The Sumitomo Type-37 Micro-Core Fusion Splicer

GUIDE TO OPERATION

SUMITOMO ELECTRIC
L I G H T W A V E

TYPE-37

Micro-Core

FUSION SPLICER

OPERATION MANUAL

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1.0   General

1.0.1   This manual contains all the necessary information required to unpack, setup and use the Type-37 Micro-Core Fusion Splicer for creating low-loss optical fiber splices in the field. The Type-37 can create low-loss optical fiber splices for single optical fibers with cladding diameters of 80 to 150 μm.

➲ *Note: Before using the fusion splicer for the first time, read this manual in it's entirety and perform a few trial splices under controlled conditions.*

1.0.2   The Type-37 is designed to splice a variety of optical fiber types including:

> ✓ Single mode (SMF)
> ✓ Multi-mode (MMF)
> ✓ Dispersion Shifted (DSF)
> ✓ Non-Zero Dispersion Shifted (NZ-DSF)
> ✓ Cut-off Shifted (CSF)
> ✓ Er-doped (ER)

The acceptable cleave length is 9 to 16 mm. Identical fiber splices require approximately 18 seconds, and average splice losses are typically 0.02 dB or less with single mode fibers.

1.0.3   The splicer automatically aligns a pair of optical fibers in both the X and Y (horizontal and vertical) planes and then fuses them together with heat from an electric arc to form a low-loss splice. HDCM (High-resolution Direct Core Monitoring) image processing software in the splicer is used to perform core alignment and splice loss estimation. A proof test can then be performed to verify the strength and physical integrity of the fiber junction. Finally, a splice protection sleeve is applied over the bare glass and cured in the built-in heater.

Figure 1. Type-37 Fusion Splicer

1.1   Unpacking the Fusion Splicer

Please check to make sure that the following items have been included:

Standard Equipment

Description	Quantity	Part Number (US Only)
Fusion Splicer Main Body	1pc	Type-37
Transport Case	1pc	SC-M1
AC Power Cord	1pc	PC-AC2
Spare Electrodes	1 pair	ER-8
Splice Cooling Tray	1pc	CT-37
V-Groove Cleaning Brush	1pc	VGB-003-CR
Power Supply Module	1pc	PS-M1
Operation Manual	1pc	N/A

Optional Accessories

Description	U.S. Part No.	SEI Part No.
Precision fiber cleaver	FCP-22L	FCP-22L
FCP-22L & FCP-25 Replacement Blade	FCP-BL	FCP-BL
Jacket Remover	JR-22	JR-22
Replacement Blades for JR-22	JR-22BL	JR-22BL
Battery Module	BU-M1	BU-65
Aerial splice platform	APF-02	
Fiber Protection Sleeves, 60mm	FPS-1	FPS-1
Solvent dispensing Bottle	HL-2	HL-2
External Splice Protection Heater	HP-2A	HP-2A
Halogen work light	SPL-1	SPL-1

1.2   Specifications

- *Optical Fiber Requirements*

Material	Silica Glass
Profile Type	SMF, MMF, DSF, NZDSF, CSF, Er-doped Fiber
Fiber Diameter	80 - 150 μm
Fiber Coating Diameter	250 - 900 μm
Fiber Count	Single Fiber
Cleave Length	9 - 16 mm

- *Size and Weight*

Size	150W X 150D X 176H mm, (5.9W X 5.9D X 6.9H inches)
Weight	4 Kg (8.8lb)
Display	Adjustable 5.6" Color LCD monitor

- *Power Source*

AC	100 to 240V 50/60 Hz
DC	12V
Battery Type	NiMH (40+ splices including heat cycles)

- *Environmental Conditions*

Operation Temperature	0° to 40°C (32° to 104°F)
Operation Humidity	95% RH Non-Condensing
Storage Temperature	-40° to 60°C (-40° to 140°F)
Altitude	0-3660 meters (12,000ft.)

- *Standard Performance*

Typical Splice Loss (Identical Fibers)	SMF: 0.02 dB MMF: 0.01 dB DSF: 0.05 dB
Splice Cycle Time	18 Seconds
Heater Cycle Time	75 Seconds
Splice Data Storage	750 Splices

- *External Terminals*

Data Communications	9 Pin D-Sub Connector RS-232C
12 VDC Output	Accessories
Video Output	RCA Jack – Video Signal

- *Programs*

| Fusion Condition Settings | 48 Maximum (10 Fiber Categories with program selections) |
| Fusion Parameters | 7 Adjustable Parameters |

1.3 Structure

1) Main Body
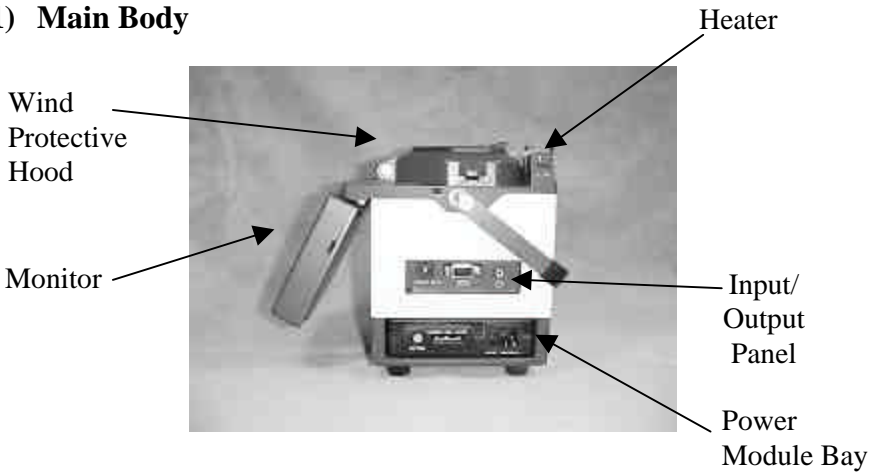
Figure 2. Side View
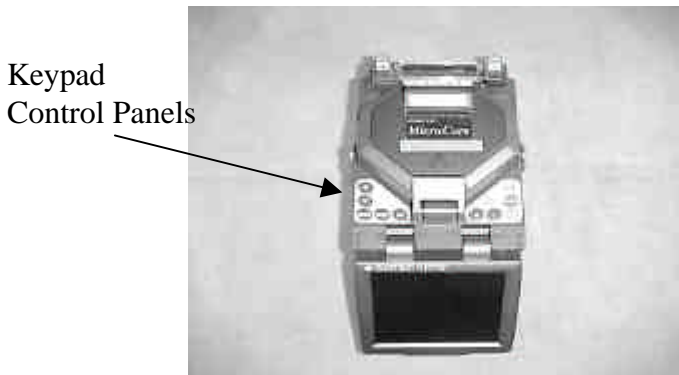
Figure 3. Top View

2) AC Power Cord [PC-AC2]

Ground Terminal
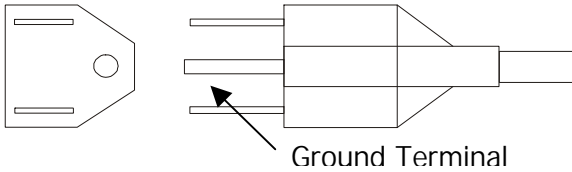
3) Electrode (ER-8)
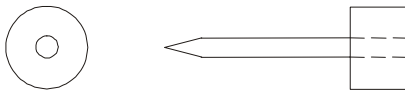
4) Input/Output Panel

The input/output panel is located on the lower right hand side of
the fusion splicer's main body.
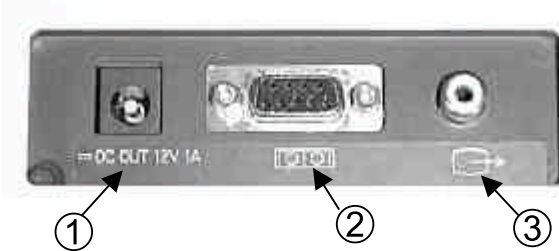
Figure 4. Input/Output Panel

No.	Item	Description
①	12V DC Output Terminal	Used to supply 12V DC power to accessories.
②	RS-232C Terminal	Can be used to download stored splice loss data, or run machine diagnostics when connected to a personal computer.
③	Video Output Terminal	An NTSC video signal outputs from this terminal. This can be used for external monitoring.

1.4 Operating Recommendations

1.4.1   Exercise care when packing, unpacking, and transporting the splicer unit. Severe mechanical shock or excessive vibration may cause alignment problems.

1.4.2   If the splicer is to be powered by battery pack, ensure that the battery module is fully charged according to the procedures contained in Section 12.0, *Using Power Supply Module*. A fully charged battery can power the splicer for approximately 40 splices including heating cycles.

Note: Remove the battery module form the module bay when storing the splicer.

1.4.3   To ensure low-loss and quality splices, proper fiber preparation is essential.

1.4.4   The fusion splicer is a precision instrument. For best results, keep the unit clean and handle it with care.

1.4.5   Check for condensation before operating. If necessary, dry the splicer with a hair dryer before operation.

1.4.6   When cleaving fibers, do not allow the waste fibers to build up around the fusion splicer or work area. Account for each loose fiber, pick it up with cello-tape, wrap it, and dispose of it properly.

1.4.7   When transporting the fusion splicer, use its padded transport case to protect it from dust, dirt, moisture, shock, and impact.

➲ *Note: Before starting each splicing session, perform an ARC TEST to ensure the proper arc settings and optimum splice quality.*

1.4.8   The ARC TEST will correct for fiber differences, environmental changes, and electrode deterioration.

2.0   Safety Precautions

2.0.1   Handle glass fibers with care. Fibers can easily puncture the skin and break off. Wear safety glasses at all times for protection from glass fibers. Dispose of the fibers properly.

2.0.2   Handle cleaners such as pure alcohol with extreme caution. Wear safety glasses when using alcohol to clean fibers. If alcohol splashes in the eyes, flush with cold water and seek medical attention immediately.

> *WARNING: Do not use alcohol near heat, flames, or electric arcs. This includes the arc in the fusion splicer.*

2.0.3   Do not use the fusion splicer in the presence of explosive gases. Gases can accumulate in poorly ventilated manholes and vaults. Always follow the recommended testing, purging, and ventilation procedures.

2.0.4   When using AC power use a grounded three-prong power source to protect against accidental electrical shock.

2.0.5   Unplug the fusion splicer before attempting any electrical maintenance. Avoid contact with the high-voltage electrodes used to produce the arc.

2.0.6   Do not lubricate any part of the splicer. Oil based residues on the V-grooves, electrodes or fiber chucks will limit the effectiveness of the equipment.

2.0.7   Do not use compressed gas (i.e., canned air) to clean the splicer, as it will contaminate the V-grooves, electrodes, and optics. Poor splice performance may result.

2.0.8   Read any Material Safety Data Sheets (MSDS) for materials used in this procedure.

3.0   Reference Documents

The fusion splicer requires additional tools used to prepare fiber for splicing. Please refer to manuals as provided for procedures regarding related fusion splicing accessories.

Document Number	Description
ETK9926004	JR-22 Jacket Remover
OME0126031-01	FC-6M Fiber Cleaver
MSDS	As supplied

4.0   Parts, Repairs, and Ordering Information

4.1   Standard Equipment

Description	Quantity	Part Number (US Only)
Fusion Splicer Main Body	1pc	Type-37
Transport Case	1pc	SC-M1
AC Power Cord	1pc	PC-AC2
Spare Electrodes	1 pair	ER-8
Splice Cooling Tray	1pc	CT-37
V-Groove Cleaning Brush	1pc	VGB-003-CR
Power Supply Module	1pc	PS-M1
Operation Manual	1pc	N/A

4.2   Optional Accessories

Description	U.S. Part No.	SEI Part No.
Precision fiber cleaver	FC-6M	FC-6M
FC-6M Replacement Blade	FCP-BL	
Jacket Remover	JR-22	JR-22
Replacement Blades for JR-22	JR-22BL	JR-22BL
Battery Module	BU-M1	BU-65
Aerial splice platform	APF-02	
Fiber Protection Sleeves, 60mm	FPS-1	FPS-1
Solvent dispensing Bottle	HL-2	HL-2
External Splice Protection Heater	HP-2A	HP-2A
Halogen work light	SPL-1	SPL-1

4.3   Consumables

Part Number	Description (US Only)
FPS-1	Fiber protection sleeves (single fiber)
ER-8	Replacement Electrodes
GW-33804	Gauze wipes
CTSW-1	Cotton swabs
N/A	Isopropyl alcohol

4.4   Support Information *(US Only)*

To place an order, please call our Customer Service at 1-800-358-7378 or (919) 541-8100.

For engineering or other product information contact Fusion Splicing Applications Department at 1-800-358-7378 or (919) 541-8100.

4.5   Maintenance and Repair Assistance *(US Only)*

If assistance is required for this or any other fusion splicing product:

Call Service Center at **1-888-SPLICER**
If any maintenance requires returning the product:

- Pack the unit in the original transport case and ship *prepaid* to :
     Sumitomo Electric Lightwave Corp.
     Fusion Splicing Products
     78 Alexander Drive/ Box 13445
     Research Triangle Park, NC 27709
- Supply in the case the following information:
     Contact name and Telephone number
     Ship To / Bill To information
     Brief description of problems.

➲ *Note: The equipment has a high value. Investigate the carrier's insurance surcharge before agreeing to insure the shipment.*

5.0   Packing and Storage Instructions

The Type-37 fusion splicer is a precision instrument. Its rugged shipping/storage case is custom designed to protect it from impact, dust, dirt, and moisture. Always store, transport, and ship the machine in its case. Perform the following procedure to pack the splicer unit for shipment.

1. Before packing the splicing machine, clean all components which have been it contact with bare fibers (clamps, and v-grooves). *(Refer to Section 14.0 Maintenance)*

2. Remove and store any attachments, such as the cooling tray, from the splicer. Clean and pack all accessories and consumables into the splicer storage case.

3. Reposition the LCD screen so that it is flat against the main body of the unit.

4. Unplug any external connectors from the input/output panel. Neatly coil up the power cords and store them in the padded carrying case.

5. Lift the fusion splicer by its handle and lower it into its padded transport case.

6. Close the storage case and latch it.

WARNING: Discard the liquid solvent properly before packing the dispenser in the case.

6.0   Preparation for Splicing

6.1   Splicing Accessories

Before splicing collect all of the necessary equipment:

- Cleaver
- Jacket Remover
- Fiber cleaning supplies including 99% alcohol and lint-free gauze wipes.
- Fiber Protection Sleeves

6.2   Adjusting the LCD Monitor

6.2.1   The Type-37 LCD monitor can be raised/lowered for optimum viewing angles. There are 2 possible locations:

- Operating Position
- Storage Position

6.2.2   Raising the monitor as shown in Figure 5 allows you to alternate between operation and storage positions.

➲ *Note: The LCD monitor is designed to rotate 90 degrees from the storage position. Do not exceed this limit.*
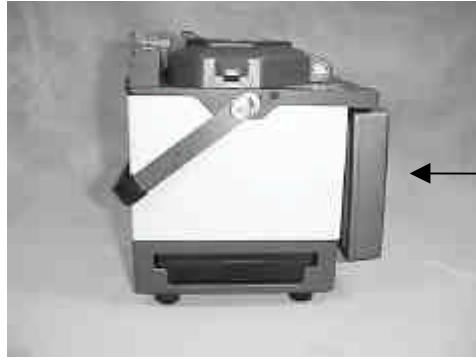
Storage
Position

Optimal
Viewing
Position

Maximum
Rotation

Figure 5. Positioning LCD Monitor

6.3 AC Operation
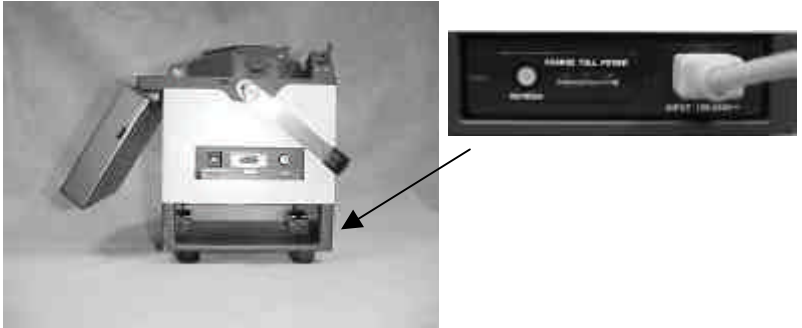
Figure 6. AC Operation

1. Insert the AC Power Supply Module into the module bay and connect the power cord to AC input terminal. Next, insert the other end into an AC outlet.

2. On the right, top panel keypad, press the "ON" button. When initialization is complete the splicer will display the SPLICE MODE screen.

6.4 Battery Operation

The Type-37 will operate on a fully charged battery module for approximately 40 splices including heat shrink protection. The battery level indicator is located in the lower left hand corner of the LCD monitor as shown in Figure 7. To help extend battery operation time refer to Section 13.6.7, *Power Management Functions*.

➲ *Note: When storing the splicer remove the battery.*

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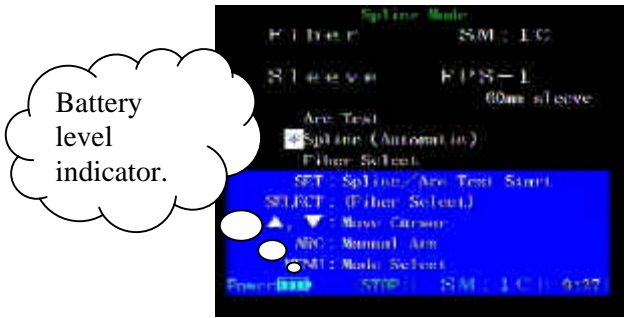
Figure 7. Battery Level Indicator

6.4.1 Installation

1. Place the battery module into the module bay on the side of the splicer and slide forward until the battery locks into place.

2. On the right, top panel keypad, press the "ON" button. When initialization is complete the splicer will display the Splice Mode screen.

6.4.2 Removal
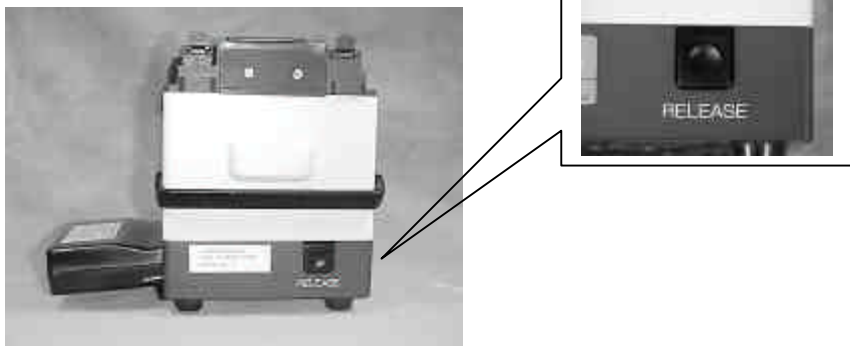
Figure 8a. Battery Removal

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1. Remove the battery module by pressing the RELEASE button located on the rear of the splicer.

2. While pressing the RELEASE button slide the battery module out of the module bay until it is free from the splicer.

6.4.3   Battery Charging

Figure 8b. Battery Installation

1. Plug the Power Supply Module into an AC Outlet. Then, using the battery charger cord plug one end in to the CHARGE OUTPUT terminal and the other end into the CHARGE INPUT terminal. Press the "REFRESH" button to begin the charging process.

2. Charging will take approximately 2.5 to 3 hours, and an LED will indicate when charging is complete. Please refer to Section 12.0, *Using Power Supply Module*, for more detailed information on the charging process.

7.0 Software Interface

7.1   Using the Keypad

The console keys shown below are located on top of the splicer unit. Keypad control keys are used to select highlighted menu options displayed in menus on the monitor screen and perform splicing operations.

Figure 9. Key Pad

Key	Description
▲	Moves the "✳" cursor up, in menu screens to select items. When editing highlighted blocks this key is used to scroll through each available item.
▼	Moves the "✳" cursor down, in menu screens to select items. When editing highlighted blocks this key is used to scroll through each available item.
MENU	Used to access the MODE SELECT screen. When entered into a MODE this key can be used to back space one step. *(Ex. when entering numbers)*
ARC	Used for manual re-arcing of a completed splice. Also advances the screen to the next page, on multiple page screens.
SELECT	Chooses the selected function and advances to the next screen. Also used to highlight the action block of a chosen item.
O	Turns splicer off.
I	Turns splicer on.
SET	Begins splicing operation and ARC TEST. Also used to edit splice conditions from the Fiber Select Menu.
RESET	Returns the splicer to the initial menu screen. Used to abort a splicing operation.
HEAT	Starts the protection sleeve heater. Orange LED illuminates during the heat cycle.

➲ *Note: The "SLEEP" LED located at the top of the right keypad will illuminate green when power save mode is active. The splicer is re-activated by pressing any key.*

7.2   Editing Action Blocks

7.2.1   Action blocks are used to edit various functions and numeric inputs throughout the splicer menus. They are indicated on screen by a double bracket as show in Figure 10. For example, to change the available functions under HEATER CONDITION, perform the following procedure:

1. Press "SELECT" to highlight the action block.

2. Use the arrow keys to scroll through each function.

3. Press "SELECT" to accept a change or press "MENU" to return to previous step.
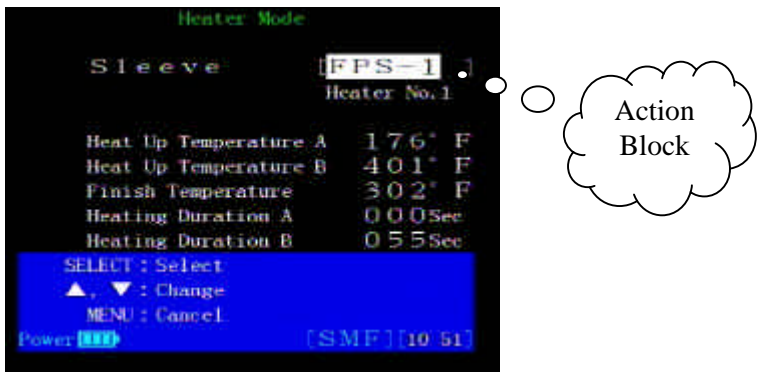
Figure 10. Editing Action Blocks

➲ *Note: When editing action blocks or numeric values, press "RESET" at any time to cancel and return to the splice mode menu.*

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7.3   Numerical Inputs

7.3.1   Entering numeric values is similar to editing a standard action block. For example, to edit a parameter value, perform the following procedure:

1. As shown in Figure 11, the highlighted block indicates the active digit.

2. Use the arrow keys to increase/decrease the digit to desired value.

3. Press "SELECT" to accept change and advance to the next digit. Repeat Step 2 and 3 until last digit is entered.

4. When the final digit is chosen, pressing "SELECT" will advance the screen to the parameter entered.
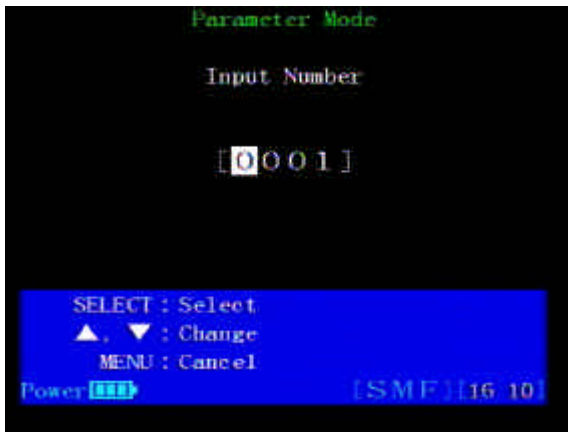
Figure 11. Editing Numeric Values

☜ *Tip: If a digit was entered incorrectly pressing the "MENU" key will return to the previous digit or step.*

8.0   Operating Procedures

8.1   Splicing Steps Summary

8.1.1   This procedure assumes the cable has already been prepared and the fiber coatings have been cleaned. The following is a summary of the steps required to make a splice with the fusion splicer:

- Turn the splicer on
- Check/select the splicing and heater program that matches the fiber being spliced
- Perform an Arc Test
- Put a reinforcing sleeve over one of the fibers
- Remove the fiber coating
- Clean the bare glass
- Cleave the bare glass to proper cleave length
- Insert the fiber into the splicer
- Repeat the preparation process for the second fiber
- Close lid and start the automatic splice process
- Release splice from chucks
- Slide the reinforcing sleeve over the splice
- Center splice and sleeve in heater, then reinforce the splice
- Remove the protected splice and store it

8.2   Splice Mode Menu Functions

8.2.1   The SPLICE MODE menu screen is the initial screen displayed when the splicer is first turned on, or when the "RESET" key is pressed. This menu screen allows selection between multiple fusion programs for various fiber types. Up to 48 fusion programs optimized for different splicing scenarios can be stored and recalled. Each program specifies five arc parameters: arc power, fusion duration, pre-fusion time, arc gap, and overlap. The programs are retained when the splicer is turned off.

- **ARC TEST**: Compensates for environmental changes by melting and measuring the fiber end faces to ensure proper arc power.

- **SPLICE (Automatic)**: Starts automatic fusion splicing, and loss estimation.

- **FIBER SELECT**: Sets up the fusion program for 1 of 48 possible fusion programs. Splice conditions can also be edited within this menu.

8.3   Selecting a Fiber Type

8.3.1   The current fiber splice condition should match the type of fiber to be spliced. The most recently used fusion program is displayed when the splicer is turned on or when "RESET". To select or view a different fusion program follow these steps:

1. Using the arrow keys move the cursor to "FIBER SELECT", and press "SELECT".

2. Use the "ARC" to access the page containing the desired fusion program.

3. Use the arrow keys to select the correct fusion program and press "SELECT".

Figure 12. Selecting a Fiber Type

Indicates name of program.
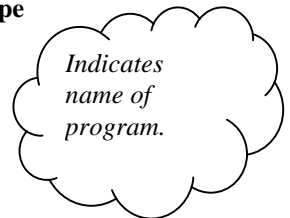
➲ *Note: Program names are user definable. Refer to Section 13.8 Editing Fusion Program Names for more information.*

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8.4   Installing a Reinforcing Sleeve

8.4.1   Slip the fiber protection sleeve (FPS-1) over one of the fibers to be spliced. Be sure to do this before stripping and cleaving the fibers.

2.4 In. (60mm)

Heatshrink Tube
EVA Plastic
Stainless Steel Rod
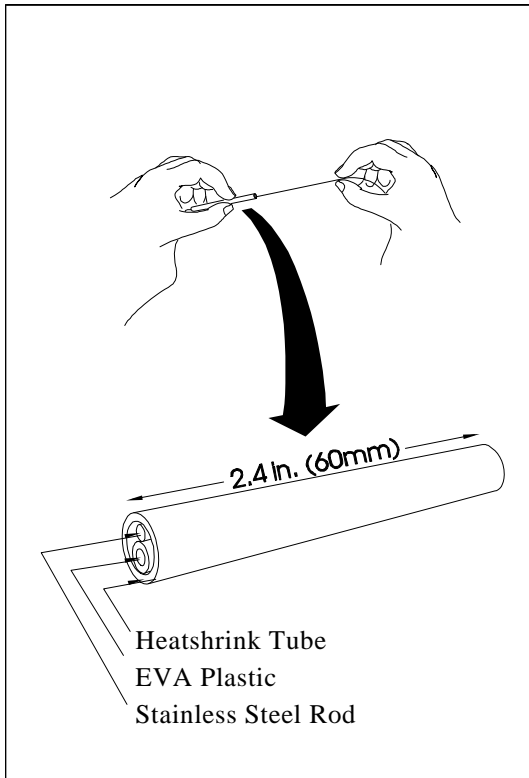
Figure 13. FPS-1 Fiber Protection Sleeve

8.5   Preparing the Fiber

8.5.1   Use a jacket remover to remove 40 mm (1 1/2") of the fiber coating in a single attempt.

8.5.2   Clean the bare fiber with a lint-free gauze pad moistened with pure alcohol, and wipe 1-2 times to remove any coating residue.

8.5.3   Use the cleaving tool to cleave the fiber. Acceptable cleave lengths are 9 - 16mm.

Note: Do not clean the fiber again after cleaving. To avoid damaging or contaminating the delicate fiber ends, insert each fiber in the splicer immediately after preparation

8.5.4   Account for all cleaved fiber fragments. Use a loop of cellophane tape to pick up fiber scraps and dispose of them properly.

WARNING : Glass-fiber fragments are extremely sharp and may puncture the skin.
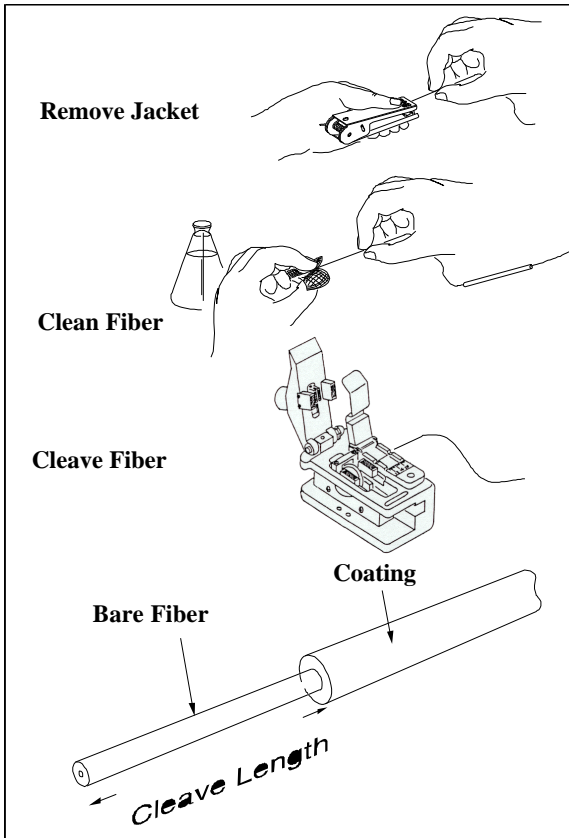
Figure 14. Preparation Process

8.6   Inserting Fibers in the Splicer

8.6.1   This section assumes that a fusion program is selected, and that a fiber has been prepared for insertion. The section describes a typical splicing operation; variations are possible.

8.6.2   Raise the splicer hood, located in the middle area on top of the unit.

8.6.3   To release the fiber clamps, pull the activators upward towards the rear of the unit. By lifting the clamp lever both the bare fiber clamp and coating fiber clamp raise simultaneously.

8.6.4   Referring to Figure 15, lower one fiber onto the v-groove so that the cleaved end overhangs the v-groove and protrudes into the arcing area.

Referring to Figure 16, the fiber end should be approximately half way between the electrodes and the edge of the v-groove.
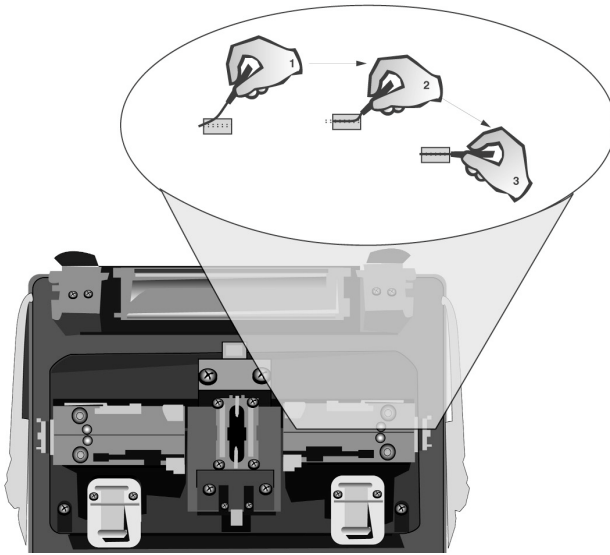
Figure 15. Inserting the Fibers into the V-Grooves

Note: Do not allow the fiber end face to touch anything or slide it horizontally in the bottom of the v-groove. This will damage or contaminate the fiber end faces resulting in poor quality splices.

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8.6.5   Push the clamp lever down to gently lower the fiber coating clamp. Continue to press the clamp down until it becomes locked. The fiber should be resting in the v-groove with the cleaved end about halfway between the v-groove's inner edge and the electrode tips. Now lower the bare fiber clamp to properly seat the bare fiber in the v-groove.
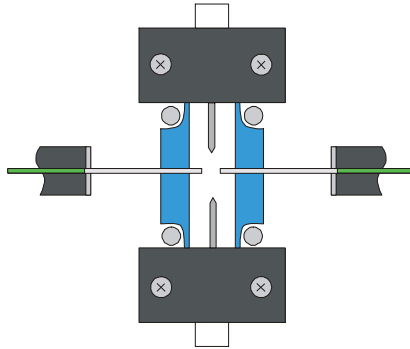
Figure 16. Positioning Fibers

8.6.6   Prepare the other fiber to be spliced and clamp it in the splicer.

8.6.7   Close the hood. Make sure the fibers are routed directly out of the side of the hood.

9.0 Arc Test Procedure

9.1 When to perform an ARC Test

9.1.1 The fusion splicer has a built-in Arc Test feature that should be used to ensure consistent high-quality splices. Situations that should prompt an arc test are:

- Changing fiber types
- Changing splice location
- Initial splicing set-up
- Extreme changes in temperatures or humidity
- Poor splice performance
- Worn or dirty electrodes
- After electrode replacement

9.1.2 Performing an arc test automatically adjusts the arc power level for the splicing program selected, and will center the fiber end faces relative to the arc heat zone. The adjusted arc conditions are retained when the splicer is turned off.

9.2 Performing an Arc Test

9.2.1 This test requires two pieces of scrap fiber of the same type as that being spliced. To perform an Arc Test, use the following procedure.

1. Remove the coatings, clean, cleave, and insert the fibers as for a normal splice. See *Section 8.5*, for instructions on preparing the fibers for splicing.

2. Select a fusion program to match the fiber type to be spliced. *Refer to Section 8.3*

3. From the SPLICE MODE menu screen, move the cursor to ARC TEST, and press "SET" to begin the test as shown in Figure 17.

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Figure 17. Starting an ARC Test

TOO STRONG   TOO WEAK   ARC OK

Figure 18. Performing an ARC Test

4. The splicer will automatically measure the amount of melt back as shown in Figure 18 to determine if the power is correct.

5. If arc power was indicated to be "TOO WEAK" or "TOO STRONG", the splicer will automatically self-adjust to the optimum level. Repeat the test until ARC OK is displayed.

6. When the message "ARC OK" appears, the splicer will automatically reset and is ready to begin splicing.

10.0   Starting the Automatic Splice

10.0.1   This process assumes the splicing mode has been set, a fiber protection sleeve has been installed and both fibers have been inserted in the splicer.

1. With the hood closed, and the splicer in the "SPLICE MODE" menu screen, move the cursor to "SPLICE" as shown in Figure 19.
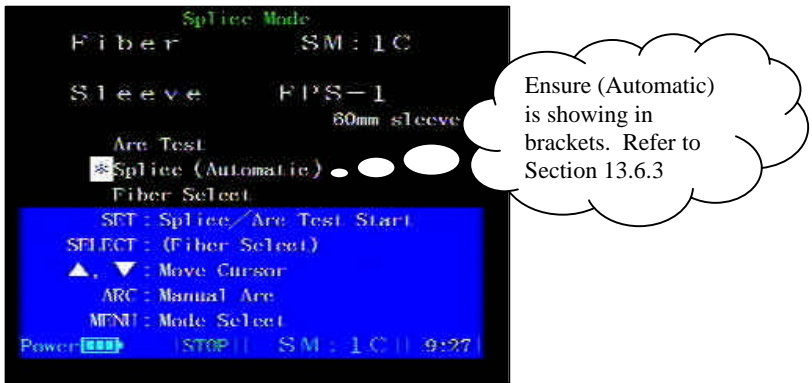
Figure 19. Starting the Automatic Splice

2. Press "SET" to begin the automatic splicing process.

10.0.2   During the automatic splice, the splicer will immediately move the fiber ends into place, and the magnified view will appear on the LCD screen.

10.0.3   The fusion splicer automatically inspects the fiber to ensure a good splice. It then automatically splices the fiber together and provides splice loss estimation.

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a)   b)   c)

Figure 20. Splicing Process

10.0.4   Following a completed splice, the splicer will display both the X and Y-views simultaneously. The view that is highlighted in white is the "active" view. This view can be actively re-focussed using the up and down arrow keys. To change the "active" view between X and Y, press the "SELECT" key.

10.0.5   Following splice loss estimation, complete splice/fiber inspection data and before and after splice images can also be viewed. To access these, press "MENU" to exit the Multi-field screen.

10.0.6   The next screen that will appear gives you the option to make and additional arc to the fiber or return to the Multi-field screen. To re-arc the fiber, depress the "ARC" key.

Note: Re-arcing the fiber may improve or worsen splice results.

Press the "ARC" key to re-arc the fiber.
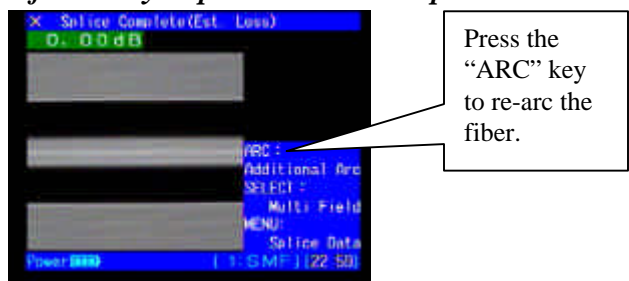
Figure 29. Making an Additional Arc

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10.0.7   To advance to the splice data, press the "MENU" key. From this screen it is possible to view before and after images of the fibers in both the X and Y-views. It is also possible to access fiber and splice data. Follow the on-screen instructions to take advantage of the options available here. For more information about splice data, reference *Section 13.3, Splice Data Storage Functions.*

Use the on-screen instructions to navigate through the options available here.

Figure 30. After Splice Options

Note: The splicer can be configured to perform a 200g tensile test on the splicing stage following a completed splice.

10.0.5   Upon completion of the splice, a tensile test can be performed to the splice ensuring its physical integrity by pressing the "SET" key.

10.1   Evaluating Splice Quality

10.1.1   Following a completed splice, visual inspection of quality can be performed in both views by using the "ARROW" keys.

10.1.2   For large loss estimations, bubbles, or bulging always redo the entire splice.

10.1.3   For gray and white lines about the splice point: sometimes repeating the ARC can improve the results, especially for cladding defects. Note do not re-arc a splice more than twice. Instead, perform the ARC TEST procedure, then try to re-splice it.

➲ *Note: The appearance of gray/white lines at the splice point is normal and acceptable when splicing dissimilar fiber types.*

11.0   Splice Protection

11.1   Positioning the Splice in the Heater

11.1.1   The integrated heater unit, as shown in Figure 21, is located at the rear top edge of the splicer unit. The right fiber clamp has a built in tensile mechanism that is used to maintain approximately 50 grams of tension on the splice while heating the protection sleeve.

Figure 21. Heater Unit

1. Open the heater clamps on both sides of the heater. One heater clamp is attached to the heater door and will it open with the clamp.

2. Open the splicer hood and the fiber clamps to release the spliced fiber.

3. Center the FPS-1 fiber protection sleeve over the spliced portion of the fiber.

Note: Take care to keep the spliced fiber straight. Do not flex it back and forth.

4. Make sure the fiber protection sleeve is centered over the spliced portion, maintain a slight tension on the fiber ends, lower the fiber onto the heater clamp arms, and push down. The tension of the fiber on the clamp arms should close the heater clamps. Refer to Figure 22.

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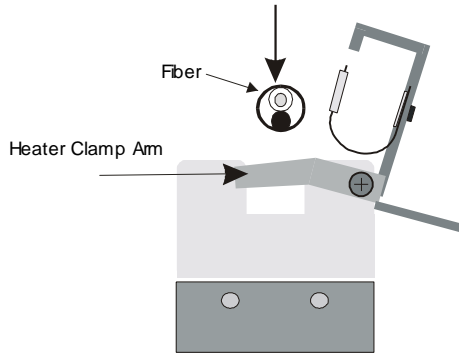
Figure 22. Closing the Heater Clamps

5. The right side clamp has a built-in spring mechanism used to keep the fiber taught inside the fiber protection sleeve during the shrinking process. Referring to Figure 23, open the left heater clamp and pull the fiber to the left to activate the tension spring and close.
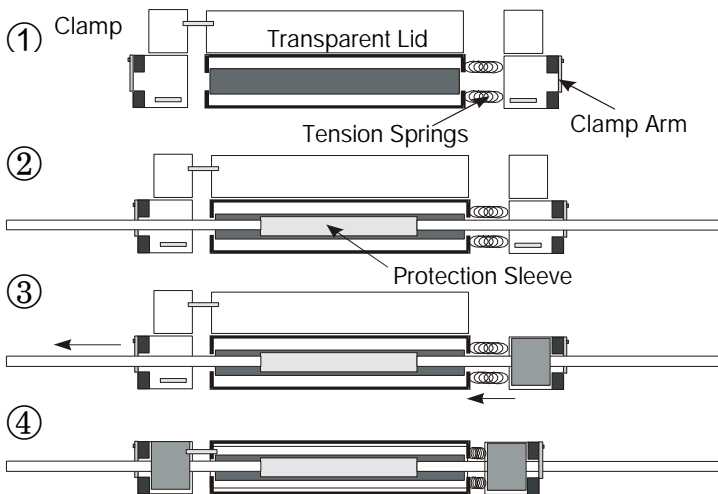
Figure 23. Applying Maintaining Tension

Note: Before starting the heating cycle, make sure the bare fiber portion is in the middle of the protective sleeve, and the sleeve is centered inside the heater.

11.2   Heating/Shrinking the Sleeve

1. Press "HEAT" on the keypad to begin the heating cycle, and shrink the reinforcing sleeve. The green LED on the "HEAT" key indicates that the heater is active. To cancel heating, press the "heat" key again.

2. When the heater starts, begin preparing the next splice.

    Note: The splicer and heater can be operated simultaneously.

3. After about 75 seconds, a single long beep will indicate the heat cycle is completed.

4. Open both clamps. Remove the reinforced splice while pulling gently on the fiber to keep it straight. Visually inspect the sleeve. (See Figure 24)

    Warning: Sleeve may be hot! Handle with care.
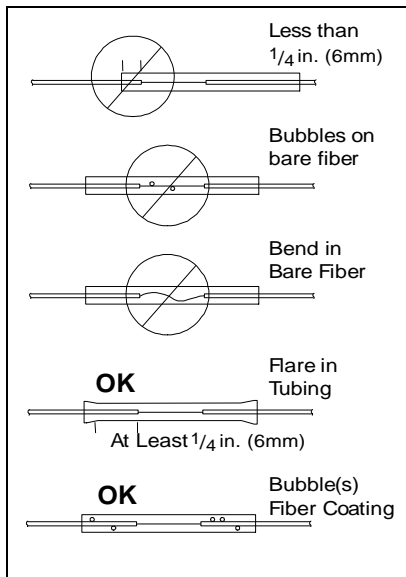
Figure 24. Reinforcing Sleeve Inspection.

12.0   Using the Power Supply Module

12.1   Description

BU-M1 (BU-65) battery modules are re-charged using the PS-M1 (PS-65) power supply module. The charger has 3 status LED's located on the front panel, that identify the stage of the charging process. Figure 25 describes the LED's and each various status condition.
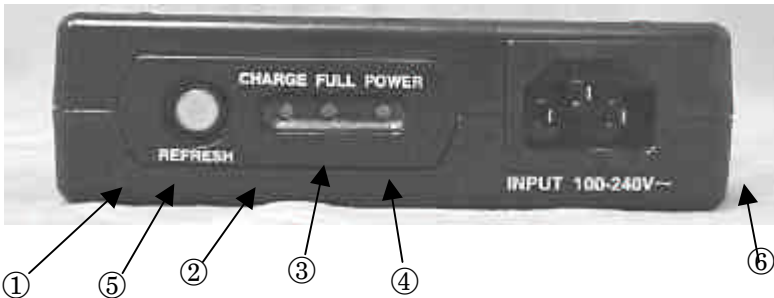
Figure 25. Battery Charger Status LED's

No.	Item	Description
①	Refresh	Used to drain any remaining battery power prior to beginning charging. When draining is complete charging automatically begins.
②	Charging (Status LED)	When lit, this LED indicates battery is being charged.
③	Full (Status LED)	When lit, this LED indicates battery is fully charged.
④	Power (Status LED)	When lit, this LED indicates power is on.
⑤	Refreshing (Status LED)	When lit, this LED indicates battery is being refreshed.
⑥	Charge Output	Connect battery to this terminal for charging.

➲ *Note: When the FULL or CHARGING LED's are flashing this indicates that using the quick charge procedure will not charge the battery effectively. Refresh battery prior to charging.*

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12.2   Battery Charging

To extend battery life it is recommended that batteries be completely drained before re-charging. Since this is not always possible, the built in "REFRESH" function will drain any remaining power in the battery prior to charging. Approximate time to charge a fully discharged BU-M1 (BU-65) battery module is 2.5 - 3 hours. To charge a battery perform the following procedure:

1. Referring to Figure 26, connect the charging cord between the "charge output" on the PS-M1 (PS-65) power supply module and the "charge input" on the BU-M1 (BU-65) battery module.

Power Supply/Charger   **Battery**
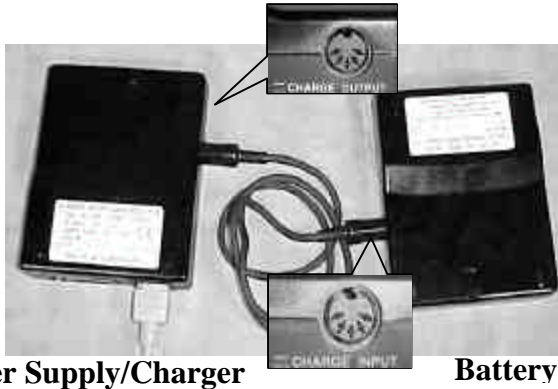
Figure 26.   Connecting the Battery for Charging

2. Using the supplied AC power cord, insert one end of the cord into the charger, then the other end into an AC outlet.

3. Press the "REFRESH" button to drain any remaining power in battery. When refreshing is complete the charging cycle will automatically begin.

4. When charging is complete, the "FULL" LED will turn on. (Refer to Figure 25 for information on status LED's.)

5. Remove the AC power cord, and disconnect the battery from the charger.

13.0   Software and Menu Functions

13.1   Splice Mode Menu

13.1.1   The Splice Mode Menu shown in Figure 27 is the normal mode of operation. This mode is used for all splicing operations. When the splicer is first turned on, or the "RESET" key is pressed the splice mode menu screen will appear.
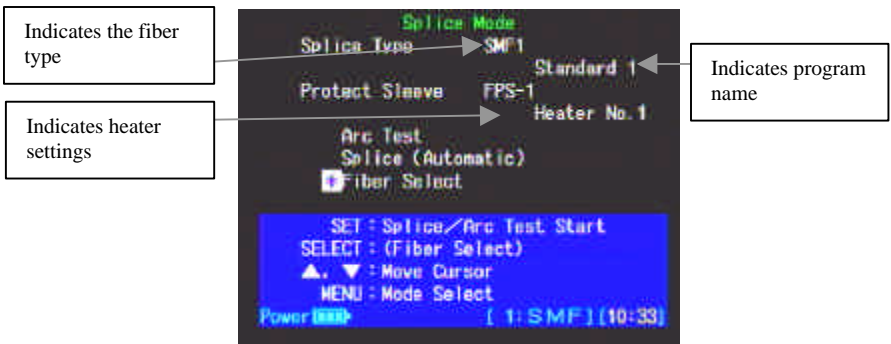
Figure 27. Splice Mode Menu Screen

13.1.2   The top section of the Splice Mode Menu screen provides information regarding:

- The type of fiber (ex. SMF or MMF) to be spliced… SMF
- The fusion program selected … **Standard 1**
- The active heater program … **FPS-1**

13.1.3   The next section contains three options, arc test, splice and fiber select. Use the arrow keys to move the cursor to desired option. The following is a description of each function:

- **ARC TEST**- Activated by pressing the "SET" key, this function performs a calibration test to optimize the splicer based upon environmental conditions and fiber type. *(For more information on performing an ARC TEST refer to Section 9.0)*

- **SPLICE**- Activated by pressing the "SET" key, this function initiates the splicing process. In Figure 27, (Automatic) indicates that the splicing process is set for automatic splicing. To change to manual splicing refer to Section 13.6.3, *Changing Splicing Mode Operation.*

- **FIBER SELECT**- This option is used to change the fusion program to match the fiber types being spliced. To enter this option press "SELECT". Splice conditions for the fusion programs can also be edited from this screen.

  (*For more information on selecting a fiber type refer to Section 8.3, to learn how to edit splice conditions refer to Section 13.8)*

13.2   The Mode Select Screen

13.2.1   To enter the MODE SELECT screen, press the "MENU" key. The MODE SELECT screen (Figure 28) provides access to the following mode functions:
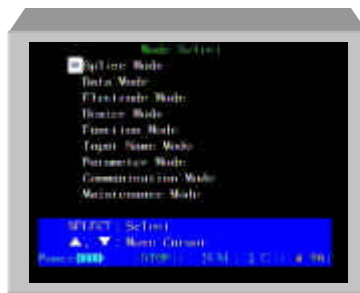
Figure 28. Mode Select Screen

- **SPLICE MODE**- Used for performing all splicing operations. This is the normal mode of operation.

- **DATA MODE**- Provides access to data memory functions. Splice loss information can be stored, viewed, and printed using this mode.

- **ELECTRODE MODE**- Use this mode to perform electrode maintenance functions.

- **HEATER MODE**- Use this mode to change the heater program to match the sleeve length being used.

- **FUNCTION MODE**- Displays and customizes machine functions.

- **INPUT NAME MODE**- Use this mode to customize fiber and heater program names.

- **PARAMETER MODE**- Displays and changes software parameters

- **COMMUNICATION MODE**- Enables maintenance personnel to control the splicer's functions using an external computer terminal.

- **MAINTENANCE MODE** – This mode is used for running diagnostics and performing system upgrades

13.3   Splice Data Storage Functions

13.3.1   The Type-37 has the capability to record splice loss information for each splice that is performed. A total of 750 splice data points can be stored. This splice loss data can then later be printed or downloaded to a PC for tracking and analysis. To enter the DATA MODE menu perform the following step:

1. From the MODE SELECT screen shown in Figure 28, choose DATA MODE and press "SELECT" to view the menu screen shown in Figure 29.
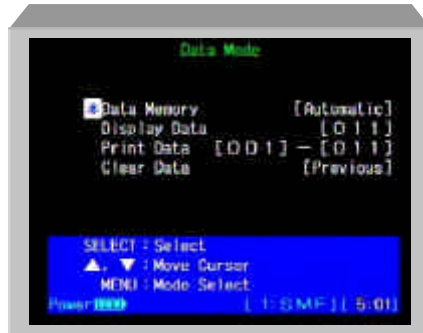
Figure 29. Data Mode Menu

13.3.2   **DATA MEMORY** allows you to choose from 1 of 3 splice data storage methods:

- Automatic- Splice loss data is stored automatically when splice is complete
- Manual- Following a completed splice you will be prompted with the option to store splice data.
- OFF- No splice loss data will be stored

To change the method of data storage:

1. Move the cursor to DATA MEMORY as shown in Figure 29 and press "SELECT" to highlight the action block. *(For detailed information on editing action blocks refer to Section 7.2)*

2. Using the arrow keys, scroll through the available options and choose desired setting.

3. Press "SELECT" to accept the change.

13.3.3   **DISPLAY DATA** allows you to display stored splice loss data. To view stored data:

1. From the DATA MODE menu shown in Figure 29, move the cursor to "Display Data" and press "SELECT" to highlight the numeric action block.

2. Referring to Section 7.3 *Numerical Inputs*, enter the memory location you would like to view and press "SELECT" to display the stored splice loss information.

Designates sheet number

Figure 30. Stored Splice Data

3. Figure 30 shows splice loss data for a typical fiber splice.

4. Use the arrow keys to scroll through the data memory and view different memory locations.

13.3.4   **PRINT DATA**- allows you to print stored splice data to a printer or download to a PC. The numbers shown below indicate the range of stored data. To print stored data:

1. From the DATA MODE menu shown in Figure 29, choose PRINT DATA and press "SELECT" to edit the start and stop printing range.

2. Referring to Section 7.3 *Numerical Inputs*, enter the starting point where you would like the printing to begin then enter the ending point where you would like printing to stop.

3. After entering the ending point the screen shown in Figure 31 will be displayed.

➲ *Note: When outputting data to a PC, reduce the Printout Delay Timer to zero (Parameter 410).*

Figure 31. Printing Splice Data

13.3.5   **CLEAR DATA**- allows you to delete stored splice data. Edit the action block to choose between deleting all stored splice data or the previously stored data. To delete stored splice data:

1. From the DATA MODE menu screen shown in Figure 29, choose "Clear Data" and press "SELECT" to edit the action block.

2. Referring to Section 7.2 *Editing Action Blocks* use the up down arrow keys to choose between ALL or PREV. and press "SELECT" to delete the data.

    ALL- *deletes all stored splice data*
    Previous- *deletes the most recently stored splice data*

13.4　Electrode Mode

13.4.1　The electrode mode is entered from the MODE SELECT screen shown in Figure 28.
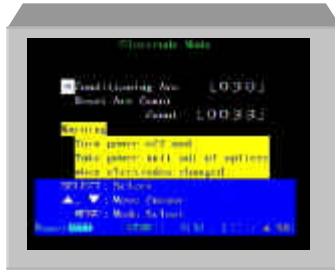
Figure 32.　Electrode Mode Menu

13.4.2　**MANUAL ARC**- is used to discharge new electrodes and condition the tips for optimum performance. *(For detailed information on using this function refer to Section 14.3 Replacing Electrodes.)*

13.4.3　**RESET ARC COUNT**- is used to reset the internal arc counter to zero. After each arc discharge an internal counter is incremented by 1, allowing you to track the number of discharges a pair of electrodes have made. Electrodes typically need replacement after 1000 arcs. To reset the arc count:

1. From the ELECTRODE MENU shown in Figure 32, choose RESET ARC COUNT.
2. Pressing "SELECT" will reset the internal arc counter to zero.

➲ *Note: When select is pressed the arc counter is reset without further notification.*

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13.5   Selecting and Editing Heater Programs

13.5.1   The protection sleeve heater can be set up to optimally shrink various lengths of fiber protection sleeves. There is space available for a total of 10 programs that can be user input to match specific types of sleeves that may be different from the standard. To select a heating program that matches your protection sleeve perform the following procedure:

1. Press the "MENU" key to display the MODE SELECT screen.

2. Choose HEATER MODE and press "SELECT".
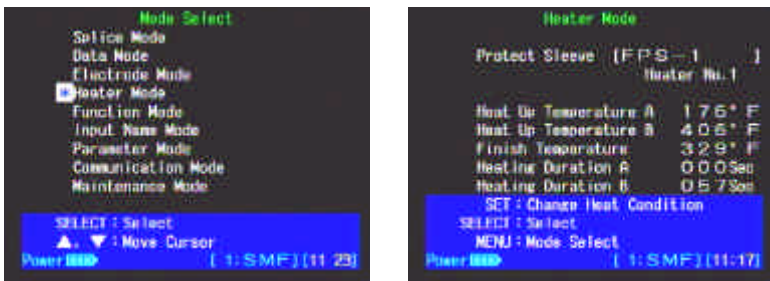
Figure 33. Entering Heater Mode

3. Press "SELECT" to edit the action block and use the "ARROW" keys to scroll through the available programs.

4. Press "SELECT" to accept changes.

5. The active heater program is indicated on the SPLICE MODE MENU screen as shown in Figure 34.
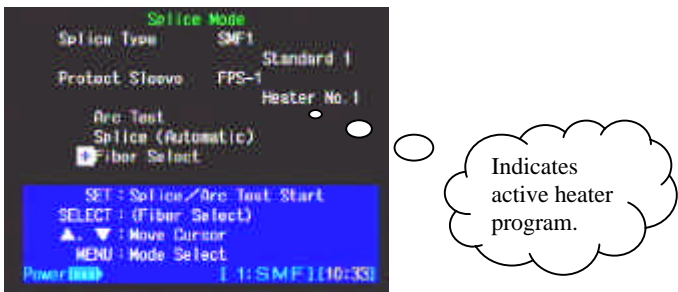
Figure 34. Active Heater Program

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13.5.2 The protection sleeve heater settings can also be edited from the Heater Mode menu.

➲ *Note: Heater programs for standard splice protection sleeves are factory optimized and should not need editing.*

1. To edit protection sleeve heater settings, access the Heater Mode menu screen by pressing the "MENU" key.

2. Using the arrow keys move the cursor down to "Heater Mode" and press the "SELECT" key.

3. To edit the program settings, press the "SET" key.

4. Using the arrow keys, select a heater condition setting, and press "SELECT" to edit that setting.

5. Input the password by pressing the following keys in order from top to bottom:

<div align="center">

"UP ARROW"

"ARC"

"DOWN ARROW"

"SELECT"

</div>

6. Use the arrow keys to increase/decrease the digit to the desired value.

7. Press "SELECT" to accept the change and advance to the next digit. If you make an error, pressing the "MENU" key will allow you to go back and re-edit that value.

8. When you are finished making your changes, press the "SET" key to return to the Heater Mode menu screen.

13.6   Changing Fusion Splicer System Settings

13.6.1 Various features and functions can be activated/deactivated and changed by entering the FUNCTION MODE menu. To change system settings:

1. Access the FUNCTION MODE menu from the MODE
    SELECT screen.

2. Scroll through three pages of available features, and make
    changes by using the techniques outlined in Section 7.2,
    Editing Action Blocks.
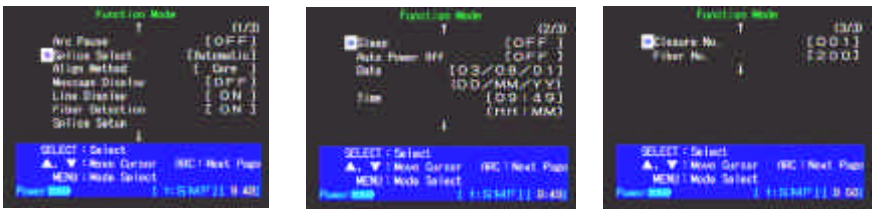
Figure 35. Function Mode Screens

Arc Pause

13.6.2   During splicing operation, when the final step before
arcing occurs, the splicer can be programmed to stop and await
operator input to continue. With this option activated, the user
must press "SET" to continue with splicing operation. To activate
ARC PAUSE, perform the following steps:

Figure 36. Activating Arc Pause

1. Referring to Figure 40, from the FUNCTION MODE menu choose ARC PAUSE and press "SELECT".

2. Referring to 7.2 *Editing Action Blocks*, use the arrow keys to choose between "OFF" and "ON".

3. Press "SELECT" to accept changes.

Changing Splicing Mode Operation

13.6.3   The Type-37 has the capability to perform fusion-splicing operations in 1 of 2 ways, automatically or in steps.
On the SPLICE MODE menu shown in Figure 38, the mode of splicing operations is indicated beside SPLICE in brackets.
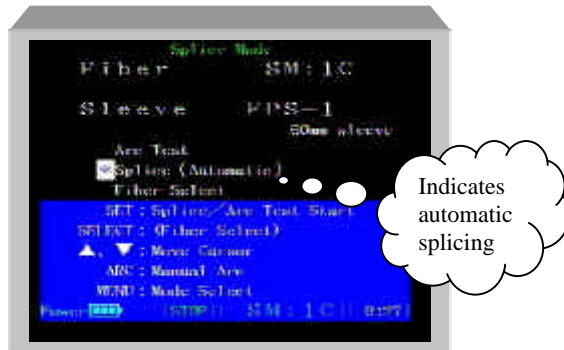
Figure 37.   Splicing Mode of Operation

To change between automatic and step splicing, perform the following steps:

1. Press the "MENU" key.

2. Enter FUCTION MODE.

3. Choose SPLICE SELECT and press "SELECT".

4. Referring to Section 7.2 *Editing Action Blocks,* use the "ARROW" keys to choose between Automatic and Step.

   Note: Step. indicates semi-automatic splicing.

5. Press "SELECT" to accept changes. The mode of splicing indicated on the SPLICE MODE menu shown in Figure 38 will change to reflect the new setting.

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Changing Alignment Method

13.6.4   The Type-37 has four different fiber alignment methods, designed to complete an automatic splice.

- Core - Aligns the left and right fibers by the centers of their cores.

- Diameter - Aligns the left and right fibers by the centers of their outer diameters.

- IAS - Signifies "Intentional Axis Shift". This method is used to intentionally offset the left and right fiber centers in order to compensate for high core-cladding eccentricities.

- ATTN - Intentionally offsets the left and right fiber cores in order to make an attenuated splice.

➲ *Note: For attenuation splicing please call the Fusion Splicing Service center at 1-888-SPLICER, for detailed instruction.*

Figure 38. Fiber Alignment Method

Splice Operation Messages

13.6.5   During the splicing operation it is possible to display messages that indicate what phase of the splice the machine is currently performing. Figure 36 shows an example of the information being displayed while splicing. To enable the display of messages during the splicing operation perform the following procedure:

1. Referring to Figure 35, enter the FUNCTION MODE menu screen.

2. Choose MESSAGE DISPLAY and press "SELECT".

3. Referring to Section 7.2 *Editing Action Blocks*, use the arrow keys to choose between, OFF and ON.

4. Press "SELECT" to accept changes.
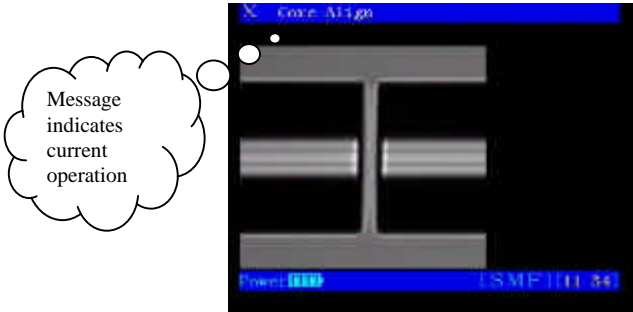
Figure 39. Splice Operation Messages

Viewing Arc Condition Program Settings

13.6.6   To view the fusion condition settings for each different fusion program perform the following steps:

1. Referring to Figure 40, choose "Splice Condition" from the FUNCTION MODE menu screen and press "SELECT".

2. Use the "ARROW" keys to cycle through the different programs.
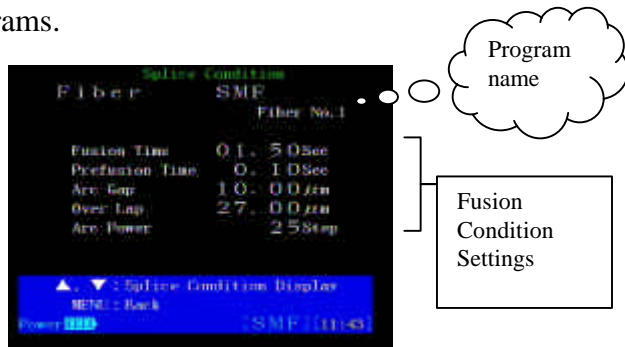
Figure 40. Splice Condition Screen

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Power Management Functions (Sleep Mode)

13.6.7   When operating from a battery source to minimize power consumption the Type-37 has a built in sleep mode and automatic power down feature, which can be activated if no keys have been pressed for time intervals of 1 to 10 minutes. To access the power management functions:

> 1. Referring to Figure 28, from the MODE SELECT screen choose FUNCTION MODE and press "SELECT".

> 2. Use the "ARROW" keys to scroll to the 2nd page

Automatic power down is not activated

After 10 minutes of no activity the splicer will go into sleep mode to save power.

Figure 41. Power Management Features

13.6.8   **SLEEP**- In Figure 37, the sleep timer is set for 10 minutes. After 10 minutes of no activity (no buttons pressed, splices being made, or heater operation) the splicer will go into a sleep mode to reduce power consumption. During SLEEP mode the following will occur:

➔ LCD Monitor will be turned off

➔ Green SLEEP LED located at top of right key panel will be illuminated

➔ 12V DC output will be turned off *(accessories being operated via the 12V DC output will not work)*

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➲ *Note: To return to normal operation, press any key, except OFF or ON.*

To change or activate the SLEEP timer setting:

1. Press the "MENU" key and choose FUNCTION MODE.
2. From the FUNCTION MODE menu choose SLEEP and press "SELECT".
3. Referring to Section 7.2 *Editing Action Blocks*, use the "ARROW" keys to choose the desired setting.

   ➲ *Note: OFF is found after 010 and before 001.*

4. Press "SELECT" to accept changes.

13.6.9 **AUTO POWER OFF**- Referring to Figure 37, the AUTO POWER OFF timer is not activated. The auto power off timer will begin counting down only after SLEEP mode has been activated. If SLEEP mode is set to "ON", AUTO POWER OFF will be activated following the programmed duration. Example:

SLEEP timer = 1 minute & AUTO POWER OFF= 2 minutes. After 1 minute the splicer will go into SLEEP mode, 2 minutes later the splicer will turn off.

13.7   Splice Condition Settings

13.7.1   Splice conditions can be edited from the Splice Mode menu screen. In order to access the Splice Mode menu screen, select Splice Mode from the Mode Select screen, or simply press the "RESET" key.

1. To edit splice conditions, choose "Fiber Select" from the Splice Mode menu screen.
2. Move the cursor to the splicing program you wish to edit, and press the "SET" key.

3. Next, move the cursor to the condition you wish to edit, and press the "SELECT" key.

4. Input the password by pressing the following keys in order from top to bottom:

<div align="center">

"UP ARROW"

"ARC"

"DOWN ARROW"

"SELECT"

</div>

5. Use the arrow keys to increase/decrease the digit to the desired value, referencing Section 7.3, *Numerical Inputs.*

Figure 42. Editing Splice Conditions

6. Press "SELECT" to accept the change and advance to the next digit. If you make an error, pressing the "MENU" key will allow you to go back and re-edit that value.

7. When you are finished making your changes, press the "SET" key to return to the Fiber Select menu screen.

8. Choose your desired splicing program, and press "SELECT" to return to the Splice Mode menu screen.

The following are brief descriptions of the items that can be edited on the Splice Condition screen.

FUSION TIME (seconds)
- Fusion time is the length or duration from the to start to completion of arc discharge.

PREFUSION TIME (seconds)
- Pre-fusion time is the time in seconds the fiber ends wait after the arc discharge begins before beginning the overlap (feed).

ARC GAP (micrometers, μm)
- Arc gap is the distance between the left and right fibers before fusion takes place.
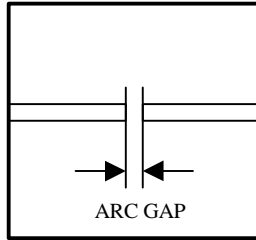
Figure 43. Arc Gap

OVER LAP (micrometers, μm)
- Over lap is the amount of over lap between the left and right fibers that occurrs when the right fiber is fed forward during the arc discharge.
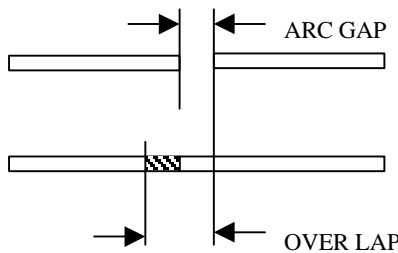
Figure 44. Overlap

ARC POWER (step value)

- Expressed in a unitless step value, arc power controls the amount of heat the fibers are exposed to during the fusion arc.

FIBER PULLING (microns)

- When a value is assigned to this parameter, the motors will pull back on the fibers during the arc discharge.

STAYING TIME (seconds)

- The staying time value corresponds to the amount of time after the arc discharge begins, before the fiber pulling begins.

13.8   Editing Fusion Program Names

13.8.1   Each fusion program and heater condition name can be changed from the factory default setting to a name that is more meaningful to the user. After assigning specific fusion parameters to a fusion program, a new name can be assigned for easier recognition. That fiber name will then appear in the FIBER SELECT menu when choosing fusion programs. To change a fusion program name follow these steps:

1. Referring to Figure 45, choose INPUT NAME MODE and press "SELECT".

Figure 45. Entering Input Name Mode
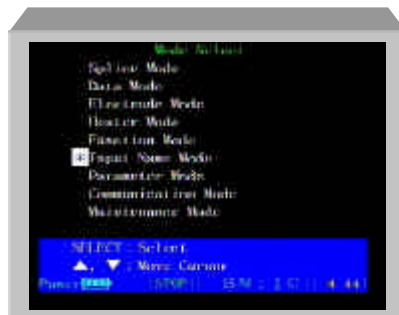
2. Referring to Figure 46, select the fusion program for which you would like to change the name.

Figure 46. Input Name Mode

3. Referring to Figure 47, enter new desired name. For each letter use the "ARROW" keys to choose the desired character and press "SELECT".

➲ *Note: A maximum of 12 characters may be entered.*

New program name

Current fusion program name

Figure 47. Entering Characters

4. When you have completed entering a new name, move the cursor to [ENTER] and press "SELECT" to save changes.

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✉️**Tips!**

- If an incorrect character was entered press the "MENU" key to erase it and try again.

- To quit entering a name without saving any changes press "RESET".

13.9   Editing Parameters

13.9.1   Parameters are information that the Type-37 fusion splicer uses to execute operation. You can adjust splicing conditions by changing splicing parameters (i.e. fusion time, arc gap, pre-fusion, overlap, arc power), in order to optimize those conditions for specific fiber characteristics. To change/view parameters stored in the splicers non-volatile memory follow these steps:

➲ *Note: A* **detailed list of all parameters can be found in Section 16,** *Parameter List***.**

1. From the MODE SELECT screen shown in Figure 48, choose PARAMETER MODE and press "SELECT".
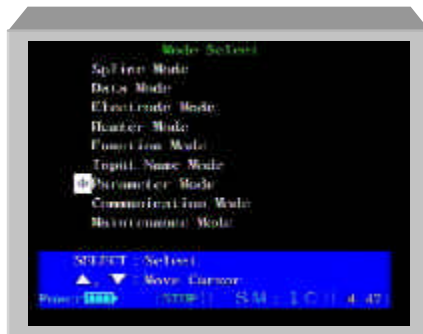
Figure 48. Entering Parameter Mode

2. Enter the Input Pass Code by pressing the following keys in this order:

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"**UP ARROW**"
"**ARC**"
"**DOWN ARROW**"
"**SELECT**"

3. As shown in Figure 49, enter the parameter number you would like to change/view and press "SELECT". *(Refer to 7.3 for detailed information on entering numeric values.)*

Figure 49. Entering Parameter Number

4. To change a parameter value press "SELECT" to edit the action block as shown in Figure 49.
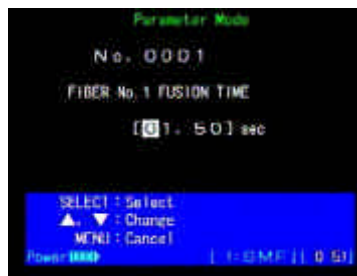
Figure 50. Editing Parameters

5. Referring to Section 7.3 *Numerical Values*, change the parameter to desired setting and press "SELECT" to accept changes.

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📫 **Tips!**

- Make a note of the current parameter value, before editing it.

- If an incorrect number was entered press the "MENU" key to erase it and try again.

- To quit entering a parameter without saving any changes press "RESET".

13.10   Communication Mode

13.10.1   In this mode, entered from the MODE SELECT screen, an external computer console controls the splicer via an RS-232C cable. The splicer screen will appear as show in Figure 51. To exit this mode you must press "RESET".

Figure 51. Communication Mode

➲ *Note: Communication mode requires Sumitomo's proprietary machine language commands in order to access the CPU and memory.   This mode is primarily used by trained factory service technicians for machine diagnostics.*

14.0   Maintenance

For product maintenance assistance contact the Service Center at
1-888-SPLICER

For engineering or other product information contact The Fusion Splicing Applications Department at 1-800-358-7378 or (919) 541-8100.

14.0.1   See Section 4, *Parts, Repairs, and Ordering Information,* for information about ordering parts, accessories, and for information about returning equipment to the factory.

14.0.2   There are two types of maintenance covered in the following sections:

- Cleaning procedures to ensure optimal performance during normal use.
- Replacing consumable parts such as the electrodes.

WARNING: Do not attempt repairs for which you are not qualified. Unauthorized repairs may void your warranty.

WARNING: Do not lubricate any part of the splicer.

➲ *Note: Before any maintenance is performed on the fusion splicer ensure the power is turned off.*

14.1   Cleaning V-Grooves and Bare Fiber Pads

14.1.1   This section describes the cleaning procedure for the v-grooves and clamps. The procedure requires pure alcohol (99.5% pure or better), the v-groove cleaning brush (supplied with splicer), and tight woven, lint-free cotton swabs.

14.1.2   V-grooves are the precision guides that keep the bare fibers aligned for splicing. Bare fiber clamps hold the fibers seated into the v-grooves. Tiny bits of dirt or coating residue in the grooves or on the pads of the clamps can cause the fiber diameters to be offset and will create poor splices.

Procedure:
1. Moisten the v-groove cleaning brush with alcohol and brush the v-grooves outwards from the electrodes to prevent dust falling on the microscope lens.

Figure 52. Cleaning the V-Grooves

2. Use firm pressure to clean the bare fiber pads with a cotton swab moistened with alcohol.

Figure 53. Cleaning the Bare Fiber Pads

3. Go over the same area with a dry cotton swab to remove any excess alcohol.

WARNING: "Canned Air" will contaminate the electrodes, so do not use such products to clean the fusion splicer.

14.2   Cleaning the LED Mirror Cover

This section describes the cleaning procedure for the LED mirror cover in the hood. The procedure requires 99.5% alcohol, and lint free cotton swabs.

14.2.1   If the LED reflecting mirrors used inside the wind protector hood become dirty, black shadows or poor light levels may cause the splicer to operate poorly. To clean the reflecting mirrors moisten a cotton swab with 99.5% or better pure alcohol

and gently wipe the mirror surface. Use a dry cotton swab to wipe off any excess alcohol.
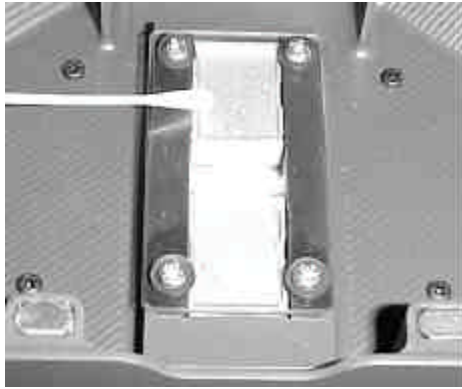
Figure 54. Cleaning the LED Reflective Mirrors

14.3   Replacing Electrodes

This section covers electrode replacement. The electrodes will typically need replacing after approximately 1000 discharges.

14.3.1   The fusion splicer maintains a count of the number of arc discharges. This procedure includes instructions about resetting the counter to zero after replacing the electrodes and conditioning the tips.

Procedure: **Electrode Replacement**

➲ **Note: For electrode replacement, use only Sumitomo electrodes, part number ER-8.**

1. To view the number of discharges on current set of electrodes, press the "MENU" key to access the MODE SELECT screen, and choose ELECTRODE MODE.
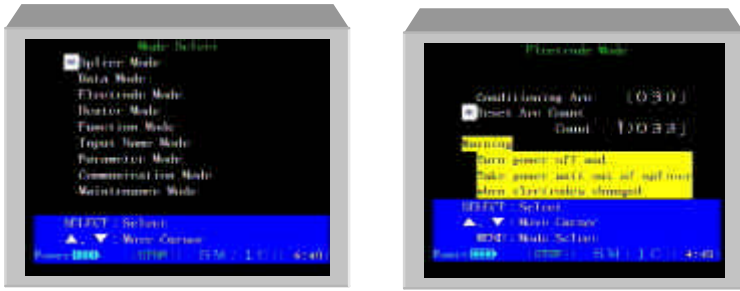
Figure 55. Displaying Electrode Mode Screen

2. Before beginning replacement, press the "RESET" key, and wait for the splicer to reset. After it resets, turn off the fusion splicer and unplug its power cord.

3. Using your fingers, loosen the thumbscrews to remove the electrode cover plates.

Electrode cover plate thumb-screw
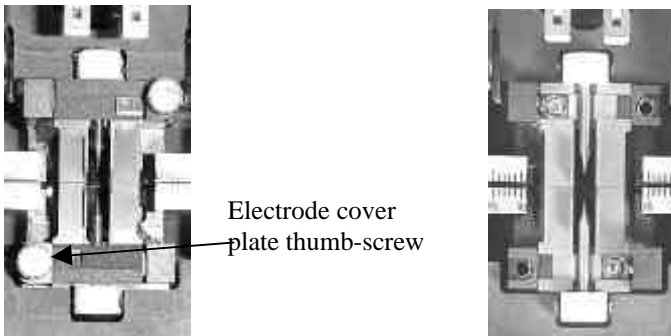
Figure 56. Removing Electrode Cover Plates

4. Remove the old electrodes and discard.

➲ *Note: While the electrodes are out of the unit, carefully check for dirt on the microscope lens (refer to Section 14.4)*

➲ *Note: When handling the electrodes avoid touching the metal portion with your skin. Skin oil left on the electrodes will deteriorate performance. If touched clean with alcohol and gauze.*

5. Before installing new electrodes, gently clean the electrodes with pure alcohol and gauze wipes.

6. Holding the electrode by the plastic button place the electrodes in the retaining groove.

7. When replacing the electrode cover plates push the plastic buttons against the clamp wall to place the electrode tips at the correct distance. Also, ensure that the beveled edges on the electrode cover plates are facing inward towards each other.

8. Gently tighten the retaining thumb-screws. **Do not over-tighten.**

14.3.2   After electrode replacement perform the following steps to condition the electrodes and reset the arc count.

➲ *Note: Electrode tip conditioning will ensure optimal performance.*

Procedure: **Electrode Tip Conditioning**

1. Plug in the AC cord into the Power Supply Module and turn the unit on.

2. Press the "MENU" key.

3. Referring to Figure 55, choose ELECTRODE MODE and press "SELECT".
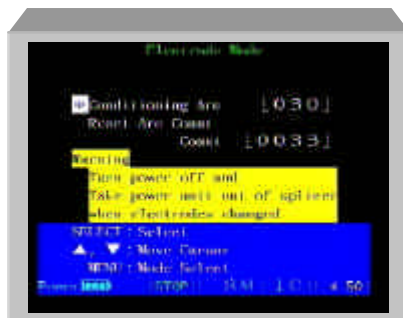
Figure 57. Electrode Mode

4. From the ELECTRODE MODE menu screen choose RESET ARC COUNT and press "SELECT" to reset the arc count.

5. As shown in Figure 57, choose CONDITIONING ARC and press "SELECT" to begin the process.

6. The electrodes will automatically arc 30 times. When this is complete, the splicer will return to the ELECTRODE MODE menu screen as shown in Figure 57.

7. Referring to Section 9.0 *Arc Test Procedure*, perform an arc test to adjust the arc conditions for the new set of electrodes.

14.4   Cleaning the Microscope Lenses

This section describes the cleaning procedure for the microscope objective lens. The procedure requires 99.5% alcohol, and cotton swabs.

14.4.1   There are two microscopes between the v-grooves in the fusion splicer's stage area used for viewing the fibers to be spliced. Large dirt particles on the microscope lens can reduce the software's ability to inspect fibers and will yield inaccurate results.

Procedure:

1. Turn the fusion splicer off and open the hood covering the splicing area.
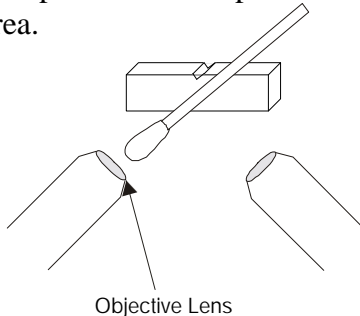
Objective Lens
Figure 58. Cleaning the Microscopes

2. Remove the front and rear electrodes *(Refer to Section 14.3, Replacing Electrodes)* to expose the lens surfaces. Each lens lies below the electrodes at a 45° angle.

3. Gently clean each lens with a cotton swab moistened with a small amount of alcohol. Clean in a spiral motion from the center of the lens and working out to the edge. Wipe each lens again with a clean dry cotton swab to dry the alcohol, thus avoiding spots.

15.0   Troubleshooting

For engineering or other product information contact Fusion Splicing Applications Department at 1-800-358-7378 or (919) 541-8100.

For product maintenance assistance contact the Service Center at **1-888-SPLICER**

15.1   Arc Problems

15.1.1   The electrodes typically need replacement after 1000 splices. Some common symptoms that indicate the electrodes need replacing are:

- Fluttering or unstable arc observed on the LCD monitor
- Sizzling noise while arcing
- Bubbles in the fibers after splicing
- Fiber burned in half
- Diameter faults
- High or inconsistent splice losses

15.1.2   Refer to Section 14.3, *Replacing Electrodes*, for procedures. Always perform a burn-in routine after electrode replacement. Electrode problems can be caused by:

- Heavily relying on the spattering arc to clean the fibers
- Worn or pitted from excess use
- Excessive dirt on electrodes
- Using canned air
- Bent electrodes
- Handling with bare fingers (skin oil)

15.1.2   Due to the critical nature of the electrode shape, electrode cleaning is not recommended. Cleaning old electrodes could damage them further, and will not resolve poor arcing problems.

15.2   Fiber Breaking

15.2.1   When the splicing process is complete, a tensile test may be performed on the fibers while in the fiber chucks. If the fibers are breaking when the tensile test is performed, check the electrode arc conditions to determine if there is a problem leading to a weak fusion splice. Perform an ARC TEST, followed by an inspection of fiber preparation procedures.

15.3   Splicer Does Not Power Up

15.3.1   If the fusion splicer fails to turn on when the ON button is pressed check the following:

- Verify the power plug is seated properly
- Verify the power source is supplying power by plugging another piece of equipment into the same outlet.
- If using battery operation ensure the battery is fully charged.

15.4   Splicing Process Errors

15.4.1   While the automatic splicing process is being performed, if an error occurs various process error messages may be displayed to prompt you of the faulty condition. For certain fiber inspection errors it is possible to override the fault condition and continue with the splicing process by pressing the "Set" key.

➲ *Note: Overriding inspection errors may result in poor splices.*

ERROR MESSAGE	DESCRIPTION	COUNTER MEASURE
Arc Test Error (Process Image)	An image processing error occurred during the arc test.	Press RESET. Re-prepare the fibers, taking extra care to make sure they are clean. Ensure that fibers are properly positioned in v-grooves.
Core / Diameter Align Error (V-groove, Time Out, Process Image, Dust)	The splicer was unable to achieve proper fiber alignment.	Press RESET. Re-prepare the fibers, ensuring that they are clean. Check the Splice Mode menu screen to ensure that the proper fiber selection has been made.
Cut Error (Angle, Crack, Projection)	The fiber's end-face was not acceptable for fusion splicing.	Press RESET, and remove the indicated fiber. Re-prepare the fiber and attempt to splice it again. If necessary, adjust or clean the cleaver.
Data Full Data Overflow	Splice data memory storage is full.	Delete some splice data points in the Data Mode Menu, or turn Data Memory to "OFF".
Fiber End Check Error (Process Image)	An image processing error occurred during end-face inspection.	Press RESET. Re-prepare the fibers, taking extra care to make sure they are clean. Ensure that fibers are properly positioned in v-grooves.
Focus Error (Time Out, Dust, Process Image, Microscope)	The splicer failed to focus on the fiber.	Press RESET. Re-prepare the fibers, taking extra care to make sure they are clean. Ensure that fibers are properly positioned in v-grooves, and that the correct splicing program has been selected. It may be necessary to clean the LEDs, mirror cover, microscope lenses, bare fiber pads, and v-grooves if problems persist.
Gap Adjust Error (Time Out, Process Image, ZL, ZR)	The splicer failed to set the proper gap	Press RESET and re-insert fibers. Verify proper cleave lengths, and fiber placement.
Initialize Error (XXX)	XXX motor caused a timeout error during initialization.	Press RESET. You may be required to press RESET a total of 3 times if initialization problems persist. If the problem is not corrected, re-initialize the splicer by holding down the up arrow key and pressing RESET.
Inserting Fiber Error (L, R)	Splicer was not able to bring the fiber into the proper position to begin.	Press RESET. Reposition fibers to the proper lengths, and ensure that the fibers are seated properly in the v-grooves.
LED Error / Brightness Error	The splicer was not able to achieve proper light levels.	Ensure that the splicer's hood is properly closed. Clean the mirror cover, LEDs, and microscopes.

ERROR MESSAGE	DESCRIPTION	COUNTER MEASURE
Preadjust Error (V-groove, Time Out, Process Image)	The splicer failed during rough alignment.	Press RESET. Re-prepare the fibers. Ensure that the fibers are seated properly in the v-grooves and clean the grooves if needed. It may be necessary to perform a re-initialization by holding down the up arrow key and pressing RESET.
Proof Test Error	An error occurred during the splice proof test.	Remove the fibers, then press RESET. Re-splice the fibers if they are broken. It may be necessary to perform an arc test if the problem persists.
Protrusion Error	The fiber was set too close to the splice area.	Press RESET. Remove the protruding fiber and reset it to the proper position.
Splice Error (Dust, Process Image)	An error occurred during post-splice inspection.	Remove the fibers and press RESET. Re-prepare the fibers and attempt the splice again. If necessary, clean the v-grooves, bare fiber pads, mirror cover, LEDs, and microscope lenses.
Additional Problems With High Splice Losses (bubbles, core offset, etc...)	The splicer is producing poor quality splices.	Perform an Arc Test to ensure that the optimum arc power selection has been made, and the arc center line is correct. If necessary contact the Fusion Splicing Applications Department at **1-800-358-7378**. For 24x7 technical support dial **1-888-SPLICER**.

CLEAVE ANGLE ERROR LIMIT (degrees)

- The cleave angle on a fiber's end face has exceeded the maximum allowable limit.
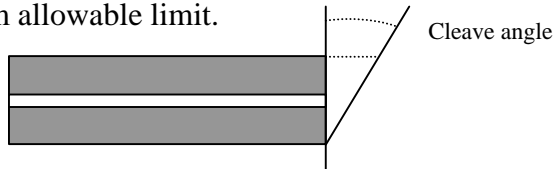
Figure 59. Cleave Angle Error

- Re-cleave the fibers. If problems persist it may be necessary to clean/adjust the fiber cleaver. Consult cleaver manual.

F / R LIMIT

- Fiber may not be positioned in the v-groove properly, or the v-groove may be dirty.

INSERT FIBER NG

- Fiber end is not inserted far enough.

LIGHT CHECK NG
PROTRUSION

- Fiber end is inserted too far

LIGHT CHECK NG
ADJUST

- Microscope(s) or LED(s) may be dirty.

FOCUS NG
DUST

- Fiber(s), LED(s), or Microscope(s) may be dirty. An improper cleave or profile setting may also cause this error.

SPLICE STATE NG

- Fibers may be dirty, or splicer may be configured improperly.

16.0   Parameter List

No.	Name	Max.	Min.	Std.	Unit	Remarks
001	FIBER No.1 FUSION TIME	20.00	0.00	1.50	SEC	
002	FIBER No.1 PREFUSION TIME	1.00	0.00	0.05	SEC	
003	FIBER No.1 ARC GAP	40.00	0.00	10.00	μm	
004	FIBER No.1 OVERLAP	80.00	0.00	25.00	μm	
005	FIBER No.1 ARC POWER	064	001	024	STEP	
006	FIBER No.2 FUSION TIME	20.00	0.00	1.50	SEC	*SMF2*
007	FIBER No.2 PREFUSION TIME	1.00	0.00	0.05	SEC	
008	FIBER No.2 ARC GAP	40.00	0.00	10.00	μm	
009	FIBER No.2 OVERLAP	80.00	0.00	25.00	μm	
010	FIBER No.2 ARC POWER	064	001	024	STEP	
011	FIBER No.3 FUSION TIME	20.00	0.00	1.50	SEC	*SMF3*
012	FIBER No.3 PREFUSION TIME	1.00	0.00	0.10	SEC	
013	FIBER No.3 ARC GAP	40.00	0.00	10.00	μm	
014	FIBER No.3 OVERLAP	80.00	0.00	25.00	μm	
015	FIBER No.3 ARC POWER	064	001	024	STEP	
016	FIBER No.4 FUSION TIME	20.00	0.00	1.50	SEC	*SMF4*
017	FIBER No.4 PREFUSION TIME	1.00	0.00	0.05	SEC	
018	FIBER No.4 ARC GAP	40.00	0.00	10.00	μm	
019	FIBER No.4 OVERLAP	80.00	0.00	25.00	μm	
020	FIBER No.4 ARC POWER	064	001	024	STEP	
021	FIBER No.5 FUSION TIME	20.00	0.00	4.50	SEC	*MMF1*
022	FIBER No.5 PREFUSION TIME	1.00	0.00	0.05	SEC	
023	FIBER No.5 ARC GAP	40.00	0.00	10.00	μm	
024	FIBER No.5 OVERLAP	80.00	0.00	25.00	μm	
025	FIBER No.5 ARC POWER	064	001	024	STEP	
026	FIBER No.6 FUSION TIME	20.00	0.00	4.50	SEC	*MMF2*
027	FIBER No.6 PREFUSION TIME	1.00	0.00	0.05	SEC	

No.	Name	Max.	Min.	Std.	Unit	Remarks
028	FIBER No.6 ARC GAP	40.00	0.00	10.00	μm	
029	FIBER No.6 OVERLAP	80.00	0.00	25.00	μm	
030	FIBER No.6 ARC POWER	064	001	024	STEP	
031	FIBER No.7 FUSION TIME	20.00	0.00	4.50	SEC	*MMF3*
032	FIBER No.7 PREFUSION TIME	1.00	0.00	0.05	SEC	
033	FIBER No.7 ARC GAP	40.00	0.00	10.00	μm	
034	FIBER No.7 OVERLAP	80.00	0.00	25.00	μm	
035	FIBER No.7 ARC POWER	064	001	024	STEP	
036	FIBER No. 8 FUSION TIME	20.00	0.00	1.50	SEC	*DSF1*
037	FIBER No. 8 PREFUSION TIME	1.00	0.00	0.05	SEC	
038	FIBER No. 8 ARC GAP	40.00	0.00	10.00	μm	
039	FIBER No. 8 OVERLAP	80.00	0.00	25.00	μm	
040	FIBER No. 8 ARC POWER	064	001	024	STEP	
041	FIBER No. 9 FUSION TIME	20.00	0.00	1.50	SEC	*DSF2*
042	FIBER No. 9 PREFUSION TIME	1.00	0.00	0.05	SEC	
043	FIBER No. 9 ARC GAP	40.00	0.00	10	μm	
044	FIBER No. 9 OVERLAP	80.00	0.00	25.00	μm	
045	FIBER No. 9 ARC POWER	064	001	024	STEP	
046	FIBER No. 10 FUSION TIME	20.00	0.00	1.50	SEC	*DSF3*
047	FIBER No. 10 PREFUSION TIME	1.00	0.00	1.50	SEC	
048	FIBER No. 10 ARC GAP	40.00	0.00	10.00	μm	
049	FIBER No. 10 OVERLAP	80.00	0.00	25.00	μm	
050	FIBER No. 10 ARC POWER	064	001	024	STEP	
051	FIBER No. 11 FUSION TIME	20.00	0.00	1.50	SEC	*NZDS1*
052	FIBER No. 11 PREFUSION TIME	1.00	0.00	0.05	SEC	
053	FIBER No. 11 ARC GAP	40.00	0.00	10.00	μm	
054	FIBER No. 11 OVERLAP	80.00	0.00	25.00	μm	
055	FIBER No. 11 ARC POWER	064	001	024	STEP	

No.	Name	Max.	Min.	Std.	Unit	Remarks
056	FIBER No. 12 FUSION TIME	20.00	0.00	1.50	SEC	*NZDS2*
057	FIBER No. 12 PREFUSION TIME	1.00	0.00	0.06	SEC	
058	FIBER No. 12 ARC GAP	40.00	0.00	6.00	μm	
059	FIBER No. 12 OVERLAP	80.00	0.00	10.00	μm	
060	FIBER No. 12 ARC POWER	064	001	024	STEP	
061	FIBER No. 13 FUSION TIME	20.00	0.00	1.50	SEC	*NZDS3*
062	FIBER No. 13 PREFUSION TIME	1.00	0.00	0.05	SEC	
063	FIBER No. 13 ARC GAP	40.00	0.00	10.00	μm	
064	FIBER No. 13 OVERLAP	80.00	0.00	25.00	μm	
065	FIBER No. 13 ARC POWER	064	001	024	STEP	
066	FIBER No. 14 FUSION TIME	20.00	0.00	1.50	SEC	*NZDS4*
067	FIBER No. 14 PREFUSION TIME	1.00	0.00	0.06	SEC	
068	FIBER No. 14 ARC GAP	40.00	0.00	6.00	μm	
069	FIBER No. 14 OVERLAP	80.00	0.00	10.00	μm	
070	FIBER No. 14 ARC POWER	064	001	024	STEP	
071	FIBER No. 15 FUSION TIME	20.00	0.00	1.50	SEC	*NZDS5*
072	FIBER No. 15 PREFUSION TIME	1.00	0.00	0.05	SEC	
073	FIBER No. 15 ARC GAP	40.00	0.00	10.00	μm	
074	FIBER No. 15 OVERLAP	80.00	0.00	17.00	μm	
075	FIBER No. 15 ARC POWER	064	001	024	STEP	
076	FIBER No. 16 FUSION TIME	20.00	0.00	1.50	SEC	*NZDS6*
077	FIBER No. 16 PREFUSION TIME	1.00	0.00	0.05	SEC	
078	FIBER No. 16 ARC GAP	40.00	0.00	10.00	μm	

No.	Name	Max.	Min.	Std.	Unit	Remarks
079	FIBER No. 16 OVERLAP	80.00	0.00	25.00	μm	
080	FIBER No. 16 ARC POWER	064	001	024	STEP	
081	FIBER No. 17 FUSION TIME	20.00	0.00	1.50	SEC	*LCF1*
082	FIBER No. 17 PREFUSION TIME	1.00	0.00	0.05	SEC	
083	FIBER No. 17 ARC GAP	40.00	0.00	6.00	μm	
084	FIBER No. 17 OVERLAP	80.00	0.00	12.00	μm	
085	FIBER No. 17 ARC POWER	064	001	024	STEP	
086	FIBER No. 18 FUSION TIME	20.00	0.00	1.50	SEC	*LCF2*
087	FIBER No. 18 PREFUSION TIME	1.00	0.00	0.05	SEC	
088	FIBER No. 18 ARC GAP	40.00	0.00	6.00	μm	
089	FIBER No. 18 OVERLAP	80.00	0.00	12.00	μm	
090	FIBER No. 18 ARC POWER	064	001	024	STEP	
091	FIBER No. 19 FUSION TIME	20.00	0.00	1.50	SEC	*PSCF1*
092	FIBER No. 19 PREFUSION TIME	1.00	0.00	0.10	SEC	
093	FIBER No. 19 ARC GAP	40.00	0.00	6.00	μm	
094	FIBER No. 19 OVERLAP	80.00	0.00	12.00	μm	
095	FIBER No. 19 ARC POWER	064	001	024	STEP	
096	FIBER No. 20 FUSION TIME	20.00	0.00	1.50	SEC	*PSCF2*
097	FIBER No. 20 PREFUSION TIME	1.00	0.00	0.10	SEC	
098	FIBER No. 20 ARC GAP	40.00	0.00	6.00	μm	
099	FIBER No. 20 OVERLAP	80.00	0.00	12.00	μm	
100	FIBER No. 20 ARC POWER	064	001	024	STEP	
101	FIBER No. 21 FUSION TIME	20.00	0.00	1.50	SEC	*EPSC1*

No.	Name	Max.	Min.	Std.	Unit	Remarks
102	FIBER No. 21 PREFUSION TIME	1.00	0.00	0.10	SEC	
103	FIBER No. 21 ARC GAP	40.00	0.00	6.00	μm	
104	FIBER No. 21 OVERLAP	80.00	0.00	12.00	μm	
105	FIBER No. 21 ARC POWER	064	001	024	STEP	
106	FIBER No. 22 FUSION TIME	20.00	0.00	1.50	SEC	*EPSC2*
107	FIBER No. 22 PREFUSION TIME	1.00	0.00	0.10	SEC	
108	FIBER No. 22 ARC GAP	40.00	0.00	6.00	μm	
109	FIBER No. 22 OVERLAP	80.00	0.00	12.00	μm	
110	FIBER No. 22 ARC POWER	064	001	024	STEP	
111	FIBER No. 23 FUSION TIME	20.00	0.00	1.50	SEC	*CSF1*
112	FIBER No. 23 PREFUSION TIME	1.00	0.00	0.06	SEC	
113	FIBER No. 23 ARC GAP	40.00	0.00	10.00	μm	
114	FIBER No. 23 OVERLAP	80.00	0.00	25.00	μm	
115	FIBER No. 23 ARC POWER	064	001	024	STEP	
116	FIBER No. 24 FUSION TIME	20.00	0.00	1.50	SEC	*CSF2*
117	FIBER No. 24 PREFUSION TIME	1.00	0.00	0.06	SEC	
118	FIBER No. 24 ARC GAP	40.00	0.00	10.00	μm	
119	FIBER No. 24 OVERLAP	80.00	0.00	25.00	μm	
120	FIBER No. 24 ARC POWER	064	001	024	STEP	
121	FIBER No. 25 FUSION TIME	20.00	0.00	1.50	SEC	*SMF3*
122	FIBER No. 25 PREFUSION TIME	1.00	0.00	0.05	SEC	
123	FIBER No. 25 ARC GAP	40.00	0.00	10.00	μm	
124	FIBER No. 25 OVERLAP	80.00	0.00	25.00	μm	
125	FIBER No. 25 ARC POWER	064	001	022	STEP	

No.	Name	Max.	Min.	Std.	Unit	Remarks
126	FIBER No. 26 FUSION TIME	20.00	0.00	1.50	SEC	*DSF1*
127	FIBER No. 26 PREFUSION TIME	1.00	0.00	0.05	SEC	
128	FIBER No. 26 ARC GAP	40.00	0.00	10.00	μm	
129	FIBER No. 26 OVERLAP	80.00	0.00	25.00	μm	
130	FIBER No. 26 ARC POWER	064	001	022	STEP	
131	FIBER No. 27 FUSION TIME	20.00	0.00	4.00	SEC	*SMF1-EDF1*
132	FIBER No. 27 PREFUSION TIME	1.00	0.00	0.05	SEC	
133	FIBER No. 27 ARC GAP	40.00	0.00	10.00	μm	
134	FIBER No. 27 OVERLAP	80.00	0.00	25.00	μm	
135	FIBER No. 27 ARC POWER	064	001	023	STEP	
136	FIBER No. 28 FUSION TIME	20.00	0.00	4.00	SEC	*SMF-EDF2*
137	FIBER No. 28 PREFUSION TIME	1.00	0.00	0.05	SEC	
138	FIBER No. 28 ARC GAP	40.00	0.00	10.00	μm	
139	FIBER No. 28 OVERLAP	80.00	0.00	25.00	μm	
140	FIBER No. 28 ARC POWER	064	001	023	STEP	
141	FIBER No. 29 FUSION TIME	20.00	0.00	3.50	SEC	*CSF1-EDF1*
142	FIBER No. 29 PREFUSION TIME	1.00	0.00	0.07	SEC	
143	FIBER No. 29 ARC GAP	40.00	0.00	10.00	μm	
144	FIBER No. 29 OVERLAP	80.00	0.00	25.00	μm	
145	FIBER No. 29 ARC POWER	064	001	023	STEP	
146	FIBER No. 30 FUSION TIME	20.00	0.00	3.50	SEC	*CSF1-EDF2*
147	FIBER No. 30 PREFUSION TIME	1.00	0.00	0.07	SEC	

No.	Name	Max.	Min.	Std.	Unit	Remarks
148	FIBER No. 30 ARC GAP	40.00	0.00	10.00	μm	
149	FIBER No. 30 OVERLAP	80.00	0.00	25.00	μm	
150	FIBER No. 30 ARC POWER	064	001	023	STEP	
151	FIBER No. 31 FUSION TIME	20.00	0.00	1.50	SEC	*CSF1-SMF3*
152	FIBER No. 31 PREFUSION TIME	1.00	0.00	0.07	SEC	
153	FIBER No. 31 ARC GAP	40.00	0.00	10.00	μm	
154	FIBER No. 31 OVERLAP	80.00	0.00	25.00	μm	
155	FIBER No. 31 ARC POWER	064	001	024	STEP	
156	FIBER No. 32 FUSION TIME	20.00	0.00	1.50	SEC	*CSF1-CSF2*
157	FIBER No. 32 PREFUSION TIME	1.00	0.00	0.07	SEC	
158	FIBER No. 32 ARC GAP	40.00	0.00	10.00	μm	
159	FIBER No. 32 OVERLAP	80.00	0.00	25.00	μm	
160	FIBER No. 32 ARC POWER	064	001	024	STEP	
161	FIBER No. 33 FUSION TIME	20.00	0.00	1.50	SEC	*SMF3-NZDS1*
162	FIBER No. 33 PREFUSION TIME	1.00	0.00	0.05	SEC	
163	FIBER No. 33 ARC GAP	40.00	0.00	10.00	μm	
164	FIBER No. 33 OVERLAP	80.00	0.00	25.00	μm	
165	FIBER No. 33 ARC POWER	064	001	024	STEP	
166	FIBER No. 34 FUSION TIME	20.00	0.00	1.50	SEC	*NZDS5-NZDS1*
167	FIBER No. 34 PREFUSION TIME	1.00	0.00	0.05	SEC	
168	FIBER No. 34 ARC GAP	40.00	0.00	10.00	μm	
169	FIBER No. 34 OVERLAP	80.00	0.00	25.00	μm	

No.	Name	Max.	Min.	Std.	Unit	Remarks
170	FIBER No. 34 ARC POWER	064	001	024	STEP	
171	FIBER No. 35 FUSION TIME	20.00	0.00	25.00	SEC	*NZDS3-NZDS1*
172	FIBER No. 35 PREFUSION TIME	1.00	0.00	0.05	SEC	
173	FIBER No. 35 ARC GAP	40.00	0.00	10.00	μm	
174	FIBER No. 35 OVERLAP	80.00	0.00	25.00	μm	
175	FIBER No. 35 ARC POWER	064	001	024	STEP	
176	FIBER No. 36 FUSION TIME	20.00	0.00	1.50	SEC	*NZDS3-SMF3*
177	FIBER No. 36 PREFUSION TIME	1.00	0.00	0.05	SEC	
178	FIBER No. 36 ARC GAP	40.00	0.00	10.00	μm	
179	FIBER No. 36 OVERLAP	80.00	0.00	25.00	μm	
180	FIBER No. 36 ARC POWER	064	001	024	STEP	
181	FIBER No. 37 FUSION TIME	20.00	0.00	3.00	SEC	*NZDS5-SMF3*
182	FIBER No. 37 PREFUSION TIME	1.00	0.00	0.02	SEC	
183	FIBER No. 37 ARC GAP	40.00	0.00	10.00	μm	
184	FIBER No. 37 OVERLAP	80.00	0.00	12.00	μm	
185	FIBER No. 37 ARC POWER	064	001	027	STEP	
186	FIBER No. 38 FUSION TIME	20.00	0.00	1.50	SEC	*NZDS3-NZDS5*
187	FIBER No. 38 PREFUSION TIME	1.00	0.00	0.02	SEC	
188	FIBER No. 38 ARC GAP	40.00	0.00	10.00	μm	
189	FIBER No. 38 OVERLAP	80.00	0.00	25.00	μm	
190	FIBER No. 38 ARC POWER	064	001	027	STEP	
191	FIBER No. 39 FUSION TIME	20.00	0.00	1.50	SEC	*NZDS2-PSCF1*
192	FIBER No. 39 PREFUSION TIME	1.00	0.00	0.07	SEC	

No.	Name	Max.	Min.	Std.	Unit	Remarks
193	FIBER No. 39 ARC GAP	40.00	0.00	7.00	μm	
194	FIBER No. 39 OVERLAP	80.00	0.00	8.00	μm	
195	FIBER No. 39 ARC POWER	064	001	022	STEP	
196	FIBER No. 40 FUSION TIME	20.00	0.00	1.50	SEC	*NZDS4-PSCF1*
197	FIBER No. 40 PREFUSION TIME	1.00	0.00	0.07	SEC	
198	FIBER No. 40 ARC GAP	40.00	0.00	6.00	μm	
199	FIBER No. 40 OVERLAP	80.00	0.00	10.00	μm	
200	FIBER No. 40 ARC POWER	064	001	022	STEP	
201	FIBER No. 41 FUSION TIME	20.00	0.00	1.50	SEC	*LCF1-PSCF1*
202	FIBER No. 41 PREFUSION TIME	1.00	0.00	0.10	SEC	
203	FIBER No. 41 ARC GAP	40.00	0.00	7.00	μm	
204	FIBER No. 41 OVERLAP	80.00	0.00	12.00	μm	
205	FIBER No. 41 ARC POWER	064	001	022	STEP	
206	FIBER No. 42 FUSION TIME	20.00	0.00	1.50	SEC	*LCF1-NZDS4*
207	FIBER No. 42 PREFUSION TIME	1.00	0.00	0.06	SEC	
208	FIBER No. 42 ARC GAP	40.00	0.00	6.00	μm	
209	FIBER No. 42 OVERLAP	80.00	0.00	10.00	μm	
210	FIBER No. 42 ARC POWER	064	001	024	STEP	
211	FIBER No. 43 FUSION TIME	20.00	0.00	1.50	SEC	*LCF1-LCF2*
212	FIBER No. 43 PREFUSION TIME	1.00	0.00	0.10	SEC	
213	FIBER No. 43 ARC GAP	40.00	0.00	6.00	μm	
214	FIBER No. 43 OVERLAP	80.00	0.00	12.00	μm	
215	FIBER No. 43 ARC POWER	064	001	024	STEP	
216	FIBER No. 44 FUSION TIME	20.00	0.00	1.50	SEC	*NZDS2-NZDS4*

No.	Name	Max.	Min.	Std.	Unit	Remarks
217	FIBER No. 44 PREFUSION TIME	1.00	0.00	0.06	SEC	
218	FIBER No. 44 ARC GAP	40.00	0.00	7.00	μm	
219	FIBER No. 44 OVERLAP	80.00	0.00	10.00	μm	
220	FIBER No. 44 ARC POWER	064	001	024	STEP	
221	FIBER No. 45 FUSION TIME	20.00	0.00	1.50	SEC	*NZDS2-EPSC1*
222	FIBER No. 45 PREFUSION TIME	1.00	0.00	0.15	SEC	
223	FIBER No. 45 ARC GAP	40.00	0.00	6.00	μm	
224	FIBER No. 45 OVERLAP	80.00	0.00	10.00	μm	
225	FIBER No. 45 ARC POWER	064	001	024	STEP	
226	FIBER No. 46 FUSION TIME	20.00	0.00	1.50	SEC	*SPF1*
227	FIBER No. 46 PREFUSION TIME	1.00	0.00	0.10	SEC	
228	FIBER No. 46 ARC GAP	40.00	0.00	10.00	μm	
229	FIBER No. 46 OVERLAP	80.00	0.00	15.00	μm	
230	FIBER No. 46 ARC POWER	064	001	024	STEP	
231	FIBER No. 47 FUSION TIME	20.00	0.00	1.50	SEC	*SPF2*
232	FIBER No. 47 PREFUSION TIME	1.00	0.00	0.10	SEC	
233	FIBER No. 47 ARC GAP	40.00	0.00	10.00	μm	
234	FIBER No. 47 OVERLAP	80.00	0.00	15.00	μm	
235	FIBER No. 47 ARC POWER	064	001	024	STEP	
236	FIBER No. 48 FUSION TIME	20.00	0.00	1.50	SEC	*SPF3*
237	FIBER No. 48 PREFUSION TIME	1.00	0.00	0.10	SEC	
238	FIBER No. 48 ARC GAP	40.00	0.00	10.00	μm	
239	FIBER No. 48 OVERLAP	80.00	0.00	15.00	μm	
240	FIBER No. 48 ARC POWER	064	001	024	STEP	

No.	Name	Max.	Min.	Std.	Unit	Remarks
241	HEAT UP TEMPERATURE A No. 1	464	176	176	° F	*FPS-1*
242	HEAT UP TEMPERATURE B No. 1	464	176	383	° F	
243	FINISH TEMPERATURE No. 1	464	176	302	° F	
244	HEATING DURATION A No. 1	999	000	000	SEC	
245	HEATING DURATION B No. 1	999	000	060	SEC	
246	HEAT UP TEMPERATURE A No. 2	464	176	383	° F	*FPS-40*
247	HEAT UP TEMPERATURE B No. 2	464	176	383	° F	
248	FINISH TEMPERATURE No. 2	464	176	302	° F	
249	HEATING DURATION A No. 2	999	000	012	SEC	
250	HEATING DURATION B No. 2	999	000	030	SEC	
251	HEAT UP TEMPERATURE A No. 3	464	176	320	° F	*FPS-19*
252	HEAT UP TEMPERATURE B No. 3	464	176	392	° F	
253	FINISH TEMPERATURE No. 3	464	176	248	° F	
254	HEATING DURATION A No. 3	999	000	020	SEC	
255	HEATING DURATION B No. 3	999	000	030	SEC	
256	HEAT UP TEMPERATURE A No. 4	464	176	374	° F	
257	HEAT UP TEMPERATURE B No. 4	464	176	374	° F	
258	FINISH TEMPERATURE No. 4	464	176	302	° F	
259	HEATING DURATION A No. 4	999	000	035	SEC	
260	HEATING DURATION B No. 4	999	000	035	SEC	
261	HEAT UP TEMPERATURE A No. 5	464	176	374	° F	

No.	Name	Max.	Min.	Std.	Unit	Remarks
262	HEAT UP TEMPERATURE B No. 5	464	176	374	° F	
263	FINISH TEMPERATURE No. 5	464	176	302	° F	
264	HEATING DURATION A No. 5	999	000	035	SEC	
265	HEATING DURATION B No. 5	999	000	035	SEC	
266	HEAT UP TEMPERATURE A No. 6	464	176	176	° F	
267	HEAT UP TEMPERATURE B No. 6	464	176	386	° F	
268	FINISH TEMPERATURE No. 6	464	176	302	° F	
269	HEATING DURATION A No. 6	999	000	000	SEC	
270	HEATING DURATION B No. 6	999	000	060	SEC	
271	HEAT UP TEMPERATURE A No. 7	464	176	176	° F	
272	HEAT UP TEMPERATURE B No. 7	464	176	374	° F	
273	FINISH TEMPERATURE No. 7	464	176	302	° F	
274	HEATING DURATION A No. 7	999	000	000	SEC	
275	HEATING DURATION B No. 7	999	000	040	SEC	
276	HEAT UP TEMPERATURE A No. 8	464	176	176	° F	
277	HEAT UP TEMPERATURE B No. 8	464	176	392	° F	
278	FINISH TEMPERATURE No. 8	464	176	302	° F	
279	HEATING DURATION A No. 8	999	000	000	SEC	
280	HEATING DURATION B No. 8	999	000	038	SEC	
281	HEAT UP TEMPERATURE A No. 9	464	176	374	° F	
282	HEATUP TEMPERATURE B No. 9	464	176	320	° F	

No.	Name	Max.	Min.	Std.	Unit	Remarks
283	FINISH TEMPERATURE No. 9	464	176	194	° F	
284	HEATING DURATION A No. 9	999	000	015	SEC	
285	HEATING DURATION B No. 9	999	000	035	SEC	
286	HEAT UP TEMPERATURE A No. 10	464	176	374	° F	
287	HEAT UP TEMPERATURE B No. 10	464	176	383	° F	
288	FINISH TEMPERATURE No. 10	464	176	194	° F	
289	HEATING DURATION A No. 10	999	000	000	SEC	
290	HEATING DURATION B No. 10	999	000	060	SEC	
291-400	NOT USED					
401	CLEANING ARC DURATION	1.00	0.00	0.10	SEC	
402	ADDITIONAL ARC DURATION	20.00	0.00	1.50	SEC	
403	ADDITIONAL ARC WAITING TIME	180	000	015	SEC	
404	ADDITIONAL ARC POWER	064	001	020	STEP	
405	CONDITIONING ARC DURATION	15.00	0.00	1.00	SEC	
406	CONDITIONING ARC TIMES	200	000	030	#	
407	CONDITIONING ARC INTERVAL	060	015	030	SEC	
408	SLEEP TIMER	010	000	003	MIN	SUPPLEMENT
409	AUTO POWER OFF TIMER	010	000	001	MIN	SUPPLEMENT
410	PRINTOUT DELAY TIMER	999	000	005	SEC	SUPPLEMENT
411	LANGUAGE SELECTION	001	000	001	-	SUPPLEMENT
412	SAMPLING LINE DISPLAY	001	000	000	-	SUPPLEMENT
413	PROCESS MESSAGE DISPLAY	001	000	000	-	SUPPLEMENT
414	ARC PAUSE	001	000	000	-	SUPPLEMENT
415	DATA MEMORY	002	000	002	-	SUPPLEMENT
416	BUZZER BIT	001	000	001	-	SUPPLEMENT

417	BAUD RATE	003	000	003	-	SUPPLEMENT
418	SIO CONTROL	255	000	000	-	SUPPLEMENT
419	SIO CONTROL 2	255	000	000	-	SUPPLEMENT
420	SIO CONTROL 3	255	000	000	-	SUPPLEMENT
421	Not Used	-	-	-	-	-
422	LIP ERROR CHECK LIMIT	20.00	0.00	5.00	°	
423	ARC WAIT TIME	010	000	003	SEC	
424	SELF INSPECTION	1	0	1	-	SUPPLEMENT
425	FIBER DETECTION SEQUENCE	3	0	0	-	SUPPLEMENT
426-460	NOT USED					

16.1 Parameter Settings, Supplemental Description

No.	Name	Description			
408	SLEEP TIMER	0 = OFF, 1 - 10 min			
409	AUTO POWER OFF TIMER	0 = OFF, 1 - 10 min			
411	LANGUAGE SELECTION	0 = JAPANESE 1 = ENGLISH (Standard Setting) 2 = KOREAN 3 = CHINESE 4 = ITALIAN 5 = GERMAN 6 = FRENCH 7 = SPANISH 8 = PORTUGUESE			
412	SAMPLING LINE DISPLAY	0 = OFF (Standard Setting), 1 = ON			
413	PROCESS MESSAGE DISPLAY	0 = DISPLAY OFF, 1 = DISPLAY ON			
414	ARC PAUSE	0 = OFF (STANDARD SETTING), 1 = ON			
415	DATA MEMORY	0 = AUTO, 1 = MANUAL, 2 = NONE			
416	BUZZER BIT	0 = BUZZER OFF, 1 = BUZZER ON			
417	BAUD RATE	VALUE: 0 1 2 3; BAUD RATE (bps): 2400 4800 9600 19200			
418	SIO CONTROL *Used to output data via the RS-232 port.*	000 NO DATA OUTPUT 001 CORE DATA 002 DIAMETER DATA 004 ARC TEST DATA 008 END ANGLE DATA 016 EST. LOSS DATA 032 FOCUS DATA 064 CLEAVE ANGLE DATA *To output more than one maintenance function, add each setting number together and enter the sum.*			
419	SIO CONTROL 2 *Used to output data via the RS-232 port.*	000 NO DATA OUTPUT 001 FIBER DETECTION DATA 002 SELF-INSPECTION DATA			
420	SIO CONTROL *Used to output data via the RS-232 port.*	000 NO DATA OUTPUT 016 MDT DATA			
424	SELF INSPECTON	0 = OFF, 1 = ON			

425	FIBER DETECTION SEQUENCE	000=PASS ON 2ND GUESS, CONT. W/ SET
		001=PASS 1ST GUESS ONLY, CONT. W/ SET
		002=PASS ON 2ND GUESS, NO CONT. W/ SET
		003=PASS 1ST GUESS ONLY, NO CONT. W/ SET

17.0 NOTES

Splice Data Documentation

Date	Enclosure	Splice #	Estimated Loss (dB)	Bi-Directional OTDR Reading (dB)		
				A ➔ B	B ➔ A	Avg.

Additional Notes

Additional Notes