

Single Board Interrogator Product Manual

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Issue	Issue Date	Change
B	19 th February 2014	Added power supply and development file information
A	7 th January 2014	Checked by KMJ
DRAFT	24 th December 2013	New document

1 INTRODUCTION

This document is a brief introduction to the Smart Fibres single board interrogator (SBI). It covers the SBI itself and the TS7200 single board computer.

1 PACKING LIST

The SmartScan package should contain the following items as standard. If any items are missing please contact Smart Fibres or your local representative immediately.

- Single Board Interrogator
- Rugged carry case
- CD containing C library and header file, cross-compiler and documentation
- Ethernet Cross-over cable
- CLETOP-S Cassette cleaner

If any items are missing please contact Smart Fibres or your local representative immediately.

2 SAFETY INFORMATION

2.1 SAFETY SYMBOLS

Symbol	Description
	Laser Safety. Refer to user manual for safety instructions for use.
	Refer to user manual for safety instructions for use and handling.

2.2 LASER SAFETY

Applicable Standard:	EN60825-1 (Safety of Laser Products)
Laser Type:	cw
Laser Class:	1M
Max power:	2.5 mW
Wavelength:	1528-1568nm

3 SBI

The SBI is designed to interrogate FBG gratings and determine their peak wavelengths. It requires a single board computer to set up its hardware registers and read spectrum and peak location data from its buffers.

3.1 JUMPERS

The SBI is delivered with jumpers on J13 and J16 which should not be removed.

3.2 DIP SWITCH

The SBI has a 4-way DIP switch which controls the interrupt request line and board ID. SW1 and SW2 should be set to IRQ5. SW3 and SW4 should be set to 0 for a single board system. For a multi LASER system the SBI with the lowest frequency LASER (the L band LASER) should be set to board ID 0. All other boards should be set to another unique ID number.

Function	SW1	SW2	Description
IRQ5	OFF	ON	SBI sends interrupts on PC105 bus IRQ5
IRQ6	ON	OFF	SBI sends interrupts on PC105 bus IRQ6

Table 1: IRQ

Function	SW3	SW4
ID0	OFF	OFF
ID1	OFF	ON
ID2	ON	OFF
ID3	ON	ON

Table 2: Board ID

3.3 POWER SUPPLY

The SBI has a two way screw terminal for connecting 9-36V DC power. The Positive terminal is closest to the board corner. The SBI generates all it's required voltages from this input and also outputs 5V on pins B3 and B29 of the PC104 bus connector for powering connected devices such as a single board computer.

3.4 DEVELOPMENT

The SBI is supplied with a CD containing the following development files:

- libssi.a – static link library
- libssi.so – dynamic link library
- libssi.h – development header
- libssi.pdf – library documentation
- minimal-dev-snapshot-20131024-x86_64-linux-armv4t-linux-gnueabi-toolchain-smartscan.tar.bz2 – cross-compiler tool-chain for x86-64 PC running 64bit linux OS.

4 SBC

The TS7200 SBC comes pre-loaded with a Linux 2.6.36 kernel and root file-system. It is also preloaded with a kernel driver module for the SBI which is automatically loaded on boot up.

Log in to the SBC using either a serial console (with 115200,8,N,1 port settings) or using SSH. The SBC is configured with an IP address of 10.0.0.150. In both cases the user name is root with no password.

The dynamic link library and the example program from the library documentation are pre-loaded on the SBC's FLASH file-system at /home/root/sbi. The example program continuously prints the wavelengths of the first 4 gratings of all channels to the console at 25Hz.

5 MAINTENANCE

5.1 OPTICAL CONNECTOR CLEANING

The use of optical fibre connectors requires some care if good results are to be obtained. The core of the fibre is very small, typically 8 to 9 micrometres in diameter and even the smallest dust particles, lint fibres or smears of oil can obscure it and cause optical losses. Scratches and chips in the highly-polished end face of the fibre also result in poor quality, unreliable connections. Therefore, it is important to develop good habits for handling and cleaning connectors. Ideally, both sides of a connection should be inspected and cleaned before mating.

Connector tips can easily be damaged by hitting a hard surface. This can be avoided by always keeping the plastic cover in place when not using or cleaning the connector.

A brief guide to good practise is given here. The interested reader will find further information from Industry bodies. There are also some useful proprietary standards in the public domain, for example:

- AT&T: document ID ATT-TP-76461
- Cisco: document ID 51834
- JDSU: document ID IBYC – Fiber Inspection, Cleaning & Test

Note: These documents are identified for information only. No connection between any of the named companies and Smart Fibres Ltd is intended or should be implied.

We understand that the first time user of a Smart Fibres product may not have all the correct equipment to hand but cleaning and inspection tools are relatively inexpensive and help to ensure continued correct operation of the interrogator. The regular user should make an effort to acquire them and learn how to use them effectively.

Some or all of the operations described below may be required to ensure that the fibre-optic connection is free from contaminants. The order of operations is given in Section Cleaning Flowchart, 'Cleaning Flowchart'.

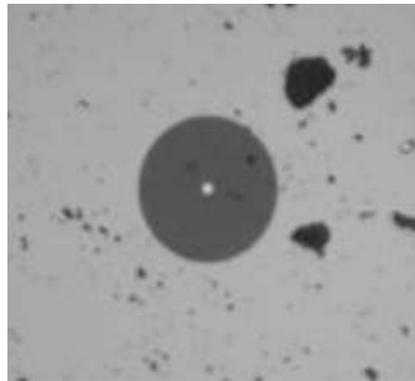
5.1.1 Inspection

It is highly desirable to inspect the end-face of connector ferrules (the white ceramic part) before mating them, to ensure that they are clean and undamaged. If no inspection means is available, you may skip this stage and proceed to a dry cleaning step, but be aware of the risk of making lossy connections by mating ferrules that may be contaminated or scratched.

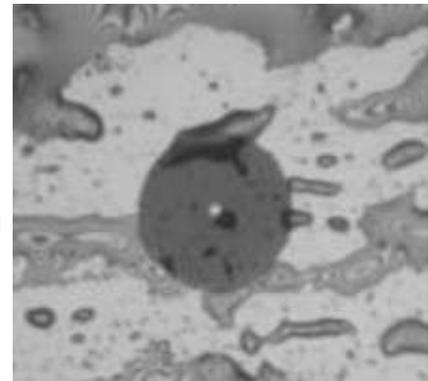
Remove the protective cap from the connector ferrule. Insert the connector into the fibre inspection microscope and examine the end face. If the connector is of an angle-polished type, it may be necessary to rotate it in order to see the end of the fibre clearly. Bulkhead connectors, such as those in the front face of a Smart Fibres interrogator, can only be inspected using a fibre video microscope with a suitable adapter. Typical views of a ferrule end-face are shown below:



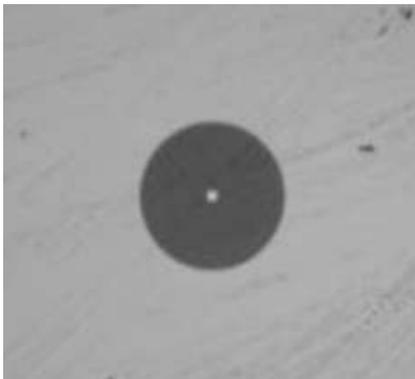
Clean fibre end-face, ready for mating.



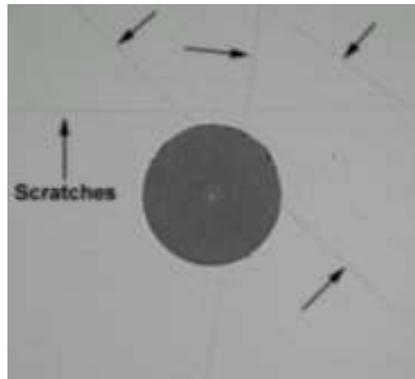
Dust particles on connector. Cleaning needed.



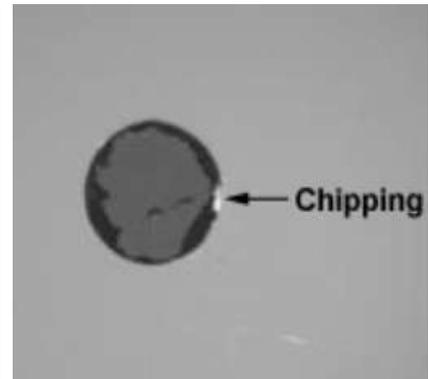
Liquid on connector. Cleaning needed.



Oily streaks on connector. Cleaning needed.



Connector is clean but has scratches. This is acceptable as there are no scratches on the fibre core. Ready for mating.



Fibre cladding is chipped. A small amount of chipping is acceptable but this connector should be replaced.

5.1.2 Dry cleaning

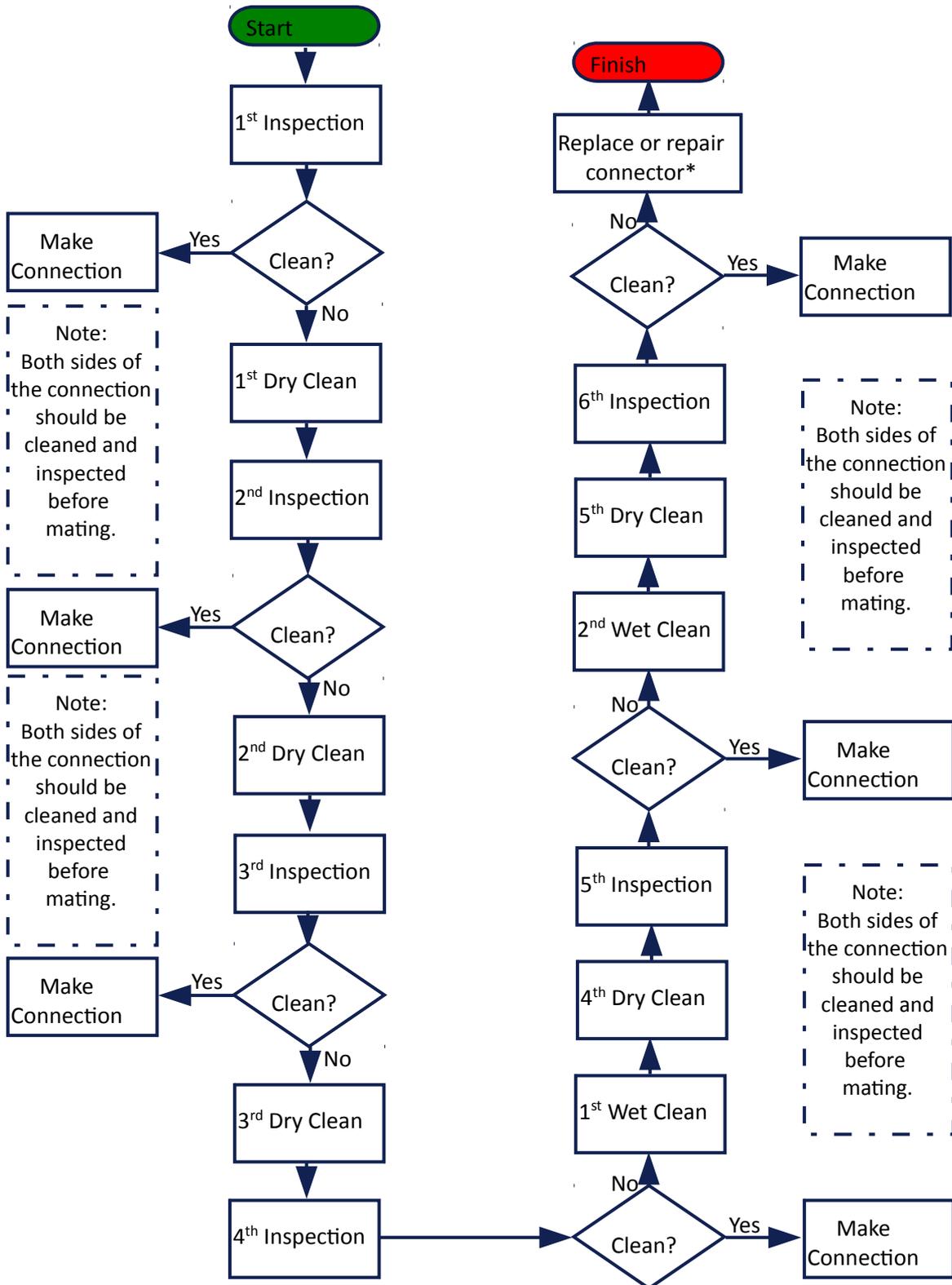
Dry cleaning involves wiping contaminants from the connector end-face using a clean, lint-free cloth. It is important to use fresh cleaning material for each wipe. Gentle but firm pressure is required, enough to depress slightly the spring-loaded ferrule. We recommend you use a 'Cletop-s' type cleaner for free connectors and a 'One-click' type cleaner for bulkhead or other recessed connectors.

5.1.3 Wet cleaning

If a contaminant resists removal by dry cleaning methods then wet cleaning may be needed. The process is similar but the cleaning material is either supplied pre-impregnated with solvent (as in some optical wipes) or a solvent is added just before use. The solvent must be of a high purity to avoid leaving a residue and a dry cleaning operation must follow immediately so that it does not have time to dry on the connector ferrule. Isopropyl alcohol is often used but there are also some good proprietary solvents.

5.1.4 Cleaning Flowchart

The flowchart below covers the process of cleaning and inspecting connectors before mating. It also shows the escalation of the cleaning method from dry cleaning to wet cleaning with solvents.



5.1.5 Cleaning tools

Fibre Inspection microscope



Battery-powered microscope with 200x magnification. Requires different adapters for different connector types. Must never be used to examine 'live' fibres.

CLETOP-S Cassette cleaner



Highly effective method of cleaning a free connector ferrule. Contains a cassette of anti-static cleaning cloth. Pressing the blue lever exposes a fresh length of material. Not suitable for wet cleaning.

'One-click' Ferrule cleaner



Required for cleaning recessed ferrules but can also be used on free connectors. Automatically wipes the ferrule end-face when it is pushed into the connector receptacle. Can be impregnated with solvent for wet cleaning.