

ML AVIATION

Technical Capability in Aerospace Engineering

PART ONE

ML AVIATION COMPANY LTD

WHITE WALTHAM AERODROME, MAIDENHEAD,
BERKSHIRE, ENGLAND.

Tel: 062882 - 3361 Telex: 847568 Cables: 'EMELAIR' White Waltham



FOREWORD

The purpose of this document is threefold: to provide an outline appreciation of ML Aviation, to present the Company organization and to illustrate the broad technical capability of the Company by virtue of the experience and ability of its senior staff.

Over the past 40 years MLA has established a highly qualified design and development team with a blend of specialist skills that enables the Company to undertake a wide range of research and development projects, mainly for the Ministry of Defence. Brief reference is made in this document to major projects but, for security reasons, details cannot be given. Unclassified projects are given fuller coverage, while details of Company products currently in production can be obtained by reference to the ML brochure 'A Complete Engineering Service for the Aerospace Industry'.

Much of the strength of the Company lies in its particular size. Comprising approximately 1000 people, it is large enough to operate the formal management and control systems required by Defence Contracts, but small enough to retain an active team spirit and allow good communication and quick reaction. Such features are usually found in the smaller company and offer advantages for rapid and cost-effective response to the problem in hand.

The document comprises four parts -

- Part 1 shows ML Aviation as part of the ML Holdings Group. The products of the subsidiary Companies are listed to indicate the diverse nature of the Group operations. Today about two-thirds of total Group turnover is associated with ML Aviation.
- Part 2 describes the ML Aviation Company, its organization and design, development and production capabilities.
- Part 3 outlines the organization of the Engineering Division and describes the technical capability as managed by key members of the engineering staff.
- Part 4 describes the organization of the Production Division and details the utilization of resources and production plant at the Slough and White Waltham locations.

In addition, to enable ready access to specific topics, an alphabetical index is included at the back of this document.

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PART 1

ML HOLDINGS p.l.c.

President E.N. Mobbs, CBE

Directors L.R. Price, CBE, FCA, (Chairman)
D.L. Donne
Air Marshal Sir Peter Horsley,
KCB, CBE, MVO, AFC
J.G. Mobbs
M.R. Mobbs
K.J. Wilson, JP

Secretary A.P. Smith, ACMA

Registered Office ML Building
Ajax Avenue
Trading Estate
Slough, Berkshire SL1 4BQ

SUMMARY OF GROUP RESULTS — for the five years to 31st March 1983

	1983 £000	1982 £000	1981 £000	1980 £000	1979 £000
PROFITS, EARNINGS AND DIVIDENDS					
Turnover	23,150	25,350	25,586	19,796	15,007
Group profit before taxation	926	1,219	1,143	1,028	833
Taxation	(a) 12	28	138	(43)	(41)*
Net profit after taxation	914	1,191	1,005	1,071	874
Dividends on preference shares	20	20	20	20	20
Earned for ordinary shareholders	894	1,171	985	1,051	854
Earned per ordinary share (b)	624.11p	31.56p	31.05p	37.28p*	34.77p*
Dividend on ordinary shares	259	259	255	182	156
Dividend per share	7.00p	7.00p	7.00p	7.00p	6.00p
Extraordinary item	-	-	90	-	-
Profits retained	635	912	640	869	698
NET ASSETS AND CAPITAL EMPLOYED					
Net current assets	7,447	7,090	6,470	4,137	3,832
Fixed assets	4,331	3,794	3,630	1,812	1,399
	£11,778	£10,884	£10,100	£5,949	£5,231
FINANCED BY					
Issued share capital and reserves	10,230	9,591	8,678	4,909	4,039
Deferred taxation (a)	(62)	46	104	144	261*
Loans	1,160	1,247	1,318	896	931
	£11,778	£10,884	£10,100	£5,949	£5,231
NET ASSETS PER ORDINARY SHARE					
	(b) £2.48	£2.23	£1.73	£1.40	

(a)* Taxation has been adjusted in accordance with SSAP 15.

(b)* Earnings per ordinary share have been adjusted to take account of the rights issue in August 1980 and the placing issue in March 1981.

SUBSIDIARY COMPANIES — all wholly owned and trading

ML AVIATION COMPANY LIMITED

Design development and production of:

- . armaments
- . aircraft accessories
- . electrics and electronics
- . safety equipment
- . equipment for aircrew
- . ground support equipment
- . remotely piloted air vehicles

ML ENGINEERING (PLYMOUTH) LIMITED

Design and development of:

- . railway signalling schemes and equipment
- . process control schemes
- . industrial telemetry equipment

ML COMPONENTS LIMITED

Electrical, electronic and telecommunication components

THE CROWN FOUNDRY COMPANY LIMITED

'V' process cast iron piano frames and general castings

ML AVIATION COMPANY LIMITED

Design, development and production of equipment in all fields associated with the aerospace industry, including:-

Aircraft Armament and Associated Equipment

Bomb and Weapon Carriers, Launchers and Dispensers
Cartridge Operated Cable Cutters
Drogue Deployment Guns
Ejector Release Units
Pods for Guns, Cameras and other devices
Power Cartridge Designs in conjunction with Royal Armament
Research and Development Establishment
Brake Parachute and Drogue Release Units
Store Suspension Lugs

Remotely Piloted Air Vehicles

Sprite Remotely Piloted Helicopter System

Crash Location Beacons and Flight Data Recorder Recovery
Systems

Electrical and Electronic Equipment

Automatic Battery Capacity Testers
Automatic Circuit Test Units
Earth Lead Safety Testers
Moulded Electrical Systems
Pulse Limiting Resistors
Rad/Haz Filter Testers
Solid State Distributors
Universal Testers for Aircraft Pylons, Weapons Carriers and
Rocket Launchers

Aircrew Equipment

Aircraft and Aircrew Protective Armour
Aircrew Equipment Test Units
Co-ordination of Aircrew Equipment and Safety Systems
Flying Clothing Models
Flying Helmets

Ground Equipment

Aircraft/equipment restraining system
Air Portable Sectional Trolleys
Air Portable Sectional Gantries
Bomb and Missile Ground Transportation and Aircraft Loading
Equipment
Coolair Mobile Self Contained Air Conditioning Plants
Pedestrian Controlled Aircraft Handlers for Flight Decks
and Airfields
Pneumatic Servicing Trolleys
Runway and Road Friction Measuring Equipment
Warmair Mobile Self Contained Air Conditioning Plants

ML ENGINEERING (PLYMOUTH) LTD

ELECTRICAL DIVISION

Turnkey Projects

Design, Supply and Installation of Railway Signalling,
Telecommunications and Centralized Traffic Control Systems

Design, Supply and Installation of Industrial Control and
Telemetry Systems

Railway Signalling Equipment including:

- Colour Light Signals
- Junction Route Indicators
- Stencil Route Indicators
- Position Light Shunt Signals
- Point Detectors
- Earth Leakage Detectors
- D.C. Track Circuits
- Jointless Audio Frequency Track Circuits
- Transformer-Rectifier Sets
- Solid-state Timers
- Fail-safe Frequency Division Multiplex System
- Remote Control and Indication Equipment
- Control Desks and Mimic Diagrams
- Solid-state and Relay Logic Equipment
- Radio Controlled Block Circuit Equipment
- Computer Based Train Description Systems

Industrial Control Equipment including:

- Telemetry and Telecontrol Modular Systems
- Control Desks and Mimic Diagrams
- Computer Based Data Logging and Telemetry Systems
- Machine Control Interfaces, Solid-state and Relay

ML COMPONENTS LIMITED

The industrial selling organization for the electrical and electronic products manufactured by ML Aviation and ML Engineering (Plymouth).

Sole United Kingdom representatives for L.M. Ericsson (Component Division) of Sweden and Elmwood Sensors Inc., USA.

The component range of ML Components caters for the requirements of those engaged in design and development of equipment for machine tool control, process control, instrument scanning and automatic testing. Rotary stepping switches, crossbar switches, triple and multiple relays and many other associated components are the highly developed and specialized products resulting from the need for reliable switch components in all forms of control.

List of Products:-

Miniature Precision Thermostats	Multi-way Connectors
Miniature Industrial Thermostats	Alarm Fuse Units
Illuminated Push-button Switches	Crossbar Switches
Electro-mechanical Digit Counters	Terminal Blocks
Triple and Multiple Relays	Microswitches
Rotary Stepping Switches	

THE CROWN FOUNDRY COMPANY LIMITED

Manufacture of cast iron commercial castings and piano frames by 'Vacuum Process'

Shot blasting of all castings.

Full pattern making facilities.

Finishing by spray painting in cellulose.

Radial drilling machines for complex multiple drilling and tapping operations.

HISTORY OF ML AVIATION

ORIGINAL FORMATION OF THE COMPANIES

The present ML Companies dealing with aircraft products originated during the mid 1930s with two separate companies.

Wrightson Aircraft Sales was formed in May 1934, the name of the Company being changed in September 1936 to Malcolm and Farquharson, (taking the title from the names of the two shareholders).

The R. Malcolm Company was formed in December 1936, the share capital being owned by Malcolm and Farquharson.

In December 1939, Malcolm and Farquharson became a Holding Company, with all aircraft product work being carried out by the subsidiary - R. Malcolm.

WARTIME ACTIVITIES

At about this time Marcel Lobelle who had been Chief Designer of Fairey Aviation, joined the Company. He had designed many Fairey Aircraft, the most famous being the Swordfish which sank the Italian Fleet at Taranto.

At the beginning of World War II Malcolm and Farquharson and its subsidiary R. Malcolm were faced with financial problems and turned to the Mobbs family, owners of the Pytchley Autocar Company and the United Motor Finance Corporation founded by Sir Noel Mobbs. Malcolm and Farquharson had been associated with the Pytchley Autocar Company in that they had carried out some work for that Company. During 1940, Malcolm and Farquharson and its subsidiary were taken over by the Mobbs family through the United Motor Finance Corporation.

Under the supervision of Mr Lobelle a drawing office, already started at Slough, was rapidly developing on work for the then 'Ministry of Aircraft Production'. In order to operate the expanding design element more efficiently, the drawing office and experimental work were moved to White Waltham, (where MLA is still based), whilst remaining a part of R. Malcolm, with production engineering work continuing at Slough.

In 1943 Malcolm & Farquharson's services were dispensed with and whilst the Company traded under the same name, it was managed by Mr Eric Mobbs as Managing Director and Marcel Lobelle as Chief Designer.

In October 1946 it was necessary to change the names of the present companies due to the fact that Mr R. Malcolm had set up a company in his own name and there was confusion as to which companies did what work under what name. Names were therefore changed to ML Aviation (formerly R. Malcolm) for design and development at White Waltham, and ML Engineering (formerly Malcolm & Farquharson) for production at Slough.

Wartime products included:-

- (a) a wide range of jettisonable hoods for fighter aircraft
- (b) towing hooks and tow ropes with quick release gear for use with gliders and their aircraft, which were extensively used for 'D' Day and subsequent airborne landings
- (c) personnel mine blast protection shoe
- (d) battle tank recovery/retrieval hook.

Pioneering work was associated with:

- (a) pick-up equipment by which a man was snatched from the ground without the aircraft having to land
- (b) the fitting of a rotor to a jeep to enable it to become airborne when towed by an aircraft.

POST-WAR ACTIVITIES

At this period the Company became involved in a number of specialist products such as Gyro Gun-sight Mountings, Target Towing Winches and a number of original ideas associated with pilot ejection from fixed wing aircraft.

The early 1950s saw the Company extensively involved in the development of weapon carriage and release systems with a range of multiple bomb carriers for Victor, Vulcan and Canberra aircraft. Shortly afterwards, the Company extended its activities into developing cartridge operated ejector release units fitted to new type multiple bomb carriers.

In December 1957 United Motor Finance Corporation sold its interest in ML to the Mobbs family, and those limited number of United Motor Finance Corporation shareholders who wished to buy some ML shares.

The Company was undergoing considerable expansion and further finance was necessary. In 1958 the Charterhouse Group bought shares in ML from the Mobbs family and at the end of the year ML went Public through the creation of a non-trading holding company - ML Holdings Limited - with a number of subsidiaries, each devoted to its own product range. These activities and subsequent raising of extra capital have resulted in diminishing control by the Mobbs family who now own only some 10% of the Company's shares. Over the years Charterhouse progressively sold its interest in ML.

The end of the 1950s saw the Company involved in some interesting projects such as balloon-borne suspension systems for stabilized radar platforms with a view to early warning radar systems being developed which were capable of tracking low flying aircraft. Similar systems were also used for suspension

of atomic weapons during the United Kingdom's last atmospheric tests in the Pacific. Development included the U120D radio controlled target aircraft and a collapsible delta wing two-seater aircraft using an inflatable wing specified by RAE Bedford.

The 1960s saw the Company involved extensively in the development of ejector release units, reducing the variety of different types with a view to standardization. This culminated in the production of the ML ERUs 119 and 120 which are still in current production.

The Company's experience in weapon carriage and release systems led to the development of specialized electrical test equipment and eventually into electrical and electronic products in their own right.

At the same time the Company expanded its ground support role and produced a wide range of air conditioning units and special purpose aircraft handlers.

ML Aviation and the former ML Engineering (incorporated into ML Aviation in April 1980) account for over 60% of the turnover of the Group.

OTHER COMPANY ACTIVITIES

The remaining companies in the Group are commercially orientated, this being deliberate ML Holdings policy as it is felt that whilst technical standards are equally high for all companies of the Group, the requirements of the aircraft industry are very different from that of, for example, railway signalling undertaken at Plymouth, and these can best be handled by the separate companies.

ML Engineering (Plymouth) was established in March 1960 initially to undertake railway signalling work which has subsequently developed into all forms of data transmission, particularly telemetry.

ML Components (originally formed in the name of ML Industrial Products in 1964 - name changed in 1974) was formed to handle MLA's electrical and electronic components. This Company has also developed into a factoring agency importing components from various overseas companies.

Crown Foundry based in Northampton is the oldest company in the Group; it was founded on the 22nd August, 1904, and acquired by ML Holdings on the 31st March, 1958. The Company has specialized throughout its life in the production of cast iron piano frames. For almost 75 years it was based in the Far Cotton district of Northampton, but in 1978 moved into a new factory built around the patented Japanese V Process for the manufacture of castings under vacuum. The Company supplies about 90% of the UK piano market with cast iron frames, is expanding into overseas markets and is beginning to expand into commercial castings where

the advantages of the V Process are recognized. This process, as a result of casting under vacuum, enables a very good, extremely accurate casting to be produced which requires the minimum of subsequent finishing.

Miscellaneous Dormant Companies Over the years, other miscellaneous companies have been part of ML or associated subsidiaries, but which now no longer trade:

- (a) Pytchley Autocar Car repairers and manufacturers of sliding roofs. Founded on the 18th May, 1905, and acquired by ML on the 16th January, 1956.
- (b) Electric Welders A subsidiary of Pytchley Autocar. Founded on the 29th June, 1929.
- (c) Pytchley Limited Never traded - founded on the 13th July, 1930, and acquired by ML on the 31st March, 1956.
- (d) ML Refrigeration (originally part of ML Industrial Products formed in 1964, name changed in 1974 and closed down in 1980). Factoring agency for Refrigeration equipment.