

Perkins

FROM PETER HOOPER PRESS RELATIONS OFFICER F. PERKINS LTD PETERBOROUGH



PRESS RELEASE

TEL:
5341

Assist. Press Officer
R. H. THOMPSTONE

A PERKINS GROUP PRESS VISIT & GAS TURBINE

FIREFIGHTING DEMONSTRATION

At Waddesdon Manor,
Aylesbury, Bucks, at 11 a.m.
Tuesday, September 12th.,
1961, by kind permission of
The National Trust.

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The Directors of Perkins Gas Turbines Ltd. would like to acknowledge with thanks the co-operation of the Buckinghamshire County Fire Brigade, which has made the fire demonstration possible.

PROGRAMME

- 9 a.m. Press coaches depart from Royal Automobile Club, Pall Mall, London.
- 11 a.m. Arrive Waddesdon Manor.
- Coffee
- Introduction & Welcome
Brigadier N.S. Cowan, O.B.E.,
Administrator, Waddesdon Manor.
Mr. F.N. Kirby, Director,
Perkins Gas Turbines Ltd.
- 11.30 a.m. Guided tour of Works of Art.
- 12.45 p.m. Cocktails and lunch at Waddesdon Manor.
- 2.30 p.m. Inspection of Perkins Mars gas turbine.
Demonstration of Mars gas turbine fire pump in collaboration with Buckinghamshire County Fire Brigade.
- 3.30 p.m. Tea.
- 4 p.m. Depart. Coaches will return London visitors to Royal Automobile Club.

Note: We hope you spend a pleasant and informative day with us. If you require any further information or photographs please do not hesitate to contact me or my assistant, Bob Thompstone-- we will be delighted to help you.

Peter Hooper,
Press Relations Manager,
Perkins Group.

Perkins

FROM **PETER HOOPER** PRESS RELATIONS OFFICER

PRESS RELEASE

Assist. Press Officer
R. H. THOMPSTONE

PERKINS ENGINES LTD.
PERKINS OUTBOARD MOTORS LTD.
PERKINS GAS TURBINES LTD.
PETERBOROUGH

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A unique gas turbine firefighting system— first of its type in the world— has just been installed by the National Trust at Waddesdon Manor, near Aylesbury, one of Britain's famous stately homes.

The house was bequeathed to the National Trust by the late Mr. James A. de Rothschild in 1957 and contains one of the finest privately-formed art collections in the country.

It houses a magnificent collection of French 17th and 18th century works of art, including many pieces commissioned by members of the French Royal Family. Among these is one of the finest collections of Savonnerie carpets in the world. Other priceless treasures include paintings by Gainsborough, Reynolds, Guardi, Rubens and other masters.

The National Trust has enlisted the aid of a very modern ally to protect these historic treasures against fire— a 50 h.p. Perkins Mars "baby" gas turbine, one of the smallest and lightest gas turbines made in the world.

A Mars gas turbine water pump— it can be carried by two men and delivers 500 gallons of water a minute, as much as many fire engines— has been installed at Waddesdon Manor in a small pump house near a 250,000 gallon underground reservoir some distance from the house.

It is linked to a water main, with seven hydrant points, running round three sides of the house. The instant-starting gas turbine, which can be cranked by one man, fills this with water at sufficient pressure (120 lbs per sq in) for firemen to direct jets to any part of the building. It also charges with water a "dry" pipe running up to the roof with hydrant connections on every floor.

The installation— fully approved by the Buckinghamshire County Fire Brigade— not only provides water for firefighting to any part of the house, but will also save the National Trust staff and the brigade vital minutes in tackling any major outbreak.

Previously two fire engines had to be on the spot before the underground reservoir could be used— one to pump water into the mains system, and the other to provide men and equipment at the house. As only one fire tender is kept at Waddesdon fire station, this meant that a second unit was not available until another arrived from Aylesbury 15 minutes away.

Members of the National Trust staff at Waddesdon have been specially trained by Perkins at Peterborough to operate the Perkins Mars gas turbine water pump, which can be easily removed for portable operation, and members of the Bucks Fire Brigade also know how to use the gas turbine. It can be started in 15 seconds in any weather and needs servicing only once a year.

Continued.....

Explained Brigadier N.S. Cowan, the National Trust's administrator at Waddesdon: "When we worked out our security measures, it was obvious that fire presented quite a threat to the collection.

"Before we installed the gas turbine pump, there was no means of extracting water from the reservoir until the fire brigade arrived, and much valuable time would have been lost. Now our staff is able to pressurise the fire main and the brigade can move straight in to attack the fire the second they arrive".

The gas turbine pump has already been in use and proved its worth during a recent fire in the grounds.

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FIREFIGHTING ARRANGEMENTS AT WADDES DON MANOR.

MAIN WATER SOURCE

A 250,000 gallon underground reservoir is situated in the grounds approximately 300 yds from the house. This is connected by a 6 in pipe to a ring main running round three sides of the building. The main is 5 in along the North front of the house and 4 in along the West and South aspects.

The ring main is also laid into the building and connected to a 4 in dry riser to roof level.

There are seven hydrant points at ground level and six other points covering each floor to the roof.

PUMPING FACILITIES

A 50 h.p. Perkins Mars gas turbine water pump is installed in a small pump house over the underground reservoir. There is a 10 ft suction lift from the reservoir to the pump. This has a capacity of 500 g.p.m. at 100 p.s.i. and reaches full speed (40,000 r.p.m.) in 15 secs.

This pump fully charges the mains and dry riser at 120 p.s.i., sufficient pressure to direct hoses from the ground to any point in the building.

All the staff at Waddesdon Manor have been trained to start the engine, which can be cranked by either one or two men. The Mars gas turbine starts instantly, needs no warming up period, is impervious to weather conditions and requires hardly any attention. The installation at Waddesdon, for example, is run for a routine 15 minute test period every fortnight and will be serviced only once a year.

Continued.....

The pump is simply installed and can easily be removed for portable operation. It weighs only 180 lbs and can be carried by two men.

COMMUNICATIONS

In the event of fire, Waddesdon Manor would contact the Bucks Fire Brigade H.Q. at Aylesbury by 999 call. The sequence of events then is that the Bucks Fire Brigade alerts the Waddesdon Brigade, a part-time organisation with one fire engine, by a remote control alarm system.

The Waddesdon brigade would reach the house in a few minutes and it would take about 15 minutes for a machine to arrive from Aylesbury.

Before the fire brigade arrived, the Waddesdon Manor staff would have started the Perkins gas turbine, pressurised the mains, which would be charged ready for instant use, and would be fighting the outbreak.

ANCILLARY EQUIPMENT

Firefighting equipment available for staff use includes fire extinguishers and hoses connected to the ring main, "dry" riser and to 10 gravity-fed hydrants supplied from roof tanks.

PERKINS MARS GAS TURBINE

Tremendous interest has been aroused all over the world by the Mars "baby" gas turbine, manufactured by the Perkins Group of Peterborough and marketed by Perkins Gas Turbines Ltd. under a licensing agreement with the Solar Aircraft Company, of San Diego, California.

The 98 lb Perkins Mars gas turbine will run equally well on diesel fuel, paraffin, or low-grade petrol, can be lifted easily and yet develops 50 h.p. at 40,000 r.p.m. It has only three major components and few moving parts.

The Mars gas turbine water pump, which weighs only 180 lbs, can be carried by two men and can deliver 500 gallons of water a minute at 100 lbs per sq inch - as much as many fire engines.

SMALLEST GAS TURBINE

The 50 h.p. Mars is one of the smallest gas turbines in production. Including gearbox and all accessories it is only 22 ins high, 17 ins wide and 24 ins long. This represents a power-weight ratio of about 1:2 compared with that of 1:10 for modern compression ignition engines of the same rating.

Intended primarily for emergency and stand-by applications, the Perkins Mars gas turbine has been designed for instant starting by hand or electric motor, reliability, easy handling, fuel versatility, minimum maintenance and long life.

It can be used for a wide variety of applications including pumping of liquids and fuels, ship's salvage operations, ship-board de-icing, smoke screen generation, air compressors, generation of electricity, instructional purposes in universities, schools and technical colleges.

EXCLUSIVE RIGHTS

Perkins have exclusive rights to manufacture and sell throughout Europe, Africa and the British Commonwealth, excluding Canada, all gas turbines developed by Solar.

Perkins is concentrating initially on manufacturing the Mars. The company is, in addition, marketing American-built 500 h.p. Jupiter and 1100 h.p. Saturn engines. An agreement with Solar enables Perkins to act as sales representative for Solar gas turbines not in production at Peterborough. A number of continental orders for Jupiter gas turbines have already been received by Perkins Gas Turbines Ltd.

SOME APPLICATIONS FOR PERKINS MARS GAS TURBINES

Portable Pump set: The Mars pump set delivers 500 gallons per minute at 100 p.s.i.g. discharge pressure. The engine and pump are mounted on a tubular steel frame, which supports a cranking mechanism for hand starting. The total weight of the unit, less twin fuel tanks, is 180 lbs. The water pump impeller is mounted directly on the gearbox output shaft, with a speed of approximately 4400 r.p.m. Thus, the water pump contains no bearings and no gearing and has only three main parts - impeller, suction manifold and case. An ejector primer fully primes the water pump in about 20 seconds at a suction lift of 10 ft and at higher lifts over a longer priming period. There is provision for a limited amount of water to be passed into the exhaust gases by means of a water spray nozzle located in the centre of the turbine tail pipe. This reduces exhaust gas temperature to 225 deg F. Although the turbine tailpipe generally discharges to atmosphere, in confined spaces such as shipboard applications between decks, a flexible hose can be connected to the tailpipe to duct the exhaust gas away.

Shipboard De-icing: The basic water pump set may be used on ships for de-icing by directing the exhaust through a flexible hose and discharge nozzle to melt the ice.

Electric Generator Set: The Perkins Mars may be used for direct drive or belt drive of A.C. and D.C. electric generators of up to 30 K.W. capacity. In most cases an automatic clutch coupling is incorporated which commences engagement at about 27,000 r.p.m. turbine speed afterwards gradually accelerating the generator to rated speed. Hand, electric or "flywheel" starting, in the case of no-break generator sets, may be used.

Air Compressor Set: Various air compressors of up to 200 c.f.m. at 100 p.s.i.g. - more particularly the oil-flooded rotary types - may be driven by the Mars. Either belt drive or direct drive is used dependent upon the design speed of the compressor.

Fog Generator (Smoke Screen): Adaptation of the Perkins Mars gas turbine driven water pump for fog generation is accomplished with a simple kit consisting of a venturi pipe attached to the turbine exhaust flange and a fog oil pump which attaches to the water pump suction connection and is driven from the water pump impeller. The oil from the fog oil pump is supplied to the throat of the venturi pipe through the connection normally used for injecting the cooling water spray into the exhaust gas. The only control is a throttle valve for the fog oil pump by which the flow of oil may be varied from 0 to 450 gallons per hour.

Laboratory Instructional Set: Gas turbine sets for instructional purposes are needed by universities, technical colleges and industrial organisations. Used for this purpose, the Mars engine drives a hydraulic dynamometer by means of a cardan shaft. The engine is mounted on a sub-frame with the dynamometer, and a control panel with full instrumentation is provided which may be located either adjacent to the engine or outside a test cell. The Mars, smaller and less complicated than other available gas turbines, admirably demonstrates basic operating principles and characteristics common to all gas turbines. It enables a full gas turbine cycle analysis to be verified experimentally by comprehensive instrumentation.

Heating: Up to 500,000 BTU per hour is available from the exhaust gas of the Mars gas turbine and can be utilised in processing plants, for cabin heating and other purposes.

PERKINS MARS GAS TURBINE

TECHNICAL DATA:-

	Applicable at sea level at 60 degrees F. (15.6 deg C).
Starting and operating range	-30 deg F (-34.4 deg C) to 130 deg F (54.5 deg C) sea level to 25,000 ft (7620 m).
Rated engine speed	40,000 r.p.m. approx.
Rated output speed	4400 r.p.m. approx.
Turbine inlet temperature at rated power	1200 deg F (650 deg C)
Pressure ratio	2.5:1
Air flow	2.7 lb/sec (1.224 kg/sec).
Weight, including gearbox and engine accessories	98 lb (44.5 kg)
Continuous rating	50 h.p.
Speed control	± 0.5% steady state ± 2% no load to full load.
Dimensions, including gearbox and engine accessories	24.5 x 17 x 22 in. (62.2 x 43.2 x 55.9 cm)
Fuels	Diescl, paraffin, low grade petrol.
Lubrication	30 p.s.i. (2.1 kg/sq cm) pressure system, 6 pt (3.4 litres) capacity.
Starting	Manual or electrical.
Cooling	None required.

DESCRIPTION OF PERKINS MARS GAS TURBINE

TURBINE ASSEMBLY

The turbine assembly employs a single stage centrifugal compressor, single elbow combustor and a single-stage radial inward flow turbine. Air enters the compressor through a screened annular inlet case leading to a centrifugal impeller. Following the impeller, the air passes through a radial diffuser and is collected by a compressor scroll. This directs the compressed air into a combustor where fuel is injected and burnt to produce combustion gases at high temperature. Ignition, required only for original lightoff, is achieved by a sparking plug. The gases then flow to the turbine where they pass through a scroll to a nozzle ring which directs them radially inward against the vanes of a turbine rotor. After expansion, they exhaust axially through a short tailpipe.

The turbine rotor and compressor impeller are mounted back-to-back on the same shaft and are separated by a seal plate.

ANTI FRICTION BEARINGS

This arrangement is that of a single-shaft gas turbine and the entire expansion of the gases is used to rotate the one shaft. The shaft rotates on anti-friction bearings - a double row ball bearing at the output end and a single roller bearing adjacent to the overhung compressor impeller and turbine rotor.

The turbine rotating assembly has a speed of approximately 40,000 r.p.m. at the rated output. The standard gearbox reduces this speed to approximately 4,400 r.p.m. by means of a spiral bevel wheel and pinion of 9.1:1 ratio. The gearbox output shaft, lying at right angles to the turbine shaft, also runs on anti-friction bearings. Accessory gears driven from this shaft drive a constant speed-governor, over-speed safety shut-off, fuel pump and lubricating oil pump.

MANUAL OR ELECTRIC STARTING

The engine may be started manually or electrically. For hand starting, a 70:1 step-up ratio through an assembly of sprockets and chains is used, driving through a sprag-type clutch to one end of the gearbox main shaft. The chain and sprocket assembly also drives a magneto during the cranking period only to provide the spark necessary for initiating combustion.

The sprag clutch releases automatically as soon as the engine is accelerated beyond the cranking speed.

Rated speed is reached in approximately 15 seconds with hand starting and in 10 seconds with electrical starting.

FUEL SYSTEM

The engine fuel system consists of storage tanks, a filter, fuel pump, governor, overspeed safety shut-off, relief valve, throttle and a spray nozzle. Two fuel tanks of $5\frac{1}{2}$ gallons each are provided on portable units. Each tank has a self-sealing hose line coupling connected with a common fuel line manifold. This enables the engine to run on one tank while the other is being filled.

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The overspeed fuel shut-off functions as a safety shut-down, cutting off fuel flow in the event of the engine overspeeding beyond a pre-set point.

During the initial acceleration period of the starting cycle, the governor is wide open at low speeds. When rated speed is reached, the throttle is opened wide and fuel flow is controlled by the governor.

ENGINE
INSTRUMENTS.

Four engine instruments are provided:-

A tachometer, which also includes an hour counter to show total engine running time.

A pyrometer to indicate turbine exhaust temperature.

A fuel pressure gauge to indicate pressure at the fuel spray nozzle.

A lubricating oil pressure gauge indicating oil pressure ahead of the bearings and gearbox oil jets.