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WESTOVER FBP PROBE MICROSCOPE & HD3-P DISPLAY

Handheld video probe microscope and display with integrated microscope

USER MANUAL



ZP-PKG-0481
REV 1

JDSU

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PATENTS

RibbonDrive Tips: US Patent No. 6,751,017 / 6,879,439

CleanBlast: US Patent No. 7,232.262

TESTED EQUIPMENT

All pre-qualification tests were performed internally at JDSU, while all final tests were performed externally at an independent, accredited laboratory. This external testing guarantees the unerring objectivity and authoritative compliance of all test results. JDSU's Commerce and Government Entities (CAGE) code under the North Atlantic Treaty Organization (NATO) is 0L8C3.

FCC INFORMATION

Electronic test equipment is exempt from Part 15 compliance (FCC) in the United States.

EUROPEAN UNION

Electronic test equipment is subject to the EMC Directive in the European Union. The EN61326 standard prescribes both emission and immunity requirements for laboratory, measurement, and control equipment. This unit has been tested and found to comply with the limits for a Class A digital device.

INDEPENDENT LABORATORY TESTING

This unit has undergone extensive testing according to the European Union Directive and Standards.

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TABLE OF CONTENTS

CHAPTER 1 **JDSU FIBER INSPECTION SOLUTIONS** 5–6

- INSPECT BEFORE YOU CONNECT 5
- Simple Solution 5
- Good Fiber Connection 6
- JDSU Fiber Inspection & Cleaning Solutions 6
- Benefits of Proactive Inspection 6

CHAPTER 2 **FIBER OPTIC CONNECTORS** 7–10

- Key Terms & Concepts 7
- Fiber Connector (Simplex) 7
- Fiber Connection (Simplex) 7
- Body 8
- Ferrule 8
- Fiber 8
  - Cladding 8
  - Core 8
- Simplex & Multi-fiber Connectors 8
- Contamination 9
- Zones 10
  - Zones Overlays 10
- Acceptance Criteria 10
  - Single-mode 10
  - Multimode 10

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CHAPTER 3 **WESTOVER FBP PROBE MICROSCOPE** 11–12

Introduction 11
Controls 12
Focus Control 12
Magnification Control 12
Specifications 12
Analog Probe Models 12

CHAPTER 4 **INSPECTION TIPS & ADAPTERS** 13–15

Introduction 13
Barrel Assemblies 13
Standard Tips 14
Long Reach Tips 14
APC Tips 14
Angled Tips 14
RibbonDrive™ Tips 14
Alignment Guides 14
FMA Adapters 14
FBPT Tip Installation Guide 15
FBPT Standard Inspection Tips Matrix 15
FBPT RibbonDrive™ Inspection Tips Matrix 16

CHAPTER 5 **WESTOVER HD3-P DISPLAY** 17–21

Introduction 17
Improved Workflow 18
Benefits of 2 Microscope System 18
Inspection Time Trial (Average) - *Traditional Display vs. HD3-P Display* 18
HD3-P Features 19
Controls 19
Specifications 20
Patch Cord Adapters for PCM 20
FMAE Adapters 20
Charging the Battery 21
Power Modes 21

APPENDIX A **JDSU FIBER INSPECTION VIDEO PROBE SOLUTIONS** 22

APPENDIX B **JDSU CLEANBLAST® SYSTEMS** 23

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JDSU FIBER INSPECTION SOLUTIONS

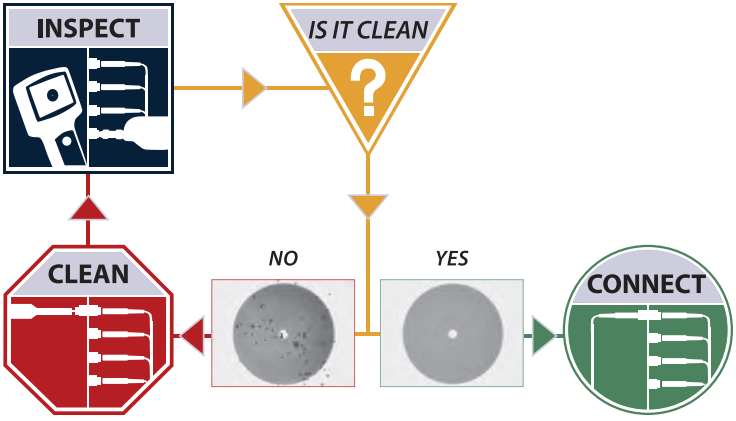
1

INSPECT BEFORE YOU CONNECT℠

CONTAMINATION IS THE #1 SOURCE OF TROUBLESHOOTING in optical networks. A single particle mated into the core of a fiber can cause significant back reflection, insertion loss, and equipment damage. Visual inspection is the only way to determine if fiber connectors are truly clean before mating them.

SIMPLE SOLUTION

By implementing a **SIMPLE yet IMPORTANT** process of proactive visual inspection and cleaning, you can prevent poor signal performance and equipment damage.

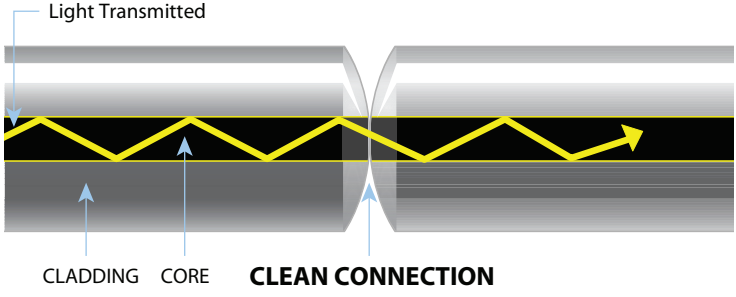


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GOOD FIBER CONNECTION

There are **3 BASIC PRINCIPLES** that are critical to achieving an efficient fiber optic connection:

1. **PERFECT CORE ALIGNMENT**
2. **PHYSICAL CONTACT**
3. **PRISTINE CONNECTOR INTERFACE**



Today's connector design and production techniques have eliminated most of the challenges to achieving **CORE ALIGNMENT** and **PHYSICAL CONTACT.** What remains challenging is maintaining a **PRISTINE END FACE.**

JDSU FIBER INSPECTION & CLEANING SOLUTIONS

The JDSU video fiber inspection probe and handheld display system is used to quickly and easily inspect connector end faces, which ultimately minimizes loss and optimizes test conditions. WESTOVER FBP series video probes, available in digital or analog and single or dual-magnification (200/400X) models are high-performance, handheld microscopes designed for inspecting both "female" (bulkhead) and "male" (patch cord) connectors, as well as other optical devices. The probe microscope can also be combined with a USB converter module to inspect connectors via compatible test platforms and PC/laptop. Our versatile systems offer a wide range of configurable solutions that can meet the demands of any application.

BENEFITS OF PROACTIVE INSPECTION

- **Reduce Network Downtime**
- **Reduce Troubleshooting**
- **Optimize Signal Performance**
- **Prevent Network Damage**

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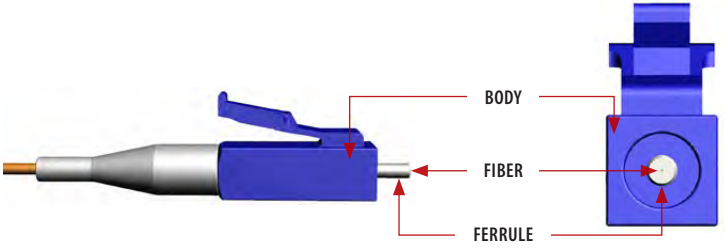
FIBER OPTIC CONNECTORS

2

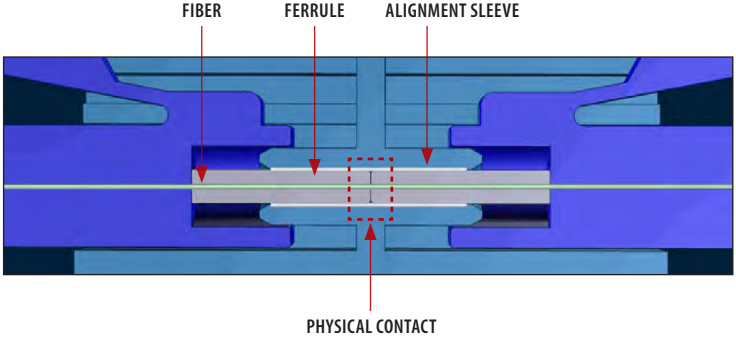
KEY TERMS & CONCEPTS

Fiber connectors enable fiber-to-fiber mating by aligning the two optical fibers. Fiber connectors come in various types and have different characteristics for use in different applications. The main components of a fiber connector are detailed below:

FIBER CONNECTOR
(SIMPLEX)



FIBER CONNECTION
(SIMPLEX)



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BODY Houses the ferrule that secures the fiber in place; utilizes a latch and key mechanism that aligns the fiber and prevents the rotation of ferrules of two mated connectors.

FERRULE Thin cylinder where the fiber is mounted and acts as the fiber alignment mechanism; the end of the fiber is located at the end of the ferrule.

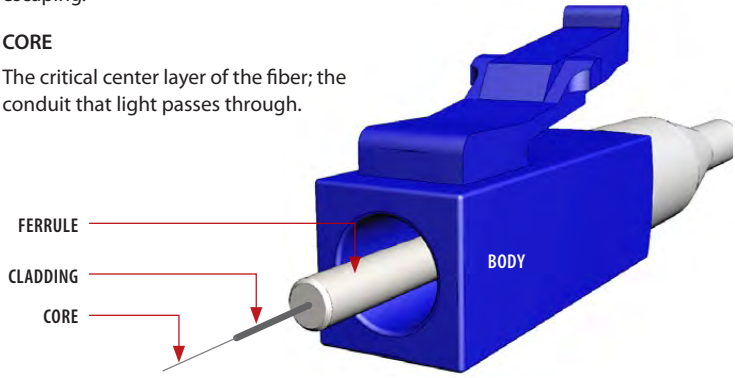
FIBER

CLADDING

Glass layer surrounding the core, which prevents the signal in the core from escaping.

CORE

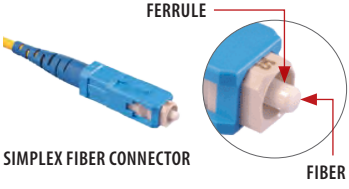
The critical center layer of the fiber; the conduit that light passes through.



SIMPLEX & MULTI-FIBER CONNECTORS

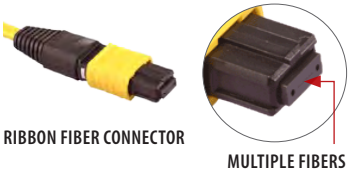
SIMPLEX FIBER CONNECTOR

A simplex fiber connector contains a single fiber located in the center of the ferrule. Common types include SC, LC, FC and ST.



MULTI-FIBER CONNECTOR

A multi-fiber/ribbon fiber connector contains multiple linear fibers (4, 8, 12, 24, 48 or 72) in a single connector to provide high-density connectivity. The most common configuration is MPO (also called the MTP®).



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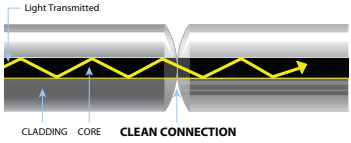
CONTAMINATION

DIRT IS EVERYWHERE, and a typical dust particle (2–15µm in diameter) can significantly affect signal performance and cause permanent damage to the fiber end face. Most field test failures can be attributed to dirty connectors, and most of them are not inspected until the problem is detected, AFTER permanent damage has already occurred.

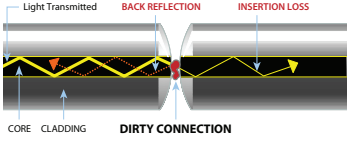
When dirt particles get on the core surface the light becomes blocked, creating unacceptable insertion loss and back-reflection. Furthermore, those particles can permanently damage the glass interface, digging into the glass and leaving pits that create further back-reflection if mated. Also, large particles of dirt on the cladding layer and/or the ferrule can introduce a barrier that prevents physical contact and creates an air gap between the fibers. To further complicate matters, loose particles have a tendency to migrate.

Scratches are typically created during polishing, cleaning or mishandling fiber connectors. Scratches that touch the core are problematic because they create back reflection.

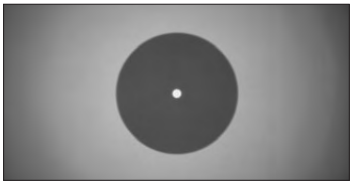
CLEAN CONNECTION



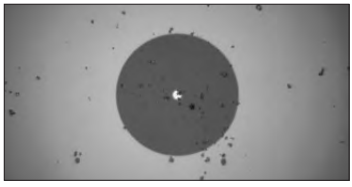
DIRTY CONNECTION



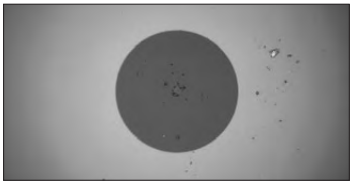
CLEAN FIBER



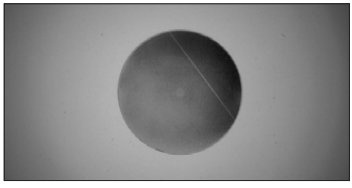
DIRT / CONTAMINATION



PITS / CHIPS



SCRATCH



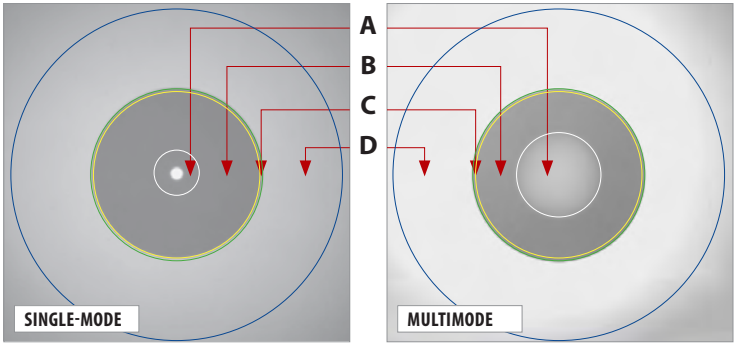
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ZONES

ZONES are a series of concentric circles that identify areas of interest on the connector end face. The inner-most zones are more sensitive to contamination than the outer zones.

ZONES OVERLAYS

A. CORE
B. CLADDING
C. ADHESIVE/EPOXY
D. CONTACT/FERRULE



ACCEPTANCE CRITERIA

ACCEPTANCE CRITERIA are a series of failure thresholds that define contamination limits for each zone.

The tables below list the **ACCEPTANCE CRITERIA** standardized by the **International Electrotechnical Commission (IEC)** for single-mode and multimode connectors as documented in *IEC 61300-3-35 Ed. 1.0*.

SINGLE-MODE

ZONE NAME (Diameter)	**SCRATCHES**	**DEFECTS**
A. CORE Zone (0–25µm)	none	none
B. CLADDING Zone (25–120µm)	no limit <= 3µm none > 3µm	no limit < 2µm 5 from 2–5µm none > 5µm
C. ADHESIVE Zone (120–130µm)	no limit	no limit
D. CONTACT Zone (130–250µm)	no limit	none => 10µm

MULTIMODE

ZONE NAME (Diameter)	**SCRATCHES**	**DEFECTS**
A. CORE Zone (0–65µm)	no limit <= 5µm 0 > 5µm	4 <= 5µm none > 5µm
B. CLADDING Zone (65–120µm)	no limit <= 5µm 0 > 5µm	no limit < 2µm 5 from 2–5µm none > 5µm
C. ADHESIVE Zone (120–130µm)	no limit	no limit
D. CONTACT Zone (130–250µm)	no limit	none => 10µm

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WESTOVER FBP PROBE MICROSCOPE

3

INTRODUCTION

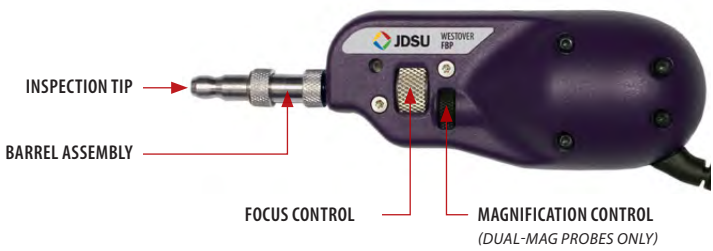
JDSU's **WESTOVER FBP Series Probe Microscopes** are portable video microscopes used to inspect fiber optic connectivity. While most fiber microscopes are limited to inspecting "male" connectors, JDSU's WESTOVER FBP Probe is designed to inspect both simplex and multi-fiber (ribbon) types of both "male" and "female" connectors as well as optical devices, such as transceivers. The probe is specially designed to fit and operate comfortably and easily in-hand, allowing the user to inspect hard-to-reach connectors that are installed on the backside of patch panels or inside hardware devices. This eliminates the need to disassemble hardware devices prior to inspection.



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CONTROLS

The basic design of the **WESTOVER FBP** probe microscope incorporates an imaging system, integrated light source, video camera, focus mechanism and magnification control. The probe is fully assembled and is powered by the display device. The only assembly required by the user is the connection to the display device and installation of the appropriate barrel assembly and/or the inspection tip. The FBP analog probe is equipped with a 4-pin circular Hirose™ connector with notch-keys which allows for a secure and firm latch-lock connection to the display device.



FOCUS CONTROL

The **FOCUS CONTROL** on the probe allows the user to adjust focus manually of the live fiber end face image on the display.

MAGNIFICATION CONTROL

The **MAGNIFICATION CONTROL** *(available only on dual-magnification probes)* allows the user to switch between LOW and HIGH magnifications of the fiber end face image.

SPECIFICATIONS

Dimensions	140mm x 46mm x 43mm (5.5" x 1.8" x 1.7")
Weight	180g (6.3 oz)
Optical Magnification	200X, 400X, 200/400X
Focus Control	Adjustable, in-probe
Cord Length	240cm (94")
Connector	4-pin Hirose™ male
Camera Type	1/3" CMOS Sensor
Video Output	NTSC or PAL
Light Source	Blue LED, 100,000+ hour life
Lighting Technique	Coaxial
Power Source	from the display device or USB module

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FBPT INSPECTION TIPS & ADAPTERS

4

INTRODUCTION

JDSU's comprehensive selection of over 250 precision, stainless-steel fiber inspection tips and adapters will inspect every connector and application. Our unique optics architecture and design provide true versatility and adaptability, and designed and engineered for consistent and accurate inspection. These connector-specific and universal inspection tips are interchangeable, which allow the probe to interface with different types of fiber connectors.



BARREL ASSEMBLIES

The ***BARREL ASSEMBLY*** houses the objective lens and works in conjunction with a number of tips.

NOTE: *Certain tips are equipped with integrated optics and do not require a barrel assembly (e.g., Long Reach Tips [FBPT-LC-L], Angled Tips [FBPT-SC-A6]).*



FBPP-BAP1



FBPP-BAP2



FBPP-BAP3

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FBPT-SC *(BULKHEAD)*

STANDARD TIPS (BULKHEAD & PATCH CORD)

Standard bulkhead tips allow the user to inspect the fiber end-face on the "female" side of the bulkhead *(e.g., inside hardware devices or on the back side of patch panels)*.



FBPT-U25M *(PATCH CORD)*

Standard patch cord tips allow inspection of "male" ends of a fiber connection *(e.g., patch cords, pigtails, etc.)*. "Universal" tips include the **FBPT-U25M**, compatible with 2.5mm ferrules *(e.g., FC, SC, ST)* and the **FBPT-U12M**, used to inspect 1.25mm ferrules *(e.g., LC, MU)*.



FBPT-LC-L

LONG REACH TIPS

Long reach tips have a 1/2" longer reach than standard tips, and allow the user to inspect the fiber end-faces in tight, hard-to-reach spaces.



FBPT-SC-APC

APC TIPS

APC tips are designed with an angle that complements the end face of an APC polish fiber connector. This allows the entire fiber image to stay in focus during inspection.



FBPT-SC-A6

ANGLED TIPS

Angled tips, identified by "A6," are angled 60° to allow easy maneuvering and inspection of hard-to-reach locations such as transceivers on a printed circuit board (PCB) or bulkheads located in tight spaces.



FBPT-MTPA

RIBBONDRIVE™ TIPS

JDSU's patented RibbonDrive™ tips are specialty tips that allow inspection of high-density, multifiber array connectors that are mounted within a bulkhead adapter. Each tip mates securely with connectors using a precision-keyed mating adapter interface. The patented "panning knob" allows the user to view each fiber individually in the linear array.



FBPT-A801-2-001-R

ALIGNMENT GUIDES

Alignment guides enable the inspection of various military & aerospace connectors that use a plug & receptacle design. In addition to providing an alignment channel for sockets, these alignment guides work in conjunction with a barrel assembly to prevent the pins from breaking.

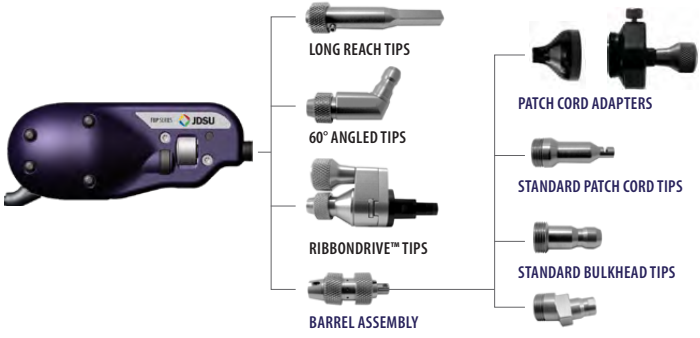


FMA ADAPTERS

FMA Adapters provide optimized inspection for "male" connector ends and are ideal for inspecting patch cords with multi-fiber ribbon and APC polish connectors. FMA adapters can be utilized by a probe microscope with a universal flare adapter **(FBPT-UFMA).**

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FBPT TIP INSTALLATION GUIDE



JDSU offers a comprehensive selection of over 250 tips and adapters that will to inspect every connector and application.

FBPT STANDARD INSPECTION TIPS *(common tips shown)*

CONNECTOR TYPE	INSPECTION TIP	APPLICATION	DESCRIPTION
SC/UPC 	FBPT-SC 		Inspect SC/UPC connectors through a bulkhead.
	FBPT-U25M 		Inspect 2.5mm UPC patch cord connectors.
SC/APC 	FBPT-SC-APC 		Inspect SC/APC connectors through a bulkhead.
	FBPT-U25MA 		Inspect 2.5mm APC patch cord connectors.
LC/UPC 	FBPT-LC 		Inspect LC/UPC connectors through a bulkhead.
	FBPT-U12M 		Inspect 1.25mm UPC patch cord connectors.
	FBPT-LC-L 		Inspect LC/UPC connectors through a bulkhead with 1/2" longer reach.
LC/APC 	FBPT-LC-APC 		Inspect LC/APC connectors through a bulkhead.
	FBPT-U12MA-SF 		Inspect 1.25mm APC patch cord connectors.

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FBPT STANDARD INSPECTION TIPS

CONNECTOR TYPE	INSPECTION TIP	APPLICATION	DESCRIPTION
ST/ UPC 	FBPT-ST 		Inspect **ST/UPC connectors through a bulkhead.**
	FBPT-ST-A6 		Inspect **ST/UPC connectors through a bulkhead at a 60° angle.**
FC/ UPC 	FBPT-FC 		Inspect **FC/UPC connectors through a bulkhead.**
FC/ APC 	FBPT-FC-APC 		Inspect **FC/APC connectors through a bulkhead.**
E2000/ APC 	FBPT-E2000 		Inspect **E2000/APC connectors through a bulkhead.**

FBPT MULTI-FIBER RIBBONDRIVE™ INSPECTION TIPS

CONNECTOR TYPE	INSPECTION TIP	APPLICATION	DESCRIPTION
MTP®/UPC 	FBPT-MTP 		Inspect **MTP®/UPC connectors through a bulkhead.**
MTP®/APC 	FBPT-MTPA-L 		Inspect **MTP®/APC connectors through a bulkhead (long reach).**
MTP® Patch Cords 	FMA-MTPA & FBPT-UFMA 		Inspect **MTP®/UPC or APC patch cords** *(MTP®/APC inspection shown).*
	FCLT-MTP-MA 		Inspect **MTP®/UPC or APC patch cords** *(MTP®/APC inspection shown).*

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HD3-P DISPLAY

5

INTRODUCTION

The HD3-P display further expands the value of the popular HD3 series by integrating a **PATCH CORD MICROSCOPE (PCM)** into the compact design. The result is a significant increase in workflow efficiency and decrease in total inspection time. By combining the power of two microscopes into one system, the HD3-P enables you to inspect both the "female" (bulkhead) and "male" (patch cord) sides of a fiber interconnect at the same time.

The HD3 series display is well known for its high-quality image resolution and compact, portable design. It features a 1.8" TFT LCD in a durable, ruggedized enclosure, and is powered by a rechargeable NiMH battery with a power conserving GripSwitch mode that extends operating life by a grip-release activation.



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IMPROVED WORKFLOW

With the HD3-P two-microscope system, inspecting the bulkhead with the probe and the patch cord with the integrated patch cord microscope at the same time can be achieved with a push of a button.

1 **INSPECT** PATCH CORD



2 **PRESS A/B BUTTON** ACTIVATE PROBE



3 **INSPECT** BULKHEAD



4 **CONNECT**

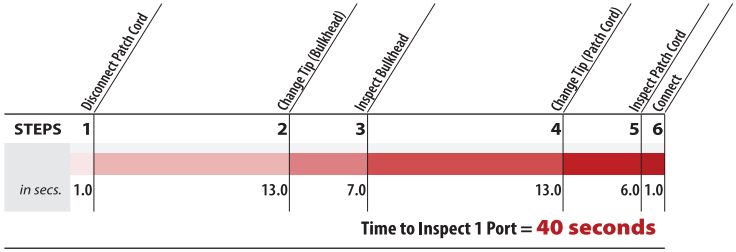


BENEFITS OF 2 MICROSCOPE SYSTEM

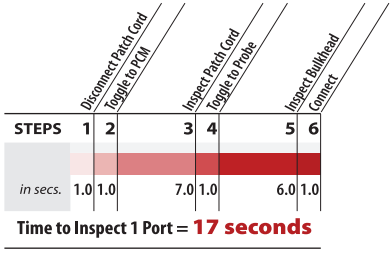
- Reduce inspection time by more than 50%
- Inspect the bulkhead with the probe and the patch cord with the display
- No more changing, mishandling and misplacing inspection tips for the probe
- Inspect 1 port/channel at a time and prevent mis-routing
- Ensure patch cords stay clean by "parking" it in the patch cord microscope before connecting

INSPECTION TIME TRIAL (AVERAGE)

WITH TRADITIONAL DISPLAY



WITH HD3-P DISPLAY



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HD3-P FEATURES

- **2 microscopes in 1 system**
  (inspect both bulkhead & patch cord at the same time)
- 1.8" TFT LCD for clear, crisp, detailed images of fiber end faces
- Ergonomic, small form-factor design for portability
- Integrated 200X or 400X magnification patch cord microscope in display
- 3-hour run time on continuous-ON mode, dramatically longer run time when utilizing the GripSwitch™ mode
- Low battery warning LED
  (when lit, remaining battery life will equal approximately 30 minutes)
- AC adapter (power supply 100–240VAC/12VDC) for alternate power source and for charging NiMH battery

CONTROLS



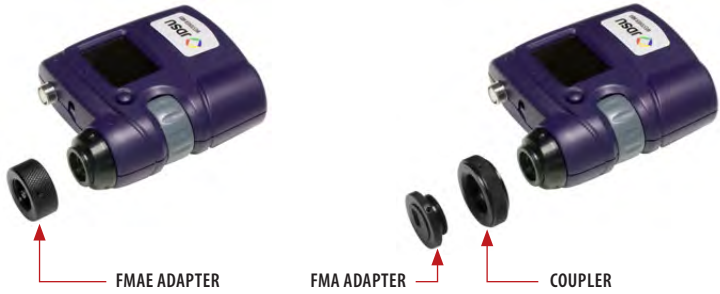
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SPECIFICATIONS

Dimensions	130mm x 98mm x 40mm (5.1" x 3.9" x 1.6")
Weight	360g (12.7oz) with probe
Video Display	45.7mm (1.8") TFT LCD
Power Modes	• **ON** (continuous ON) • **GRIPSWITCH™** (activates power saving mode) • **OFF/CHARGE** (power off / charge battery)
Connectors	4-pin Hirose™ for FBP Probes or hardwired FBP or FBE probe
Power Source	Built-in rechargeable NiMH (nickel metal hydride), 800mAH battery or AC adapter (100-200VAC/12VDC)
Run Time	• ~3 hours continuous ON • Extended run time with use of GripSwitch™
Horizontal FOV (200X Probe)	550µm
Horizontal FOV (400X Probe)	350µm
Horizontal FOV (200X PCM)	550µm
Horizontal FOV (400X PCM)	350µm
Warranty	1 year

PATCH CORD ADAPTERS FOR PCM

The integrated patch cord microscope is designed to accept JDSU's **FMAE adapters** and configurable to accept **FMA adapters** with the addition of a **coupler.**



FMAE ADAPTERS



FMAE-U25
Inspect Universal 2.5mm UPC Connectors

FMAE-SCA
Inspect SC/APC Connectors

FMAE-U25
Inspect Universal 1.25mm UPC Connectors

JDSU offers a diverse and comprehensive selection of FMAE and FMA adapters. Ask your sales representative or visit our web site for a complete list.

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CHARGING THE BATTERY

WARNING: *Use ONLY the AC adapter/charger provided to power the display and charge the battery.*

IMPORTANT: *Charge the battery for ~4 hours before using the battery power for the first time.*





1. Switch the power mode switch to the OFF/CHARGE position.
2. Connect the AC adapter/charger to the display and plug into wall socket.
3. The LED on the AC adapter/charger will illuminate **RED WHEN CHARGING** and **GREEN WHEN COMPLETE.**

POWER MODES



ON MODE

Continuous ON mode

When the battery is fully charged, the display will stay on for approximately 3 continuous hours.



GRIPSWITCH™ MODE

Battery conserving mode

Press and release the GripSwitch™ feature on both sides of the display to turn the display ON and OFF, respectively.



OFF/CHARGE MODE

OFF or battery CHARGE mode

Switch to OFF/CHARGE mode to turn the display OFF or to recharge the internal battery using the AC adapter (included).

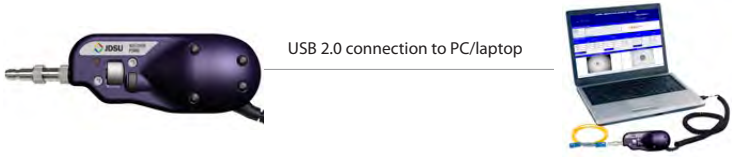
NOTE: *The power mode switch must be in the OFF/CHARGE position for the battery to charge.*

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APPENDIX A: JDSU VIDEO PROBE INSPECTION SYSTEMS

DIGITAL VIDEO PROBE

JDSU's **WESTOVER P5000** digital probe microscope connects directly to PC/laptops via a USB 2.0 connection, and operates with **FIBERCHEK2™**, an advanced software that determines the acceptability of optical fiber end faces through advanced automated inspection and analysis.



ANALOG VIDEO PROBE

JDSU's **WESTOVER FBP** analog probe microscopes connect directly to **WESTOVER HD DISPLAYS** *(HD1, HD2 or HD3)* or to a PC/laptop or JDSU test platform *(T-BERD/MTS or FST)* via a **USB DIGITAL CONVERTER**.



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APPENDIX B: JDSU CLEANBLAST® SYSTEMS

JDSU's **CLEANBLAST®** system is an advanced, non-contact fiber cleaning instrument that provides a fast, effective, repeatable and cost-effective ***(less cost per clean than conventional cleaning methods at under $0.01 per clean)*** solution for removing loose dirt and debris from optical connectors. It utilizes a highly filtered stream of pressurized gas to create a high flow rate jet consisting of specially formulated cleaning solvent that blasts across the surface of the fiber, with nearly 100% effectiveness. Precision cleaning tips and adapters are also available for multiple configurations and connector types, allowing users to optimize their cleaning efficiency and performance. The CleanBlast® system also includes an input for an optional probe microscope, as well as a video output that can be connected to an external monitor or to a mounted LCD.

PORTABLE CLEANBLAST®



BENCH-TOP CLEANBLAST®



FEATURES & BENEFITS

- Provides rapid, controlled, and repeatable cleaning & removal of contamination from fiber end faces
- Utilizes a precise **non-contact "air-solvent-air"** combination to blast, remove and dissolve contamination
- Faster, more effective, and less cost per clean than other conventional cleaning methods
- Precision cleaning tips & adapters available to clean various types of "male" and "female" fiber connectors, including SC, FC, LC, ST, E2000, MPO, MPX, MT, MTP®, transceivers, etc.
- Inputs for optional video probe microscope and LCD display for fiber inspection
- Multiple system configurations for different applications

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