying as an electrical engineer during an apprenticeship with EMI, Mr Howarth spent 2 years in the Royal Air Force as a radio technician and then joined Associated Transistors where he was engaged upon the design and development of test equipment for transistors. He has been with MLA since 1961 during which time he has been responsible for electronic test equipment design, firing system development and for microprocessor applications.

The Electrical Development Department is responsible for developing existing MLA products for new applications in both military and non-military situations, for the application of proven electronic techniques and new devices to aerospace and industrial problems.

Performance of these functions requires a knowledge of state-of-the-art techniques in electronics and avionics, an understanding of the EMC and RFI problems and solutions likely to be met by modern equipments, and an appreciation of nuclear hardening techniques.

Typical of the existing MLA products for which new uses are continually being found, is the MLA Radio Frequency Attenuating Connector which is the most advanced method of satisfactorily initiating the electrical ignition of explosive devices. It works on an inductive coupling principle and completely isolates the igniter from radio frequency or electrostatic voltage hazards.

## CHEVALINE

The work of this project embraces all MLA activities in the development and production of a major naval weapon system. The Manager responsible is Mr B.C.E. Jones BSc., CEng., MRAeS who joined MLA in August 1977 after serving as an engineering officer in the Royal Air Force for 27 years. Much of this time was spent as a staff officer involved with the development and procurement of guided weapons.

MLA commitment to this project is a major one both in development and production. It has evolved from the application of the MLA Radio Frequency Attenuating Connector to the weapon, and has resulted in some five years of development. It has involved close and constant contact both with the Ministry of Defence Procurement Executive staffs and those of other major British aerospace companies who are contributors to the project. Associated with the hardware developed for the weapon system itself MLA have been required to develop an extensive range of sophisticated electrical test equipment.

With development complete MLA are now in full scale production of the hardware and this will continue for several years.

## JP233 AIRFIELD ATTACK SYSTEM

This Project embraces all MLA activities for the design manufacture and development testing of a multi-weapon dispenser intended for the UK Tornado and other modern strike aircraft. The Project Manager, Mr A.G. Povall, CEng., FIERE, F.INST.PET, who has more than 20 years experience in the aerospace industry particularly on aircraft and missile weapon systems, joined ML in April 1980. Prior to this he was employed for 10 years by EASAMS, the first 8 years as Trials Manager leading an international team conducting carry aircraft trials for the Tornado avionic system and the remainder as manager of a group providing project management services to the North Sea oil industry.

MLA has played a leading role through feasibility studi and project definition to a major commitment in full developmen The project spans advanced techniques in aircraft structures, mechanical and electrical systems, hot gas ejection systems, RF attenuating connectors, test gear and ground handling equipment

The Project Team of engineers and technicians has a comprehensive capability ranging across airborne design, stress and value engineering, development manufacture and quantity production, trials management and performance assessment, netwo analysis, project accounting and control, quality assurance, reliability and safety engineering.

# TEST FACILITIES

Laboratories and test facilities are situated both inside the works complex and on the perimeter of the airfield at White Waltham. MLA staff are experienced in a range of test activities including the mechanical testing of structures and mechanisms; hydraulic and gas pressure testing of equipments, testing explosive and ballistic devices, climatic testing of systems, acoustic testing and electrical testing of components and systems.

## FIRING RANGE

The airfield site is particularly valuable as MLA has a self-contained secure area, where space is available for testing ejector equipment, ballistic devices and RPV launching etc. The Company has a number of test rigs available and a wide range of instrumentation facilities and suitably qualified and experienced staff. There is a comprehensive range of vibration and climatic test facilities for environmental testing of explosive devices to Ordnance Board requirements.

## MECHANICAL TESTING

A number of strength testing machines are available up to 250,000 lb capacity both for steady and oscillatory loading. Impact and hardness testing machines are also available. Vibration test equipment is capable of carrying out all vibration tests called for in BS 3G. 100 and MIL-STD-810 specifications. For mechanism testing, a range of dynamometers, tachometers, stroboscopes, vibrators are used with full electrical instrumentation and recording back-up. Facilities are also available for carrying out drop tests and ejection tests on stores weighing up to 40001b.

## PRESSURE TESTING

Fluid and gas pressure supplies, and devices for pressure monitoring are available for testing hydraulic and pneumatic equipment.

## ENVIRONMENTAL TESTING

Several environmental testing cabinets are available with equipment capable of producing and measuring temperatures in the range of -70 deg C to + 180 deg C, with altitude control up to 100,000 feet and humidity control within the range of 30% to 95%.

## ELECTRICAL TESTING

A wide range of electrical testing can be carried out using sophisticated types of test equipment e.g., Advance Gould Digital Storage Oscilloscope with X-Y Plotter, Tektronix 7000 Series Oscilloscopes, Datalab Transient Recorders together with numerous digital multi-meters.

R.F. insertion loss measurements (in a 50 ohm system) and some conducted susceptibility electromagnetic compatibility (EMC) testing can be carried out.

The testing capability embraces both analogue and digital systems and is performed by test engineers who have experience over a wide field. A variety of microprocessor based special-to-project test equipment is also available.

## PLASTICS LABORATORY

MLA has QA approval for the manufacture of glass reinforced plastics, injection moulding of nylon and polythene materials, compression moulding of phenolic material, blow forming and vacuum forming of ABS material, foamed materials, and for the encapsulation of electronic components. The plastics development laboratory, and the production plastics department are equipped with tools for preparing, laying up, moulding and forming plastics materials, and curing ovens and air evaluation equipment for environmental control.

## CHEMISTRY LABORATORY

The laboratory carries out tests and advises upon protective treatments, adhesives, propellents, paints, rubber materials and plastics. It also conducts tests on incoming material in conjunction with the Inspection Department.

The laboratory has the usual facilities required by these activities including a fume cupboard, crack detection equipment, X-ray equipment, gas detection equipment, balances and microscopes.

## CABLE CUTTERS

Although not specifically associated with armament systems, a wide range of cable-cutting units have been developed by the armament group. These are activated either electrically or mechanically depending upon type.

Their function is primarily to provide an emergency severance of cable used in a range of systems including helicopter hoists and cargo winches.

## AIRBORNE DISPENSING DEVICES

Among a number of other experimental and design study projects dispensing devices have been a major activity. Airborne dispensing brings together the pyrotechnic, mechanical, electrical and aerodynamic structural expertise for the deployment of stores from small self-defence IR flares, to such weapons as mines.

## FLIGHT SYSTEMS

The Flight Systems Manager Mr R.G. Austin MSc., CEng., FRAeS, MAIAA, joined MLA in January 1980. He is an aeronautical engineer with 35 years experience in aircraft research, design, development, manufacture, costing and programme management, particularly in the fields of helicopters and remotely piloted vehicles. He previously held senior management posts at Auster Aircraft, Bristol Aircraft, Westland Helicopters and has served on a number of Government technical and advisory committees.

Past experience of MLA in flight systems and flight equipment include:-

(a) The U120D radio controlled recoverable drone aircraft which was designed and developed by the Company in the 1950s and used for target practice. The drone was a 12 foot all-metal monoplane powered by a 60 bhp piston engine and incorporated a full three-axis autopilot.

(b) The MLA Light Inflatable Wing aircraft was designed and flown in the late 1950s powered by a 45 bhp engine driving a pusher propeller and capable of carrying two passengers. The major attribute of this aircraft was that it was designed to be readily transportable and to have a low radar signature in operation.

(c) Windmill and electro-hydraulically driven target towing winch systems have been developed and mounted on tug aircraft for deploying and recovering target drogues from aircraft.

Under the leadership of Mr Austin it is the intention of the Company to expand in the field of flight equipment and systems.