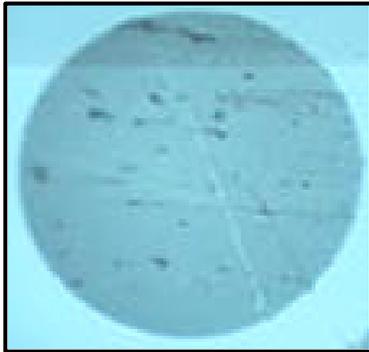

PREVENTIVE MAINTENANCE OF FIBER OPTIC CABLES AND OPTICS

The end of a fiber optic cable and the inner surface of an optical module lens constitute optical surfaces that should be properly cleaned and maintained to ensure optimum reliability and system performance.

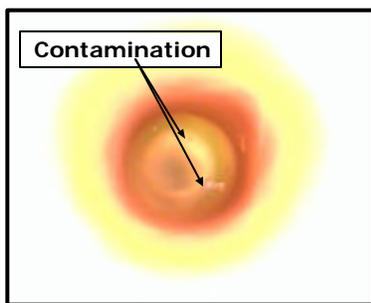


Small oil micro-deposits and dust particles on fiber optic cable optical surfaces may cause a loss of light or degraded signal power which may ultimately cause intermittent problems in the optical connection.

Figure 1 shows the oil and dust that can collect on fiber cable connector tips and canals.

FIG.1 – Fiber Optic Cable Contamination

Laser power density may eventually burn contaminants into the optical surfaces causing the fiber to produce inaccurate results effectively rendering it unusable.



By extension, contaminated cable connectors may often transfer contaminants and particulates into the "Optical Sub-Assembly" (OSA) barrels of the Optical Module they are inserted into.

Figure 2 shows particulates transferred to the inside barrel of a module OSA.

FIG.2 – Module OSA Contamination

A general practice of cleaning optical cables and module OSAs is a good and recommended habit to ensure overall system reliability and peak performance.

Safety Precautions

General safety precautions are discussed within this document but care should be taken to consult and follow your specific optical device manuals as well as the safety precautions outlined for the chemical or tool of use.

Hewlett-Packard Corporation assumes no liability for customer failure to comply with these requirements.

WARNING

Never look into the end of an optical interface while the device is operational. Laser radiation can be harmful to the human eye and injury may occur under prolonged exposure.

Cautions

- Do not remove transceiver covers when operating.
 - Ensure the unit power is turned off during cleaning.
 - Ensure that other power/light sources are disabled during the cleaning of the optical interfaces.
 - Do not install any unauthorized modifications to the optical devices.
-

Tools

Compressed air

Clean Dry Air (CDA) is essential to ensure the aerosol is free of dust, water, and oil. Use filtered compressed air or canned compressed air, which is available at any laboratory supplier or photo/camera shop.

Lens paper

A long fiber, low ash content type; having no chemical additives is recommended to minimize particulates and the chance of streaking and/or scratching of the optical surfaces. Lens paper is widely available at any laboratory supplier, drug store or photo/camera shop.

Isopropyl Alcohol or Methanol

Cleaning solutions are available at any laboratory supplier. Isopropyl Alcohol is also available at local drug stores, pharmacies, or photo/camera shops. Special care should be practiced when using chemicals and it is important to follow the manufacturer's product guidelines.

Cleaning Fiber Optic Cables and Connectors

There are multiple ways to clean fiber-optic cables and connectors. Included below are some helpful tips to properly clean fiber optic cables.

Notes

- Do not allow the end of the fiber optic cable to make contact with any surface including fingers.
- Do not bend the fiber cable. Bending the cable may cause internal breaks along the fiber resulting in poor performance or instability.
- Optics and optic coatings are easily chipped and/or scratched. Use of finger cots or powder free surgical gloves while handling fiber optic cables, to help ensure cleanliness.
- Only fresh (dry) spectroscopic grade Methanol or Isopropyl Alcohol should be used as a cleaning solvent.
- Ensure that the module power is off and that other light sources are disabled.

Cleaning Procedure

1. Blow the fiber surface with a stream of Clean Dry Air (CDA) as shown in *Figure 3*. This will dislodge larger, loose particles.

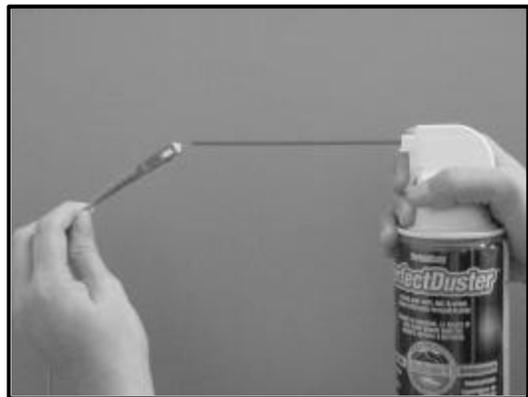


Fig.3 – CDA cleaning (cable)

2. Place 1-3 drops of spectroscopic grade methanol or isopropyl alcohol in the center of a lens tissue.
3. Hold the fiber by the connector or cable as shown in the Figure 4 below. Place the wet portion of the lens tissue on the optical surface and slowly drag it across.

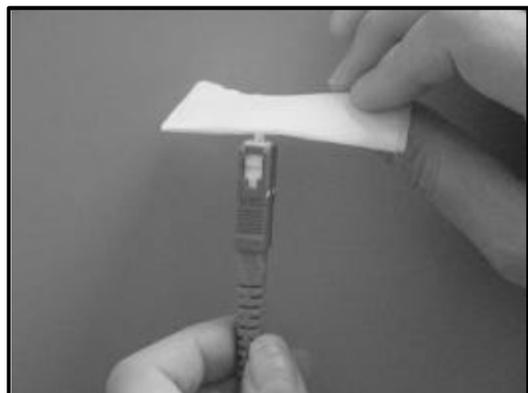


Fig.4 – Lens tissue

4. Examine the surface of the fiber under high intensity light using a magnifier, an optical loop, or a video inspection tool as shown in *Figure 5*. If streaks or contaminants still remain, repeat the process using a fresh lens tissue.



Fig.5 – 400X Video Inspection Scope

5. Immediately install a protective cover over the end of the cable to avoid re-contamination or insert the fiber for immediate use.

Notes

- Do not tip the can of CDA while blowing. Liquid may be released contaminating the surface of the fiber.
- Do not use lens paper dry. Dry lens paper is extremely abrasive.
- Do not use Acetone as a cleaning solvent on the fiber optical surfaces.
- To ensure the purity of the Methanol or Alcohol, do not insert the lens tissue, swabs, etc into the liquid. Instead, drip the liquid onto the material.
- Optical cable cleaning kits such as the Cletop Reel-Type Cleaner (PN:CLETOP-RL), a Realm Fieldmaster (PN:REALM FP-6), or 3M kits (PN: 4144) are also good solutions (see *Figure 6*). Follow the instructions for the cleaning kit you use.



Fig.6 – Fiber cable cleaning kits

Cleaning Optical Transceivers

The best way to clean a transceiver port is to remove particles using a stream of Clean Dry Air (CDA). Included below are some helpful tips to properly clean fiber optic modules.

Notes

- Always handle optical modules in an ESD safe area using the proper safety precautions.
- Ensure that the module power is off and handle the modules with care.
- Always use CDA or an approved canned compressed air supply.
- Always hold the can of compressed air upright. Tipping may release liquids in the air stream.
- Do not touch the inner surfaces of the module including the Optical Sub-Assemblies (OSA), or insert any foreign objects into the ports.
- Use of finger cots or powder free surgical gloves are not required but may be used to ensure cleanliness.

Cleaning Procedure

1. With the clean dry air, blow the inner barrel of the Transmitter and Receiver Optical Sub-Assemblies. This will dislodge loose particles (see *Figure 7*).

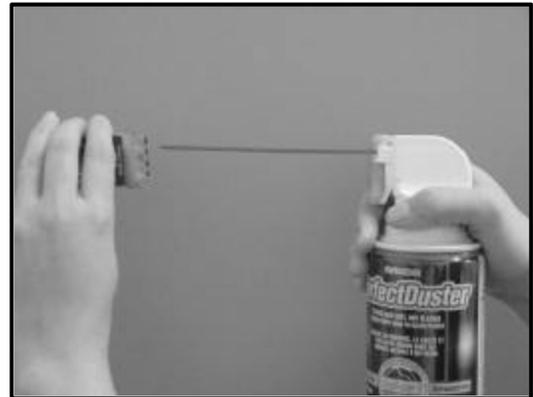


Fig.7 – CDA cleaning (module)

2. Examine the surface of the OSA lens under high intensity light using a microscope or verify the optical signal and eye pattern quality (see *Figures 8 & 9*). If contaminants still remain, repeat the process.

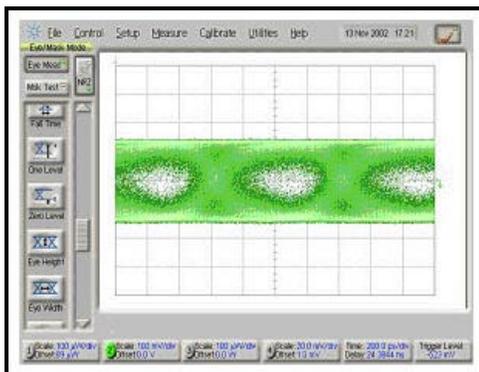


Fig.8 – Particles in OSA

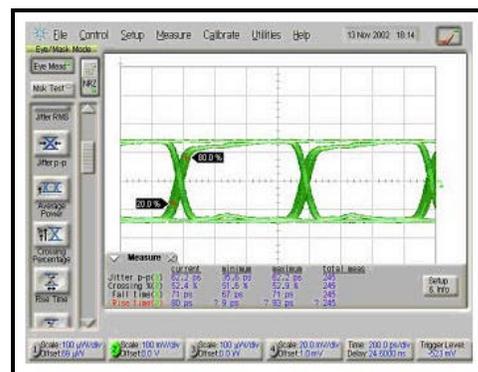


Fig.9 – Particle removed

The information
contained herein is subject to
change without notice.



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