The installation at Low Head comprises 2 air compressors, only one operating at a time. The other as a standby. One compressor is powered by a 20 hp. Electric motor and the other by a 19 hp. Gardner kerosene engine.

Each compressor supplies air to two large tandem air receivers to a regulated I pressure of 35 lbs per square inch. Large pipes are connected between the air receivers and two large air operated valves. One an operating valve, and the other the main sounding valve for the Diaphone. Smaller pipes are connected to relay valves which control the larger ones and an air motor which maintains the coding or timing of the sound blasts.

The Diaphone consists of three main parts. A piston, a cylinder and an outer casing. There is also the resonator or trumpet but the function of this is to reinforce the sound and it's direction.
The Diaphone piston has two diameters. The larger or driving end fits into a portion of the cylinder of corresponding size. Both the driving end of the piston and the cylinder are machined with various air ports. The smaller sized section of the piston fits into a corresponding section of the cylinder but each is machined with annular narrow slits. These slits are so arranged that during each stroke of the piston the slits come opposite each other allowing air to flow from the Diaphone casing to the interior of the piston and thus to free air through the resonator. When the piston is operated the slits are opened and closed 180 times per second .This means that the large volume of air flowing through is cut 180 times per second which produces the sudden intense note and enormous volume of sound. The outer casing contains an annular passage at the

back of the Diaphone, round which the driving air passes. A passage at the front of the casing passes the sounding air .

A characteristic of the Diaphone is at the end of each blast, as the piston passes from full speed to stop, it stalls and a peculiar "grunt" is produced. This adds enormously to the distinctiveness of the sound and under certain conditions greatly increases the distance at which it can be heard.

The timing air motor drives two cam wheels through a gear box with a ratio of 243.2:1. The cam wheels open and close the small air relay valves which in turn control the piston operating valve and the main Diaphone sounding valve. The cam wheels are adjusted to provide the operating sequence of blasts unique to Low Head.

The Operating Valve and the Sounding valve are ordinary bronze mushroom types but they are both actuated by pressure of air from the timing relay valves admitted to the undersurface of a pliable rubber diaphragm. The diaphragm is expanded and through a distance piece lifts the mushroom off it's seat and allows air to pass to the Diaphone.

Operation of the installation is very simple :-

The cut-off valve between the compressor to be operated and the air receivers is opened.
Either the electric motor or the Gardner engine is started.
When operating pressure is reached the valve between the air receivers , the coding motor and the relay valves are opened.

From Pamplet produced by Bruce Findlay:

The Sound Had Gone...

Many who had lived or who had holidayed at the mouth of the Tamar River , at Low Head or George Town from the early I 930's, would remember the mournful sound of the Fog Horn at the Low Head Lightstation. During still nights and days, when sea and river fog encompassed the area, the roar of a thousand elephants would be heard for distances up to 20 miles. Many children and adults had laid in bed comforted by this unique sound which alerted those at sea that they were approaching dangerous shores. It was also heard far up the Tamar Valley on very still and foggy nights. Residents as far away as Dilston, near Launceston, can remember its distant sound.

The Fog Alarm installation was installed and operated by the Australian Government Shipping and Navigation Authorities from 1929 till 1973 when its use was abandoned because of technical advances in navigation.

A smidgeon of History about this sound

Shortly after European settlement at George Town in 1804 it was decided to mark the hazardous entrance of the Tamar river with a fire beacon at Low Head. This was lit when ships were expected and was attended by convicts. Buildings for pilots and rowing crews were also established in the sheltered bay below which is now known as The Pilots Station.

During 1833 a stone tower 15 metres high was built to support a light which burned whale oil. This tower was replaced in 1888 by the present 21 metre brick structure which was initially operated by paraffin and subsequently electricity.

Following a substantial increase in the amount of shipping using the Tamar River, it was found that very heavy river and sea fog created significant hazards and costly delays. It was decided during the 1920's to install a Fog Alarm at the lightstation. This would warn ship's masters that they were approaching a dangerous shore and advise them by means of a unique signal that the shore was Low Head.

Fog Signals had been used along the coastlines of England , Scotland , Europe and North America from the 17th. Century. These signals had evolved through bells, gongs, explosive charges, firing cannons and sirens. Each country had its own experts and specialist sound making engineers. In the U.K. the acceptance of a contract by Trinity House or The Northern Lighthouse Board was of great value and prestige.

In Canada an engineer and church organ builder was experimenting with an air operated device designed to greatly improve the bass tones of large church organs. He found that if he could open and close a valve through which a vast quantity of air was flowing, at a precise speed. a very loud and penetrating sound was produced. His invention, called a Diaphone, immediately attracted the attention of Fog Alarm users and manufacturers across the Atlantic .

In England a glass and optical manufacturer called Chance Bros., located in Birmingham , had already entered the Lighthouse supply business and were supplying ground glass lenses and rotating and timing equipment to many marine authorities around the world. Chance Bros. saw the advantages of the Diaphone and obtained the rights to manufacture it in Europe .

It was to this company who had already supplied the optics and operating mechanism for the Low Head Lighthouse that The Australian Department of Shipping turned to supply the new Fog Horn. The necessary equipment was shipped to Tasmania and installed in April 1929. After commissioning the Fog Horn was operated by the lighthouse keepers whenever fog was imminent.

The original installation consisted of 2 Reavell air compressors (I a standby,) powered by 2 Gardner kerosene engines (I a standby.) supplying air to 2 joined air receivers each with a capacity of 7.5 cu. Metres to an operating pressure of 35 lbs/sq.in. An air operated timing mechanism controlled operating and sounding valves which provided the unique tone in the Diaphone which in certain conditions could be heard at distances up to 20 miles from Low Head.

In the late 1930s electric power became available at the Lightstation and Fog Horn. One of the Gardner engines was removed and replaced with a 20 hp. Electric motor.

Following the increased use by shipping of new electronic marine navigation aids, it was decided in 1973 to decommission the Fog Horn.

The responsibility for the operation of lightstations around the Australian coast had for many years been in the hands of various Commonwealth Departments, depending on which Government was in power. It was probably due to this and also to the remoteness of the equipment from Canberra that the installation was forgotten and remained untouched, just as when the door to the equipment room was locked in 1973.

Early in 2000 a group of volunteers in conjunction with the Tasmanian Government Parks & Wildlife Department (the present owners of the equipment) decided that an attempt be made to rehabilitate the Fog Alarm. An initial inspection was made by committee members and it was decided to proceed.

Many problems were encountered. The external appearance of the equipment had been quite well preserved by the liberal application of paint shortly after the installation had been decommissioned in 1973, however it was not known in what condition the internal parts were. Before attempting to disassemble the various parts, it was thought responsible to obtain operating manuals and if possible, engineering drawings. Every attempt to source this information through the various government departments and archives was thwarted. The original equipment manufacturers in the U.K. were no longer in business and it was found that no longer anywhere in the world was there any similar equipment operating.

Following an exhaustive search, contact was at last made with the Senior Maintenance Engineer at the British Lighthouse Service in Penzance U.K. .He became interested in our project and was able to find the exact information that we required in a disused shed at the Portland Lightstation on England 's south coast.

After receiving these documents it became possible to take the equipment apart and thoroughly inspect all of the components. It quickly became very evident that due to the quite magnificent design and precision engineering used in the manufacture of the system that very little would have to be done to make the Fog Horn fully operational again.

However, one major obstacle still remained. During the many years of non use, a small leak had developed in the roof of the building. Rain water had caused surface rust to appear on several of the large rivets used in the construction of one of the air receivers. An initial report by an inspection engineer had recommended that to rectify this problem to the satisfaction of the testing authorities would be far too expensive a task and that the project should not proceed.

Many months went past while discussions were held with many expert advisers as to how we would be able to overcome what we, as non engineers, regarded as a very superficial problem. All of the components that we had inspected were so massively over designed and constructed that we sure that this small area of corrosion would not create any danger. At last we were able to make contact with an engineer who had considerable experience with pressure vessels and who agreed that it would be appropriate to carry out small repairs which he felt would satisfy the inspection authorities and allow the pressure vessels to be full certified.

With continued help and assistance from the Parks & Wildlife Service it was agreed to engage a specialist welder and under the supervision of an inspection engineer, to replace three of the offending rivets with hi tensile bolts. This work was carried out and the pressure vessels tested and certified.

During this period all components of the compressors, timing equipment, operating and sounding valves and the Diaphone had been taken apart, inspected, cleaned and reassembled as per the instructions received from U.K. All was ready for the final test. Information had also been received from Trinity House that should we be successful in our endeavour that we would have the only operating Type “G” Diaphone in the world. All other installations were either in a complete state of disrepair or in maritime museums. This information only provided us with further incentive.

Using the electric motor, (work had not yet started on refurbishment of the Gardner engine) the compressor was started and the pressure vessels brought to operating pressure. The control valves were opened, the timing motor started and several seconds later the magnificent roar of a thousand elephants echoed through the area.

The Sound Was Back...

Following the successful operation of the Low Head Fog Horn in April 2001, using the electric motor, attention was now drawn to the refurbishment of the Gardner engine and the standby compressor. After making several enquiries we were able to contact a retired engineer and a long time employee of the Gardner Engine Co., who in his retirement has taken charge of the Gardner Vintage Engine Register. Gardner no longer exists as it used to be. The name is now owned by a Texan aero electronics company. Over two tons of paper relating to Gardner engines was now in his possession..

We advised this gentleman of our intentions and sought his assistance. We provided what we thought was the serial number, model number, and any other further relative information. His reply amazed us. He advised that the serial number of our engine was not that which we thought and supplied the correct number. He also provided the original works test sheets for the engine. Further he advised that the engine that we had was extremely rare and that to his knowledge no other of the particular model would be able to be made operational anywhere in the world.

We had already commenced to dismantle the engine so that we could check the internal workings. Like the rest of the installation the exterior had been lavishly covered with paint. Springs and valves and oiling ducts that should never be painted were all treated similarly. Internally however the engine was in a most perfect condition. The massive and precision engineering was a sight to behold.

Information received from U.K. advised that under normal working conditions the Works guaranteed life of the engine without major overhaul was 500,000 hours. One piece of local information that we did manage to obtain from the Lighthouse Keepers log books in the archives in Hobart was that this engine had only operated for approx. 1000-1200 hours. There was a lot of life in it yet.

The work of cleaning up the engine and reassembling it, regrinding valves, checking clearances, changing oil and filters and general maintenance is almost complete. A new fuel tank is being made as the original was rusted out and a new tank for the water cooling system and new copper plumbing is being installed.

The engine has now been repainted and work on recommissioning and running is underway.

Bruce Findlay 2001

The Fog Alarm is sounded on most Sundays at mid-day by the volunteers who restored it.

It's all over in less than 5 minutes so don't be late.