Flight Automation Research Laboratory

FIBRE OPTIC COMMUNICATION LINKS

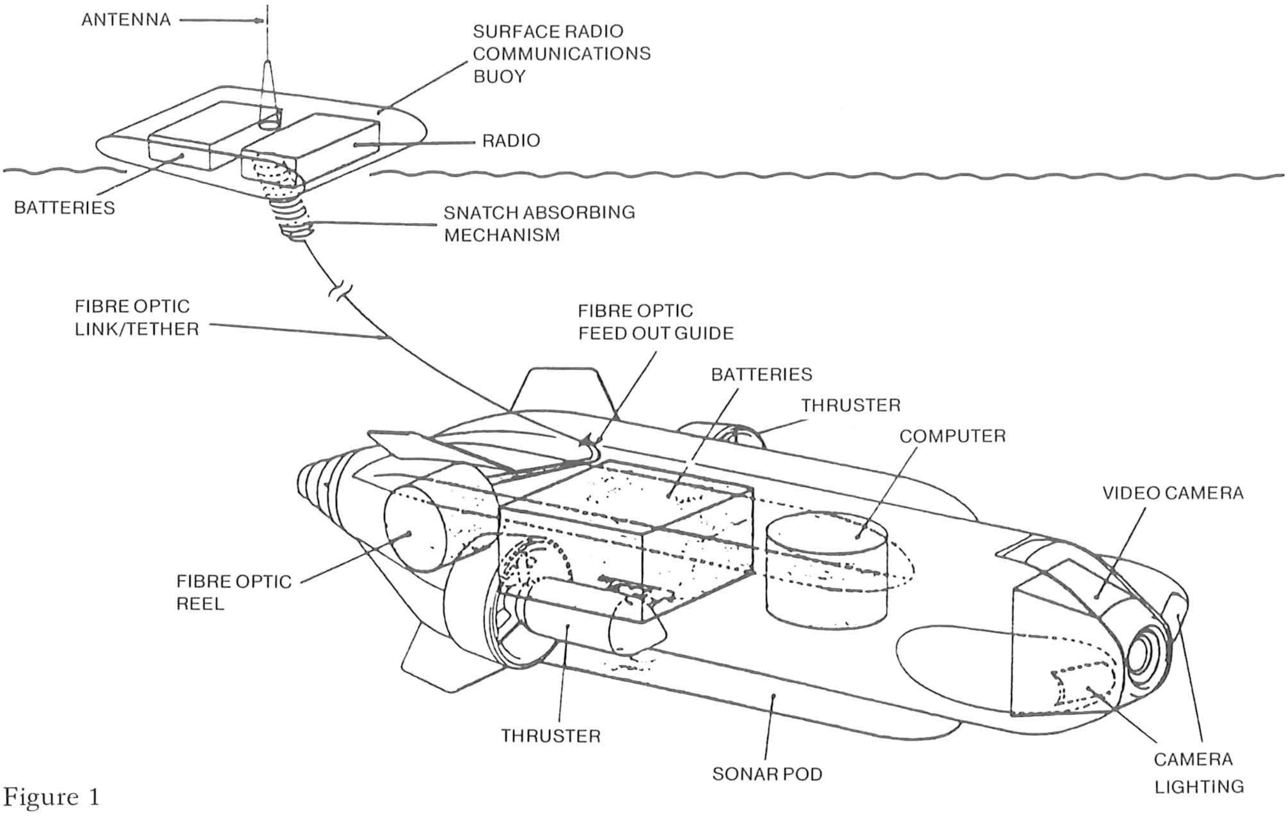


Figure 1

Remotely Piloted Vehicles - Fibre Optics Communications Links

The laboratory has been working on two different Remotely Piloted Vehicle (RPV) concepts, but the design of the link between the vehicle and its controller has many similarities. The common principle is to use a spool of optical fibre which is deployed by the RPV as it travels. Two way communication across this link allows data to be gathered from the vehicle and command information sent to it.

Semi Autonomous Rapid Inspection and Survey (SARIS)

Current underwater RPVs have limited range and depth capability. The main reason for this is the umbilical cable which gives excessive drag when working at large distances. The aim of the SARIS programme is to develop a system which decouples the RPV from the mother vessel. This is achieved in two ways, firstly to use a lightweight, small diameter fibre cable to communicate from subsea vessel to a buoy, and secondly by using a radio link from the buoy to the mother ship (see Figure 1). Initial investigation into these areas has been carried out at FARL for the underwater group at GEC Avionics Nailsea.

A demonstration rig is being built at FARL to prove the fibre optic link (see Figure 3). This prototype system operates over 3km of fibre, which is the requirement for this system, but the technology is capable of much greater distances. The link is bi-directional and allows four data channels to be used simultaneously in both directions. Each channel is capable of either analogue (eg video) or digital data transmission.

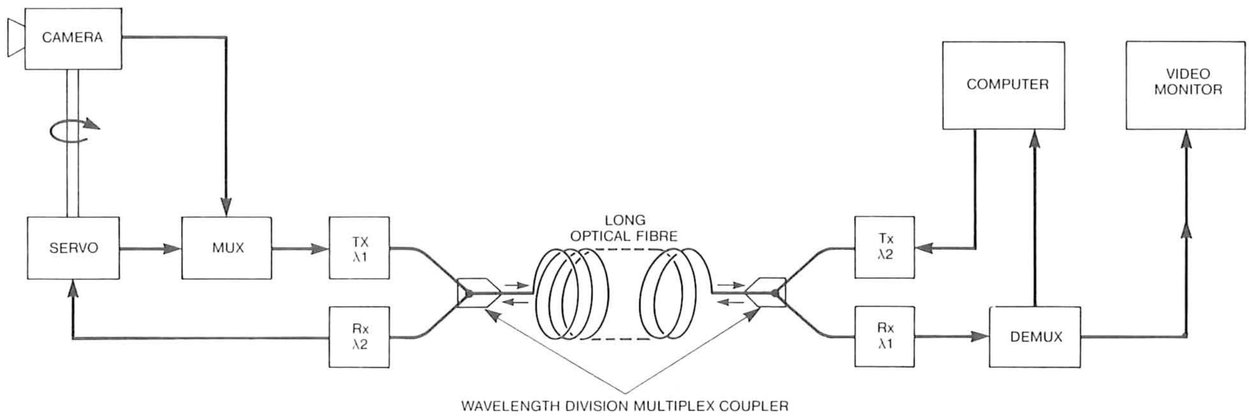
Figure 2

The Close Battlefield Surveillance System (COBSS) was conceived by GEC Avionics as a non line of sight missile system which could perform both surveillance and attack in its terminal phase (see Figure 2). The use of fibre optics in this system allows it to operate a video and high data rate link in a hostile EMC environment. As part of the work to support a presentation to the British army a fibre optic system was built at FARL to demonstrate the feasibility of communicating video, data and control signals over the required distances. This demonstration was integrated with a low light camera, the GSD digital map system and RSDs multi channel video recorder. This was done to illustrate the COBSS concept of recording the missile's view with its actual position, and to show the potential for intelligence gathering.

Bi-directional Fibre Optic Link

For both of the above systems similar techniques were used for the communications link. Figure 3 shows a general scheme for the links. Wavelength Division Multiplexing (WDM) was used to achieve bi-directional communication over a long length of optical fibre. WDM is needed to achieve a full duplex link, and to increase the efficiency of the couplers. Electrical multiplexing techniques are then used on each wavelength to increase the number of channels in each direction.

Figure 3



GEC AVIONICS

GEC Avionics Limited

Flight Automation Research Laboratory

Airport Works Rochester Kent England

Telephone: Medway (0634) 44433

Telex: 965884

Facsimile: (0634) 813652

Printed in England

PL9202