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Type–65 Micro-Mass Fusion Splicer

1.0 General

1.0.1 This manual contains all the necessary information required to unpack, setup and use the Type-65 Micro-Mass Fusion Splicer for creating low-loss optical fiber splices in the field. The Type-65 can be used to splice multi-fiber ribbons of up to 12 fibers and single optical fibers with a cladding diameter of 125 µm. Factory or field constructed ribbons with a coating diameter and fiber pitch of 250 µm are applicable.

➲ ***Note: Before using the fusion splicer in the field 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-65 is designed to splice a variety of optical fiber types including:

- ✓ Single mode (SMF)
- ✓ Multi-mode (MMF)
- ✓ Dispersion Shifted (DSF)

The acceptable cleave length is 10 µm. Identical 12 Count ribbon fiber splices require approximately 30 seconds, and average splice losses are typically 0.05 dB or less.

1.0.3 Dual microscopes allow the user to examine fiber alignment from two perspectives (X view and Y view), ensuring optimum fiber placement prior to splicing. When the AUTOMATIC MODE is selected, the precision motors automatically position the fibers at the optimal distance for pre-fusing, and control the amount of fiber overlap during the splice operation. After splicing, the splicer automatically calculates an estimated splice loss for individual fibers based upon inspection data obtained before and after fusion. A proof test can then be performed to verify the strength and physical integrity of the splice.

A shrinkable reinforcing sleeve is then applied and shrunk in the built-in heater to protect the completed splice.

Figure 1. Type 65 Fusion Splicer

1.1 Specifications

- *Optical Fiber Requirements*

Material	Silica Glass
Profile Type	Single mode, Multi-mode, Dispersion Shifted
Fiber Diameter	125 µm
Fiber Coating Diameter	250 µm Ribbon or (250, 400, 600, or 900 µm for single)
Fiber Pitch (ribbon fiber)	250 µm
Fiber Count	1, 2, 4, 6, 8, 10, 12 (Factory or Field Constructed Ribbons)
Cleave Length	10 mm

- *Size and Weight*

Size	150W X 150H X 150D mm, (5.9W X 5.9H X 5.9D inches)
Weight	2.9 Kg (6.6lb)
Display	Adjustable 5.6” Color LCD monitor

- *Power Source*

AC	100 to 240V 50/60 Hz
DC	12V
Battery Type	NiMH (20+ ribbon splices including heat cycle and hot jacket remover operation per battery charging for 12ct. ribbon fiber)

- *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	0-3500 meters (11,475ft.)

- *Standard Performance*

Typical Splice Loss (Identical Fibers)	SMF: 0.05 dB MMF: 0.03 dB DSF: 0.07 dB
Splice Cycle Time	30 Seconds(12C Ribbon)
Heater Cycle Time	90 Seconds(12C Ribbon)
Splice Data Storage	250 Splices

- *External Terminals*

Data Communications	9 Pin D-Sub Connector RS-232C
12 VDC Output	Accessories (i.e. Heated Jacket Remover)
Video Output	RCA Jack – Video Signal

- *Programs*

Fusion Condition Settings	21 Standard, 48 Maximum (3 Fiber Categories with program selections)
Fusion Parameters	5 Adjustable Parameters

1.2 Structure

1) Main Body

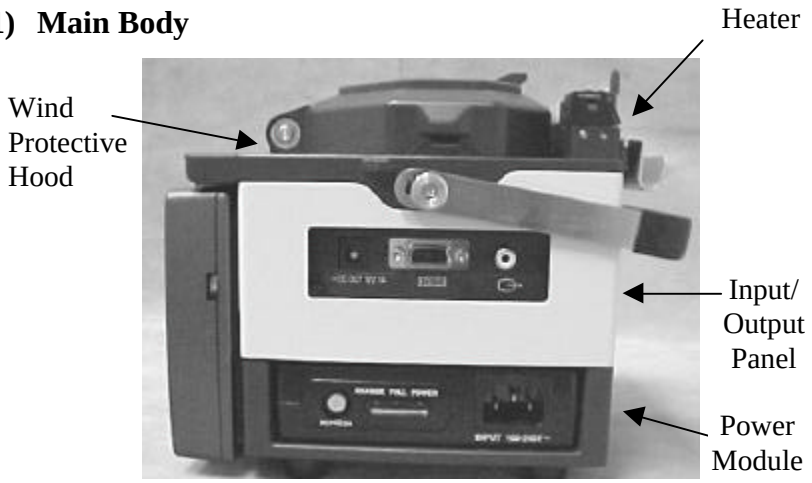
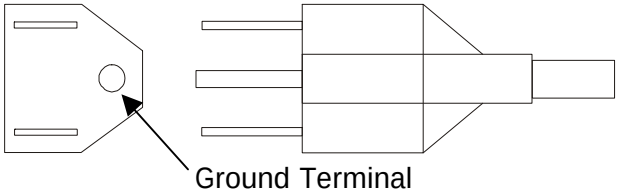


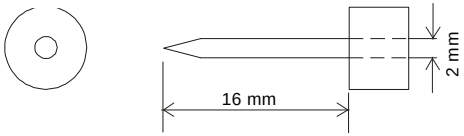
Figure 3. Side View

Figure 4. Top View

2) AC Power Cord [PC-AC2]



3) Electrode [ER-7]



4) Input/Output Panel

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

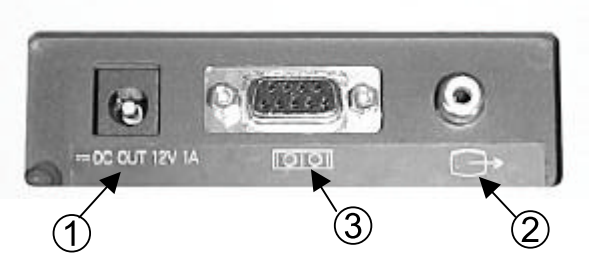


Figure 5. Input/Output Panel

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

1.3 Operating Recommendations

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

1.3.2 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 11, *Using the Battery Charger*. A fully charged battery can power the splicer for approximately 20 ribbon splices including heating cycles and hot jacket remover operation

1.3.3 To ensure low-loss and quality splices, prepare the fibers first by cleaning them carefully and then cleaving as accurately as possible. A power meter, or equivalent test, is recommended for final verification of splice loss.

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

1.3.5 Ensure the splicer is dry before operating it. If necessary, dry the splicer with a hair dryer before operation.

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

1.3.7 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.***

1.3.8 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 – *(U.S. Only)*

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
SP-F03-202	FTA-02 Fiber Arrangement Tool
ETK9926012	JR-5 Heated Jacket Remover
ETK9926004	JR-22 Jacket Remover
SP-FO3-522	FCP-25 Fiber Cleaver
MSDS	As supplied

4.0 Parts, Repairs and Ordering Information

4.1 Standard Equipment

Part Name	Quantity	Model
• Type-65	1pc	
• AC Power Supply/Battery Charger Unit	1pc	PS-M1
• Battery*	1pc	BU-M1(BU-65)
• AC Power Cord	1pc	PC-AC2
• Cooling Tray	1pc	CT-65
• V-Groove Cleaning Brush VGB-003-R	1pc	VGB-003-R
• Spare Electrodes (pair)	1pair	ER-7
• Operation Manual	1pc	N/A
• Carrying Case	1pc	SC-M1

*** Battery is optional**

4.2 Accessories

Item	Description	U.S. Part #	SEI Part #
Fiber Cleaver	Cleaves up to 12ct. Ribbon fiber	FCP-25	
Jacket Remover	Thermal remover for ribbon fiber	JR-5	
Fiber arrangement tool	Forms up to 12ct. ribbon from single strand fiber	FTA-02	
Fiber Holders	Universal 12 fiber ribbon holder (pair)	RHS-12U	SS-50-12
	10 fiber ribbon holder (pair)	RHS-10U	SS-50-10
	8 fiber ribbon holder (pair)	RHS-08	SS-50-8
	6 fiber ribbon holder (pair)	RHS-06	SS-50-6
	4 fiber ribbon holder (pair)	SM-4U	SS-50-4
	2 fiber ribbon holder (pair)	SM-2U	SS-50-2
	900 µm single fiber holder (pair)	RH-900	FH-09
	600 µm single fiber holder (pair)	RH-600	
	400 µm single fiber holder (pair)	RH-400	
	250 µm single fiber holder (pair)	RH-250	FH-025
	Power supply/battery charger for Type-65	PS-M1	PS-65
	Battery unit for Type-65 & 45	BU-M1	BU-65
	Battery unit for Type-65 & 45	BU-M1	BU-65
	Field tool kit	TK-61	
	Halogen work light	SPL-1	

4.3 Consumables

Description	Part Number
Fiber protection sleeves – 2 to 12 fibers	FPS-6
Fiber protection sleeves – 2 to 8 fibers	FPS-5
Fiber protection sleeves (single fiber)	FPS-1
Consumable kit for fiber arranger tool	FAC-24
Gauze wipes	N/A
Cotton swabs	CTSW-1
Isopropyl alcohol	N/A

4.4 Ordering Information *(U.S. 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)*

4.5.1 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-65 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 to front mounting position and lock monitor in place.

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

6.1.1 Before splicing collect all of the necessary equipment:

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

➲ ***Note: If using a heated jacket remover, allow the unit to heat up prior to use. (Refer to manual on JR-5)***

6.2 Adjusting the LCD Monitor

6.2.1 The Type-65 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 6 allows you to alternate between operation and storage positions.

➲ ***Note: The LCD monitor is designed to be raised only 90 degrees. Do not exceed the maximum limit.***

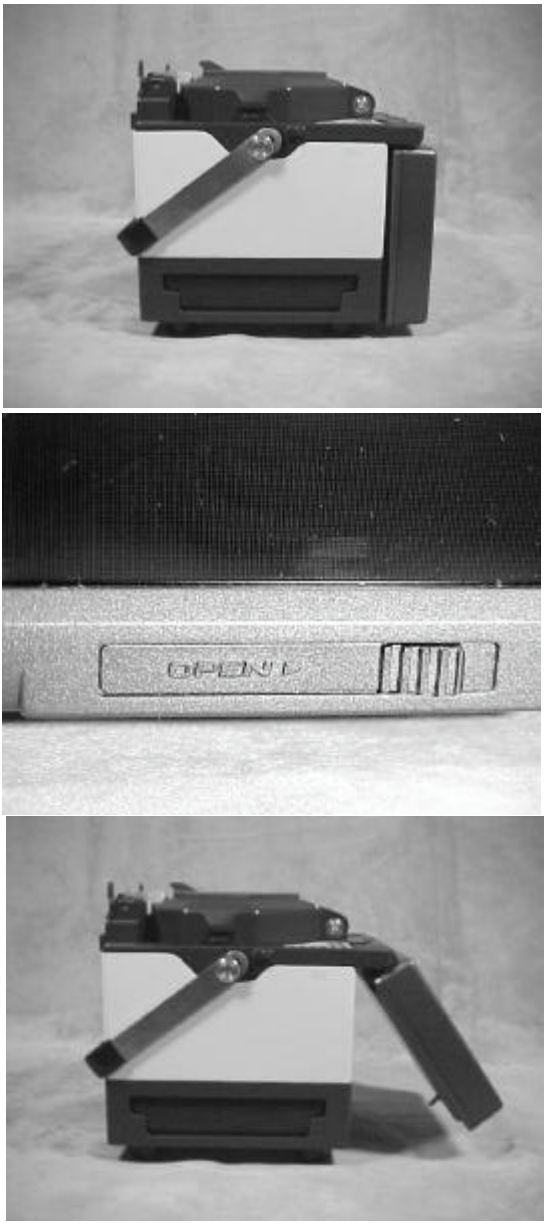


Figure 6. Positioning LCD Monitor

6.3 AC Operation

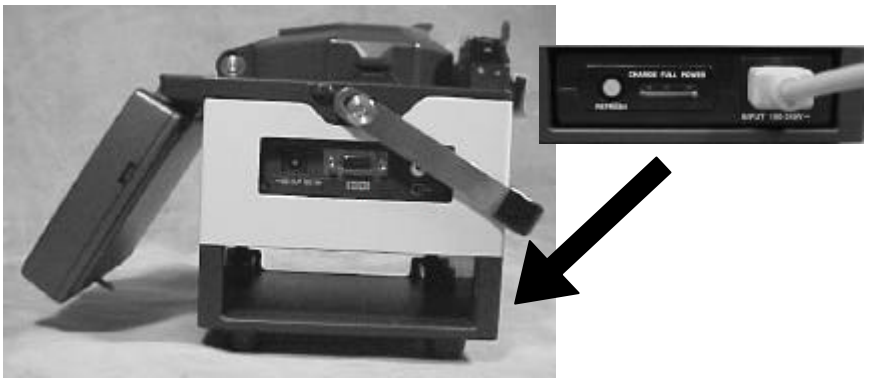


Figure 7. AC Operation

1. Insert the AC Power Supply/Charger into the power module slot 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 " | " button. When initialization is complete the splicer will display the SPLICE MODE screen.

6.4 Battery Operation

6.4.1 The Type-65 will operate on a fully charged battery pack for a duration of up to 20 splices including hot jacket remover operation and heat shrink protection. The battery level indicator is located in the lower left hand corner of the LCD monitor as shown in Figure 9. To help extend battery operation time refer to Section 14.6.3, *Power Management Functions*.

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

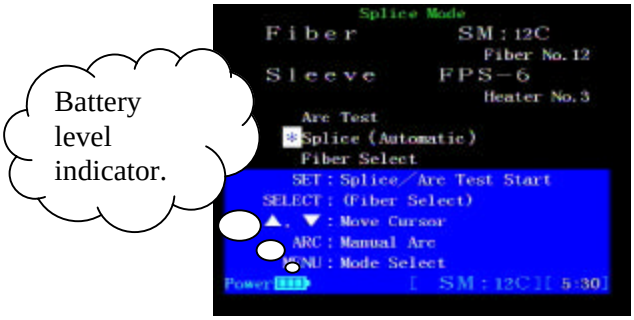


Figure 9. Battery Level Indicator

Installation

1. Place the BU-M1(BU-65) battery into the power module slot on the side of the splicer and slide forward until the battery locks into place.

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

Removal

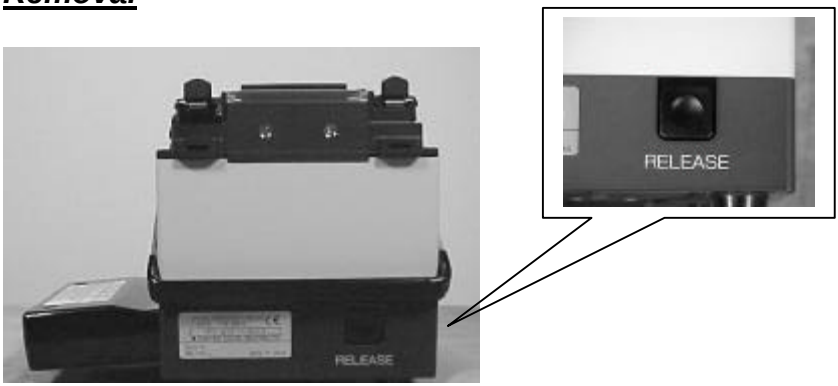


Figure 10a. Battery Removal

1. Remove the battery by pressing the RELEASE button located on the rear of the splicer.
2. While pressing the RELEASE button slide the battery out of the power module slot until it is free from the splicer.

Battery Charging

Figure 10b. Battery Installation

1. Plug the AC Power Module/Charger 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 hours, and an LED will indicate when charging is complete. Please refer to Section 11, *Using the Power Supply/Battery Charger*, 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 11. 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 MENU 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.
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.
|	Turns splicer on.
SET	Begins splicing operation and ARC TEST.
RESET	Returns the splicer to the initial menu screen. Used to abort a splicing operation.
HEAT	Starts the protection sleeve heater. Orange LED illuminates when operated.

➲ ***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 Selecting and 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 12. 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.

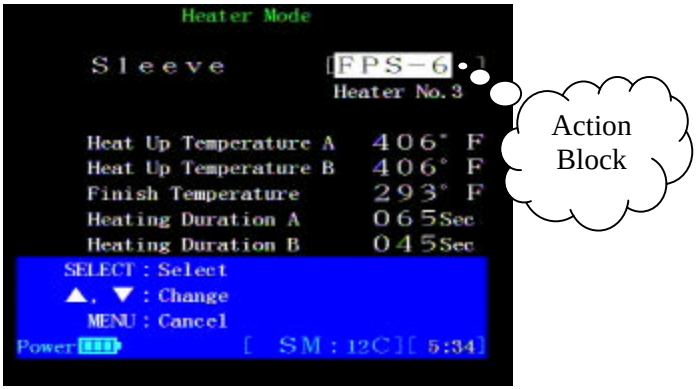


Figure 12. Editing Action Blocks

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

7.3 Editing Numeric Inputs

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

1. As shown in Fig. 13, 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 13. Editing Numeric Values

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

8.0 Operating Procedures

8.1 Splicing Steps Summary

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

- Turn the splicer on
- Plug in the heated jacket remover and allow it to warm up for approximately 20 sec.
- Check/select the fusion splicing program that matches the fiber being spliced.
- Put a reinforcing sleeve over one of the fibers
- Place the fibers into the appropriate fiber holders
- Remove the fiber jackets
- Clean the bare fibers
- Cleave the fibers
- Insert the fibers into the splicer
- Start the automatic splice process
- Slide the reinforcing sleeve over the splice
- Reinforce the splice
- Remove the protected splice and store it.

8.2 Splice Mode Menu Functions

8.2.1 The SPLICE MODE menu is the screen the splicer will show when first turned on, or when the "**RESET**" key is pressed. This menu screen allows the fusion splicer to be set up to splice different types of fibers with various ribbon fiber counts or single fibers. Up to 48 arc condition programs (factory programmed) optimized for various splicing scenarios can be stored and recalled. Each program specifies five arc parameters: arc power, fusion duration, pre-fusion time, arc gap, and overlap, to accommodate a variety of fiber types and splicing conditions. The programs are retained when the splicer is turned off.

Splice

- **SPLICE (AUTO)**: Sets automatic fusion splicing, and loss estimation.
- **ARC TEST**: Compensates for environmental changes by melting and measuring the fiber end faces to ensure proper arc power.

Splice Condition

- **FIBER SELECT**: Sets up the inspection software and arc condition for 1 of 21 fusion programs. Fiber types include SMF, MMF, or DSM. Each type includes 7 programs for splicing one of the following fiber counts; 12, 10, 8, 6, 4, 2 and 1 fiber(s).

8.3 Selecting a Fiber Type and Count

7.3.1 The current fiber splice condition should match the type of fiber and the number of fibers 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 (i.e. SM, MM or 12C, 2C) follow these steps:

1. Using the arrow keys move the cursor to "FIBER SELECT", and press "**SELECT**".
2. Use the arrow keys to select the correct fiber count and type to be spliced and press "**SELECT**".

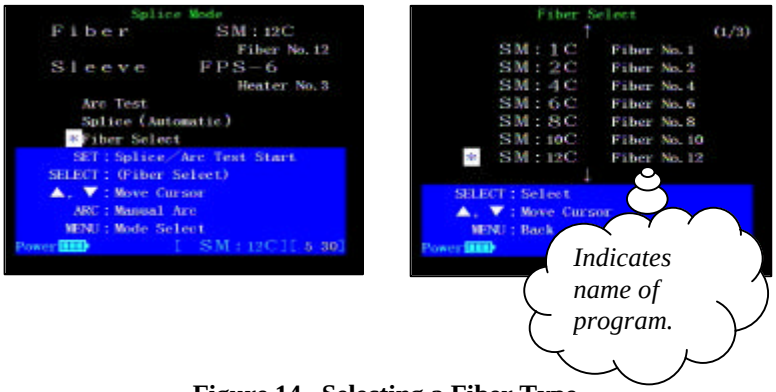


Figure 14. Selecting a Fiber Type

➲ ***Note: Program names are user definable. Refer to Section 14.7 Editing Fusion Program Names for information on customizing***

8.4 Installing a Reinforcing Sleeve

8.4.1 Select a reinforcing sleeve that will provide proper protection for the number of fibers being spliced:

- FPS-6: 2-12 fibers
- FPS-5: 2-8 fibers
- FPS-1: 1 fiber

8.4.2 Slip the fiber protection sleeve over one of the fibers to be spliced. Be sure to do this before stripping or cleaving the fibers. Place the sleeve over the fibers such that when the fibers are placed into the heater the ceramic strength member is resting against the heater element.

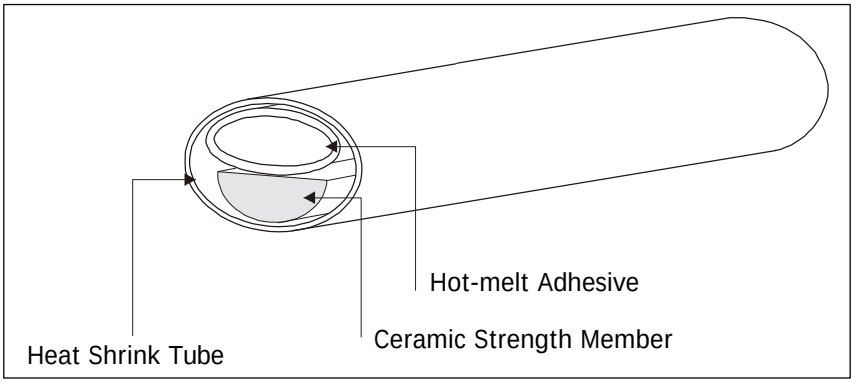


Figure 15. FPS-6 Fiber Protection Sleeve

8.5 Preparing the Fiber

8.5.1 Sumitomo mass fusion splicing requires the use of a fiber holder system throughout the entire splice procedure. To begin, place the optical fibers in a fiber holder that corresponds to the number of fibers being spliced. Fiber holders are available for splicing the following fiber counts:

- 250 µm single fiber
- 400 µm single fiber
- 600 µm single fiber
- 900 µm single fiber
- 12 fiber ribbon
- 8 fiber ribbon
- 6 fiber ribbon
- 4 fiber ribbon
- 2 fiber ribbon

1. Place the optical fiber in the fiber holders with the ends protruding approximately 2.5 to 3 cm. (1 to 1 ¼ inches)

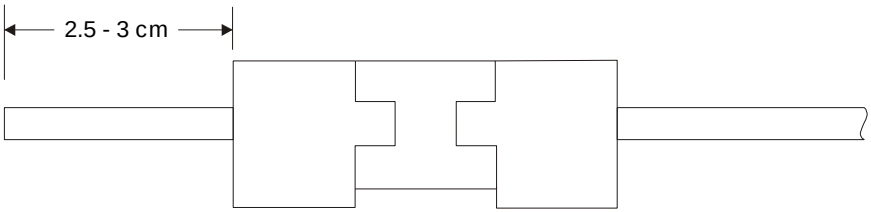


Figure 16. Placing Ribbon in Holder

2. Remove the fiber jacket using the JR5 heated jacket remover. With the cover closed, apply heat for 3 to 5 seconds, and pull the jacket off in one smooth motion. *(Operation procedures for the Sumitomo Heated Jacket Remover can be found inside the unit's carrying pouch.)*

➲ ***Note: To ensure best results do not remover the fiber from the fiber holders from this point on.***

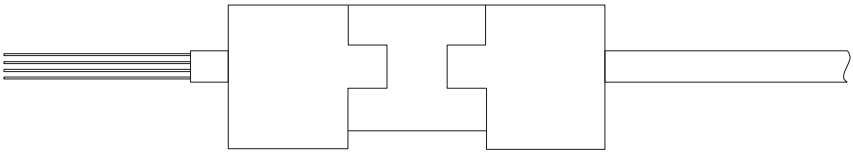


Figure 17. Ribbon With Coating Removed

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

   ➲ ***Note: For best results pay special attention when cleaning the section of fibers closest to the fiber holder. Any residue left behind will cause the fibers to fan out and increase chances for high splice losses.***

4. Lay the holder into the fiber cleaver ensuring the fibers lay flat and do not cross over each other. If crossovers are found, lightly brush the ends with your fingers to fan out all fibers in a straight line. Referring to procedures for use of the cleaver, cleave the fibers. *Operation procedures for the Sumitomo Mass Fiber Cleaver can be found inside the units carrying pouch.*

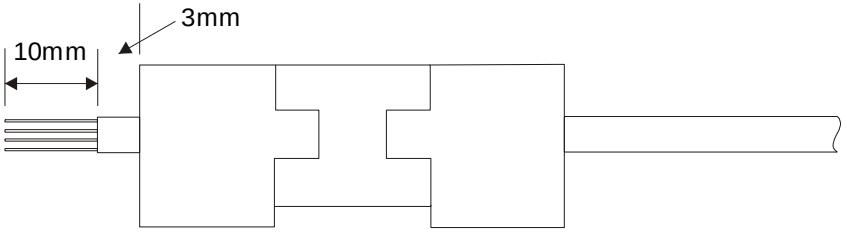


Figure 18. Cleaved Ribbon

➲ ***Note: Do not re-clean fibers after cleaving.***

5. Immediately after cleaving the fibers place the holder on the stage of the splicer to avoid chipping or damaging the delicate fiber ends. Position the fiber holder such that the hinges are at the rear of the machine or the identification markers are pointed towards the v-grooves.

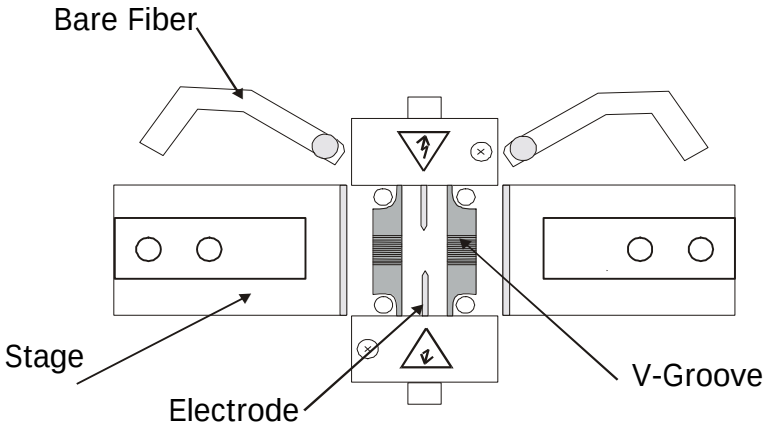


Figure 19. Splicing Area

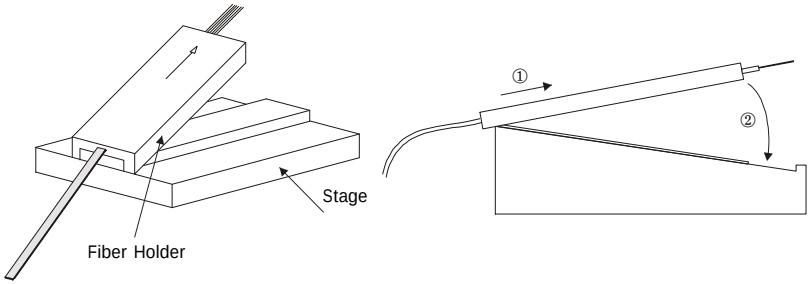


Figure 20. Positioning the Fiber Holder

➲ ***Note: Do not allow the fiber end faces to touch anything or slide horizontally in the bottom of the v-grooves. This will damage or contaminate the fiber end faces.***

6. With the fiber holder seated on the stage, lowering the fiber holder and sliding it forward should place the fibers inside the v-grooves. Check to make sure the fibers are seated properly inside each v-groove. Moving the fiber holder slightly forward and backward 1 to 2mm will aid in verifying proper position.

7. Close the bare fiber clamps by lifting and rotating arm towards the v-grooves. Close 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 function that should be used to ensure consistently high-quality splices. Situations that should prompt an arc test are:

- Changing fiber types or count
- Changing splice location
- Initial splicing set-up
- Use of splicer in extreme temperatures or humidity
- Poor splice performance
- Wear on electrodes
- Replacing or cleaning electrodes

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

9.2 Performing an Arc Test

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

1. Remove the coatings, clean, cleave, and insert the fibers as for a normal splice. See *Section 7.5*, for instructions on preparing the fibers for splicing.

2. Select a fusion program to match the fiber type and count to be spliced. *Refer to Section 7.3*

3. From the SPLICE MODE menu screen, move the cursor to ARC TEST, and press "**SET**" to begin the test as shown in Figure 21.

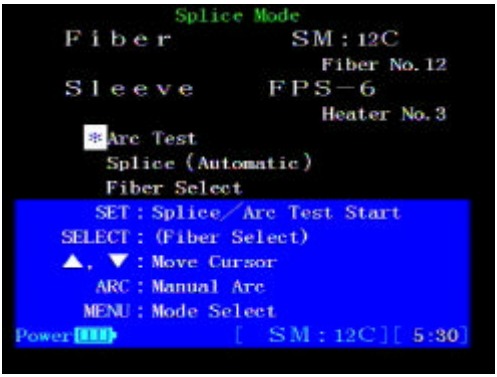


Figure 21. Starting an ARC Test

Figure 21B. Performing an ARC Test

4. The splicer will automatically measure the amount of melt back as shown in Figure 21b 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 the words ARC OK appear.
6. When the words “ARC OK” appear 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 22.

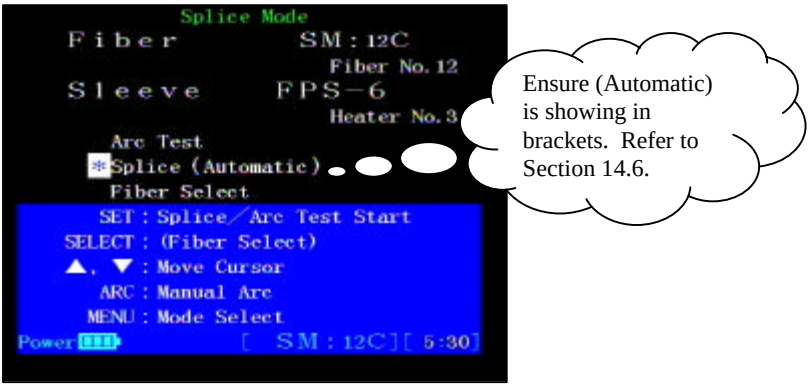
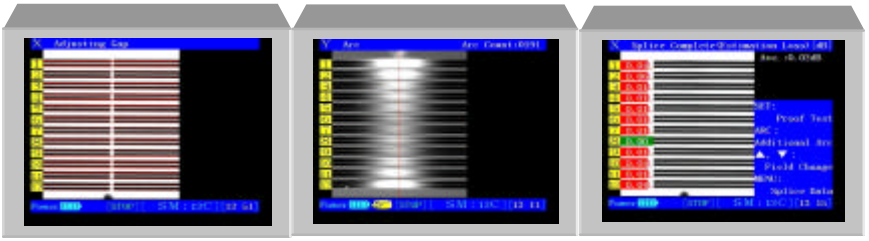


Figure 22. Starting the Automatic Splice

2. Press “**SET**” to begin automatic splicing process.
3. Upon completion of the splice, a proof test can be performed to test its physical integrity by pressing the “**SET**” key.
4. In addition, visual inspection of the fiber in both the X and Y views is possible by pressing the "▲" or "▼" arrow keys, and an additional arc can be produced by pressing the "**ARC**" key.

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.



a) b) c)

Figure 23. Splicing Process

10.0.4 Following the splice, complete splice/fiber inspection data and images can be viewed by following the on-screen instructions.

➲ ***Note: When splicing multi-mode fibers, splice loss estimations will not be shown.***

10.1 Evaluating Splice Quality

10.1.1 Refer to the Figure 23 to aid in visually evaluating the splice quality. Use the ▼,▲ arrow keys to examine the fiber images in both X and Y view.

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.

11.0 Splice Protection

11.1 Positioning the Splice in the Heater

11.1.1 The integrated heater unit, as shown in Figure 24, 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 24. 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 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. Making sure the fiber protection sleeve is centered over the spliced portion, maintain a slight tension on the fiber ends and 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 25.

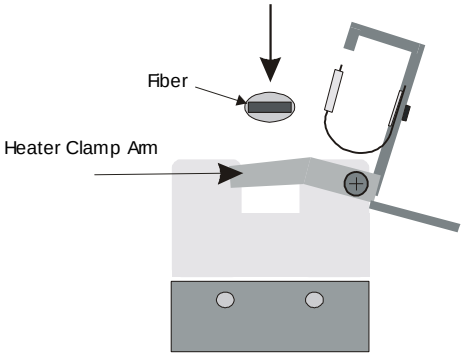


Figure 25. Closing the Heater Clamps

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 26, open the left heater clamp and pull the fiber to the left to activate the tension spring and close.

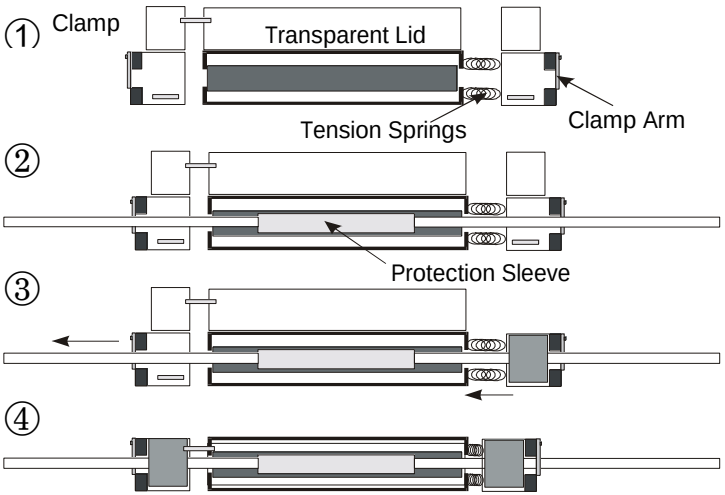


Figure 26. Applying Maintaining Tension

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

11.2 Heating/Shrinking the Sleeve

1. Press "**HEAT**" on the keypad to begin the heat 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 fusion splicer and heater can be operated simultaneously.

3. After about 90 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 27).

Warning: Sleeve may be hot! Handle with care.

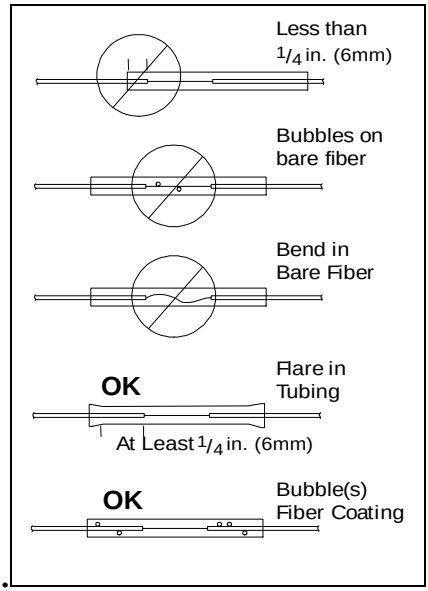


Figure 27. Reinforcing Sleeve Inspection.

12.0 Using the Power Supply/Battery Charger

12.1 Description

BU-M1(BU-65) battery packs are re-charged using the PS-M1(PS-65) power supply/battery charger. The charger has 3 status LED's located on the front panel, that identify the stage of the charging process. Figure 28 describes the LED's and each various status condition.

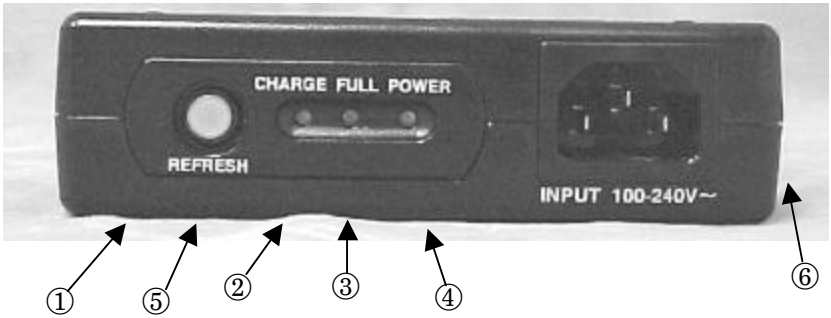


Figure 28. Battery Charger Status LED's

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	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.***

12.2 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 required charging a fully discharged BU-M1(BU-65) battery pack is 2.5 - 3 hours. To charge a battery perform the following procedure:

1. Referring to Figure 29, connect the charging cord between the "charge output" on the PS-M1 battery charger and the "charge input" on the BU-M1 battery.

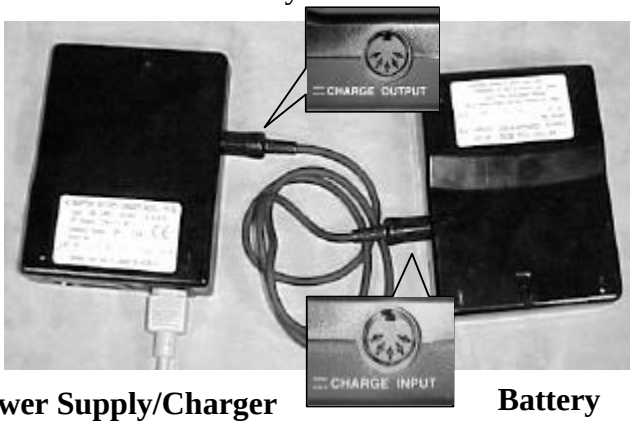


Figure 29. Connecting the Battery for Charging

2. Using supplied AC power cord, first 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.
4. When refreshing is complete the charging cycle will automatically begin. (Refer to Figure 28 for information on status LED’s.)
5. When charging is complete, the “FULL” LED will turn on.
6. Remove AC power, and disconnect battery from the charger.

13.0 Software Functions and Menu Selections

13.1 Splice Mode Menu

13.1.1 The Splice Mode Menu shown in Figure 36 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 36. Splice Mode Menu Screen

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

- The type of fiber (ex. SM or MM) and the number of fibers to be spliced… **12C**
- The fusion program selected … **Fiber No. 12**
- The active heater program … **FPS-6**

13.1.3 The lower 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 condition and fiber type. *(For more information on performing an ARC TEST refer to Section 8.0 Arc Test Procedure)*

- **SPLICE**- Activated by pressing the "**SET**" key, this function initiates the splicing process. In Figure 36, (Automatic) indicates that the splicing process is set for automatic splicing. To change to manual splicing refer to Section 14.4.1, *Changing Splicing Mode Operation.*

- **FIBER SELECT**- This option is used to change the fusion program to match the fiber type and count being spliced. To enter this option press "**SELECT**".

  (*For more information on selecting a fiber type refer to Section 7.3, Selecting a Fiber Type.)*

13.2 The Menu Select Screen

13.2.1 To enter the MENU SELECT screen, press the "**MENU**" key. The MENU SELECT screen (Figure 37) provides access to the following mode functions:

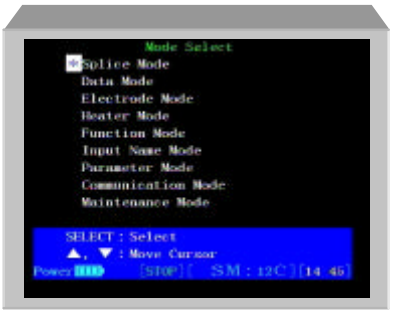


Figure 37. Menu Select Screen

- **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-65 has the capability to record splice loss information for each splice that is performed. A total of 100 splice data locations are available with each location capable of storing up to 12 data points. 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 MENU SELECT screen shown in Figure 37, choose DATA MODE and press "**SELECT**" to view the menu screen shown in Figure 38.

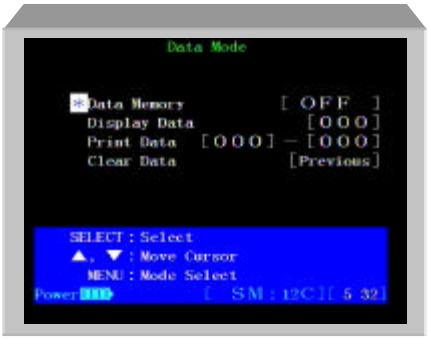


Figure 38. Data Mode Menu

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

- AUTO- Splice loss data is stored automatically when splice is complete
- MAN.- 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 38 and press "**SELECT**" to highlight the action block. *(For detailed information on editing action blocks refer to Section 6.1)*
2. Using the ▼, ▲ arrow keys scroll through the available options and choose desired setting.
3. Press "**SELECT**" to accept 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 38, move the cursor to "Display Data" and press "**SELECT**" to highlight the numeric action block.

2. Referring to Section 6.2 *Editing Numeric Inputs*, enter the memory location you would like to view and press "**SELECT**" to display the stored splice loss information.

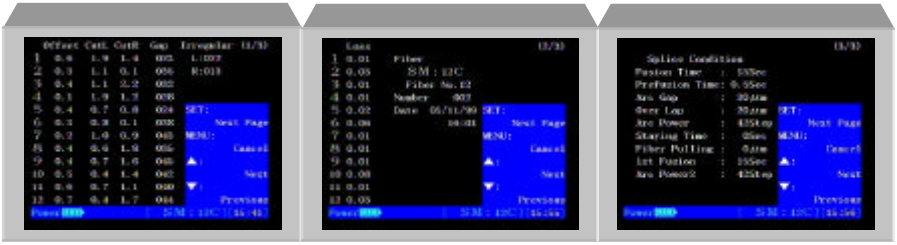


Figure 39. Stored Splice Data

3. Figure 39 shows splice loss data for a 12-fiber ribbon 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 38, choose PRINT DATA and press "**SELECT**" to edit the start and stop printing range.
2. Referring to Section 6.2 *Editing Numeric 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 40 will be displayed.

Figure 40. 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 38, choose "Clear Data" and press "**SELECT**" to edit the action block.
2. Referring to Section 6.1 *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 MENU SELECT screen shown in Figure 37.

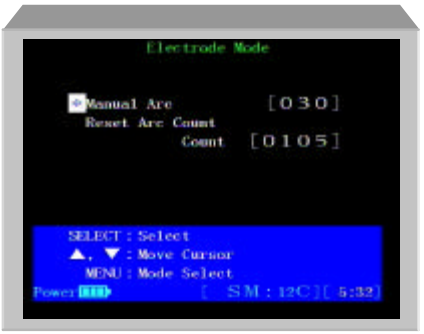


Figure 41. Electrode Mode Menu

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 13.4 Replacing Electrodes.)*

13.4.3 **RESET ARC COUNT**- is used to reset the internal arc counter to zero. Each time the electrodes arc 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 41, 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.***

13.5 Selecting a Heater Program

13.5.1 The protection sleeve heater can be set up to optimally shrink various lengths of fiber protection sleeves. There are 4 factory set programs that are available; FPS-1 (60mm, single fiber), FPS-5 (40mm, 2-8 fibers), FPS-6 (40mm, 2-12 fibers), and SP (special). The SP program can be user programmed to match a specific type sleeve that is different than the standard settings. To select a heating program that matches your protection sleeve perform the following procedure:

1. Press the **"MENU"** key to display the MENU SELECT screen.
2. Choose HEATER MODE and press "**SELECT**"

Figure 41. Entering Heater Mode

3. Press “SELECT” to edit the action block and use the ▼, ▲ arrow keys to scroll through the available programs. As the heater program is changed the condition settings shown below will also change to reflect the selected program.
4. Press “**SELECT**” to accept changes.
5. The active heater program is indicated on the SPLICE MODE MENU screen as shown in Figure 42.

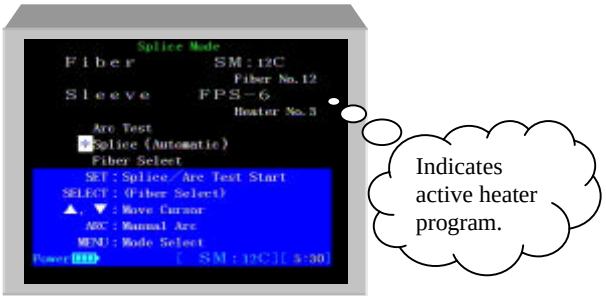


Figure 42. Active Heater Program

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:

Press “**MENU**”

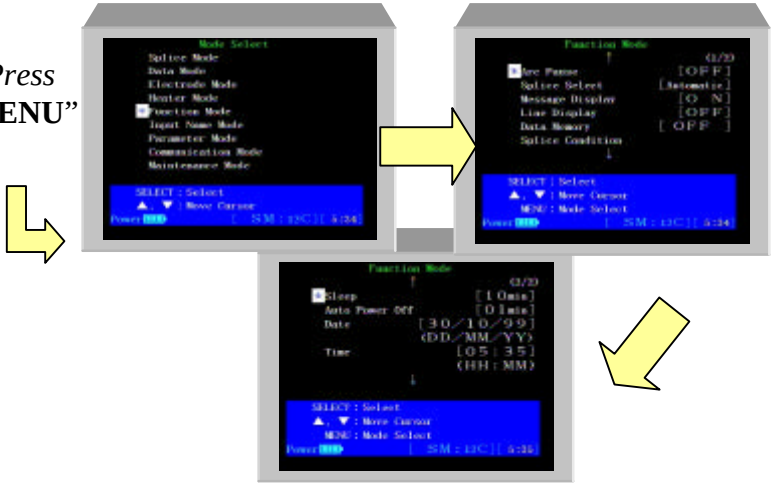


Figure 43. Entering Function Mode

Splice Operation Messages

13.6.2 During the splicing operation it is possible to display messages that indicate what phase of the splice the machine is currently performing. Figure 44 shows an example of the information being displayed while splicing. To enable the display of messages during the splicing operation perform the following:

1. Referring to Figure 43, enter the FUNCTION MODE menu screen.
2. Choose MESSAGE DISPLAY and press "**SELECT**".
3. Referring to Section 6.1 *Editing Action Blocks*, use the arrow keys to choose between, OFF and ON.
4. Press "**SELECT**" to accept changes.

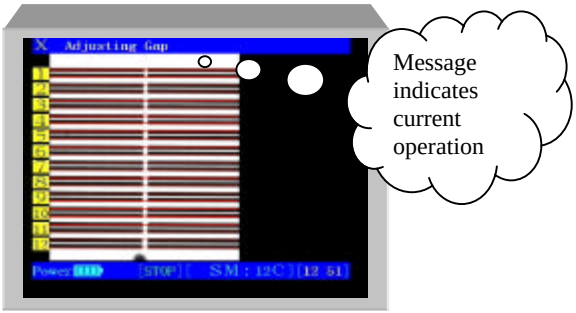


Figure 44. Splice Operation Messages

Power Management Functions (Sleep Mode)

13.6.3 When operating from a battery source to minimize power consumption the Type-65 has a built in sleep mode and automatic power down feature, which can be activated if the splicer remains in-active for time intervals of up to 10 minutes. To access the power management functions:

1. Referring to Figure 43, from the MODE SELECT screen choose FUNCTION MODE and press "**SELECT**".

2. Use the ▼, ▲ keys to scroll to the 2nd page

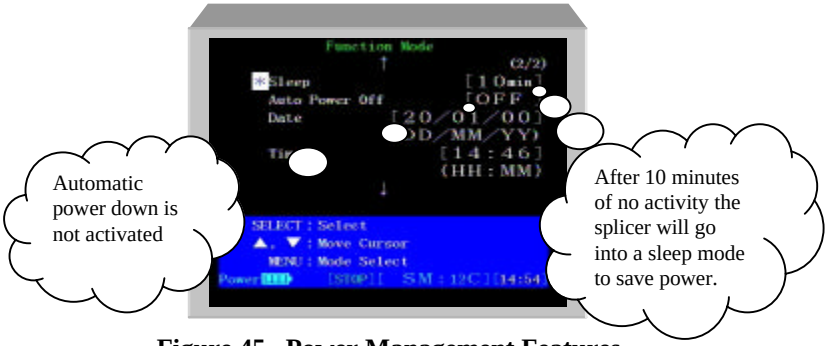


Figure 45. Power Management Features

- **SLEEP**- In Figure 45, 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 lit

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

➲ 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 6.1 *Editing Action Blocks*, use the ▼, ▲ arrow keys to choose desired setting.

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

4. Press "**SELECT**" to accept changes.

- **AUTO POWER OFF**- In Figure 45, 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 not turned 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.

Changing Splicing Mode Operation

13.6.4 The Type-65 has the capability to perform fusion-splicing operations in 1 of 2 ways, automatically or manually.
On the SPLICE MODE menu shown in Figure 46, the mode of splicing operations is indicated beside SPLICE in brackets.

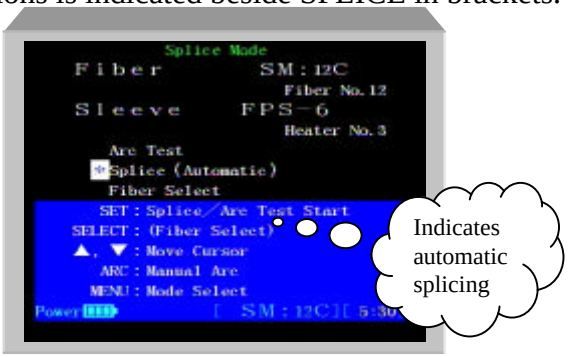


Figure 46. Splicing Mode of Operation

To change between automatic and manual 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 6.1 *Editing Action Blocks,* use the arrow keys to choose between AUTO and MAN.

Note: MAN. indicates semi-automatic splicing.

5. Press "**SELECT**" to accept changes. The mode of splicing indicated on the SPLICE MODE menu shown in Figure 46 will change to reflect the new setting.

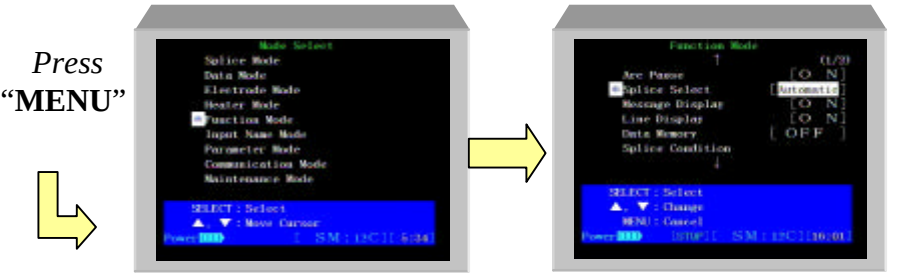


Figure 47. Changing Splice Mode Operation

- **Automatic**- This is the normal mode of operation. When the "SET" key is pressed all splicing operations will be performed automatically without pausing.
- **Manual**- When the "SET" key is pressed the splicing process will halt after each step of the splicing sequence awaiting operator input to continue. To continue splicing operations to the next step press "SET".

Arc Pause

13.6.5 During splicing operation, when the final step before arcing occurs, the splicer can be programmed to stop and await operator input to continue. This is called arc pause. When this feature is activated, the user must press "SET" to continue with splicing operation. To activate ARC PAUSE, perform the following steps:

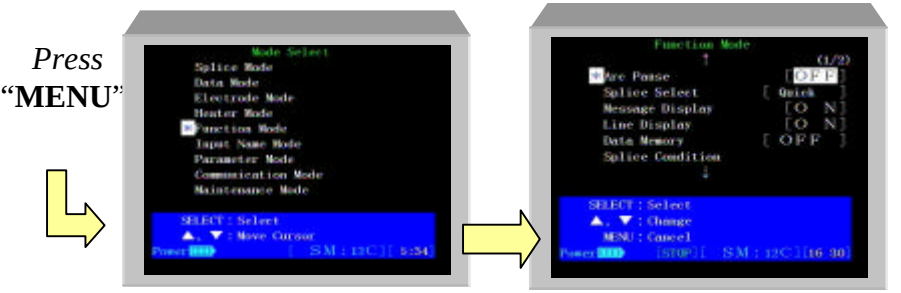


Figure 48. Activating Arc Pause

1. Referring to Figure 48, from the FUNCTION MODE menu choose ARC PAUSE and press "**SELECT**".
2. Referring to Section 6.1 *Editing Action Blocks*, use the arrow keys to choose between OFF and ON.
3. Press "**SELECT**" to accept changes.

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 48, choose ARC CONDITION from the FUNCTION MODE menu screen and press "**SELECT**".

2. Use the ▼, ▲ arrow keys to cycle through the different programs.

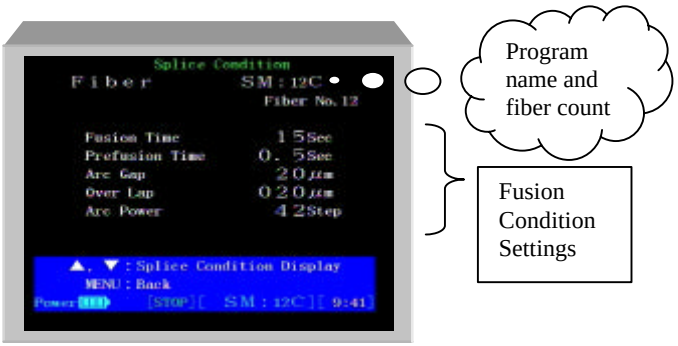


Figure 49. Arc Condition Screen

13.7 Arc Condition Settings

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 fusion splicer waits after the arc discharge begins before beginning the overlap (feed) of the right fiber.

ARC GAP (micrometers, μm)

- Arc gap is the gap distance left between the left and right fibers before fusion takes place.

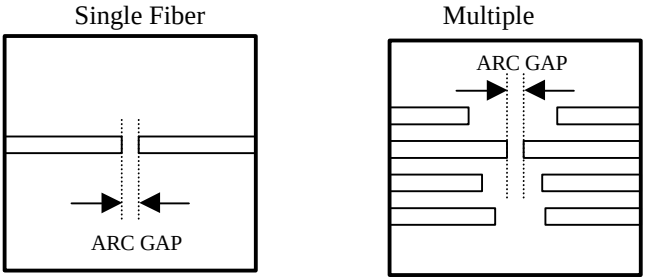


Figure 49b. Arc Gap

OVERLAP (μm)

- Overlap is the amount of overlap between the left and right fiber that occurrs when the right fiber is fed forward during the arc discharge.

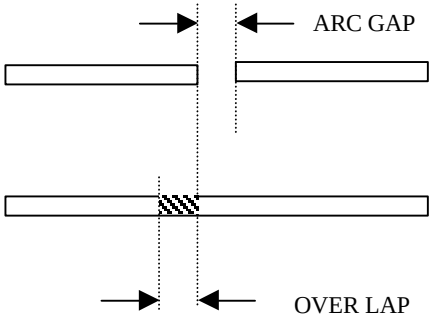


Figure 49c. Overlap

ARC POWER (step value)

Arc power represents the amount of current used during the arc discharge. *(This number is not shown directly in mA, rather in a unit-less value)*

13.8 Editing Fusion Program Names

13.8.1 Each fusion program name for all fiber types and count, and heater condition 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 50, choose INPUT NAME MODE and press "**SELECT**".

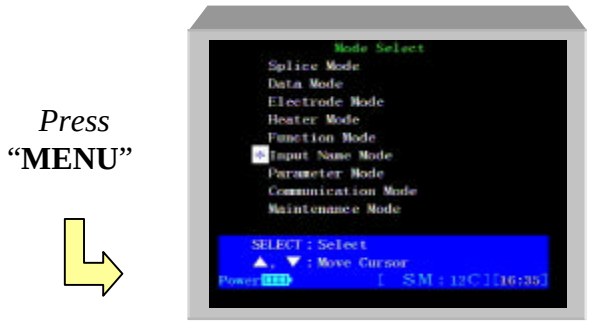


Figure 50. Entering Fiber Name Mode

2. Referring to Figure 51, select the fiber type and count for which you would like to change the fusion program name.

Figure 51. Fiber Name Mode

3. Referring to Figure 52, 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.***

Figure 52. Entering Characters

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

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-65 fusion splicer uses to execute splicing operation. You can adjust splicing conditions by changing splicing parameters (fusion time, arc gap, pre-fusion, overlap, arc power), depending on splicing conditions and optical 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 MENU SELECT screen shown in Figure 53, choose PARAMETER MODE and press "**SELECT**".

Press

"**MENU**"

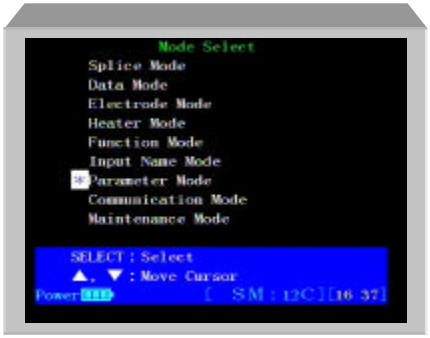


Figure 53. Entering Parameter Mode

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

"▲"
"ARC"
"▼"
"Select"

3. As shown in Figure 54, enter the parameter number you would like to change/view and press "**SELECT**" *(Refer to Section 6.2 for detailed information on entering numeric values.)*

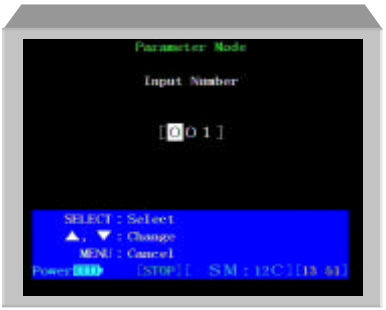


Figure 54. Entering Parameter Number

4. To change a parameter value press "**SELECT**" to edit the action block as shown in Figure 55.

➲ ***Note: For information on maximum and minimum values refer to the Parameter list in Section 16.***

Figure 55. Editing Parameters

5. Referring to Section 6.2 *Editing Numeric Values*, change the parameter to desired setting and press "**SELECT**" to accept changes.

Tips!

- Make a note of the current parameter value, before you edit 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 MENU SELECT screen, an external computer console controls the splicer via an RS232C cable. The splicer screen will appear as show in Figure 56. To exit this mode you must press "**RESET**".

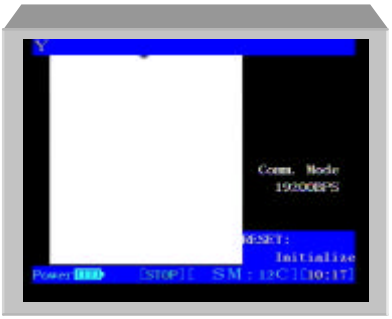


Figure 56. Communication Mode

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

14.0 Maintenance

US Only - For product maintenance assistance contact the Service Center at **1-888-SPLICER**
For engineering or other product information contact 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 To maintain accessory equipment such as the cleaver, refer to the maintenance section in the appropriate document in latter sections of this manual.

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

- Cleaning procedures to keep optimal performance during normal use.
- Replacing consumable parts such as the ER-7 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 Clamps

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 into the v-grooves. Tiny bits of dirt or coating residue in the grooves or on the clamps can cause the fiber diameters to be offset and will create poor splices.

Procedure:

1. Moisten the v-groove cleaning brush or lint-free cotton swab with alcohol and brush the v-grooves outwards from the electrodes to prevent dust falling on the microscope lens.

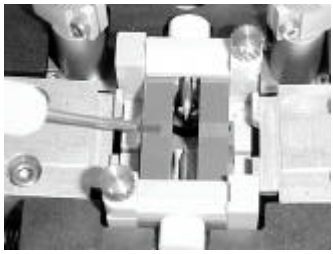


Figure 30. Cleaning the V-Grooves

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

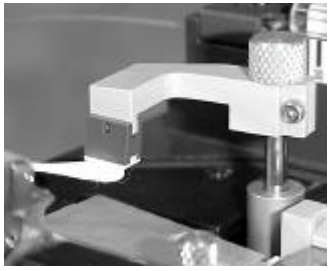


Figure 31. Cleaning the Bare Fiber Clamps

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 Reflective Mirrors

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.

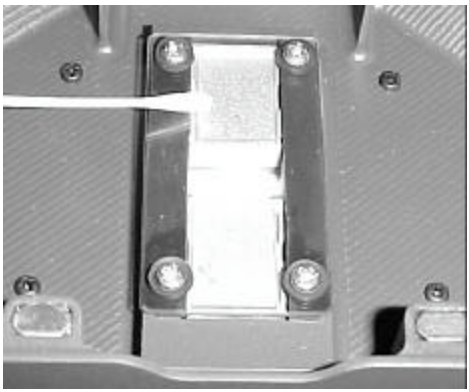


Figure 31B. Cleaning the LED Reflective Mirrors

14.3 Cleaning the Microscope Objective Lenses

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

14.3.2 There are two microscopes between the v-grooves in the fusion splicers splicing bed used for viewing the fibers to be

spliced. Dust on the microscope lens can reduce the fusion splicer'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. Each lens lies below the electrodes at a 45° angle.

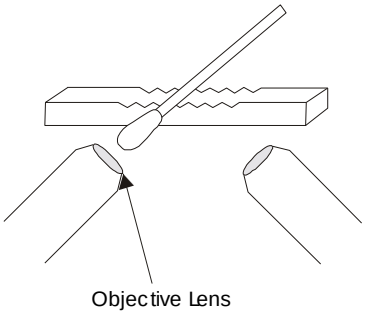


Figure 32. Cleaning the Microscopes

2. Remove the front and rear electrodes *(Refer to Section 13.4, Replacing Electrodes)* to expose the lens surfaces.
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.

14.4 Replacing Electrodes

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

14.4.2 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: **Replacement**

1. To view the number of discharges on current set of electrodes, press the "**MENU**" key to access the MENU SELECT screen, and choose ELECTRODE MODE.

Figure 33. Displaying Electrode Mode Screen

2. Before beginning replacement, with the fusion splicer on press "**RESET**" 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.

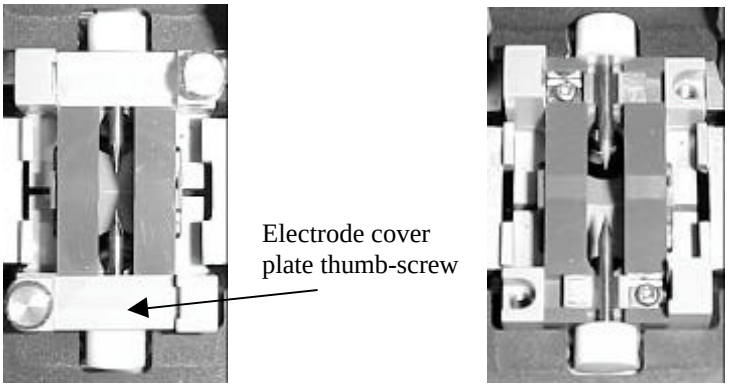


Figure 34. Removing Electrode Cover Plates

4. Remove the old electrodes and discard.

➲ ***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 buttons forward against the clamps to place the electrodes at the correct distance. Ensure that the beveled edges on the electrode cover plates are facing inward.
8. Gently tighten the retaining thumb-screws. **Do not over-tighten.**

14.4.3 After electrode replacement perform the following steps to burn-in the electrodes and reset the arc count.

➲ ***Note: Burning in the electrodes will condition the tips for optimal performance.***

Procedure: **Electrode Tip Conditioning**

1. Plug the unit in and turn it on.
2. Press the "**MENU**" key.
3. Referring to Figure 33, choose ELECTRODE MODE and press "**MENU**".

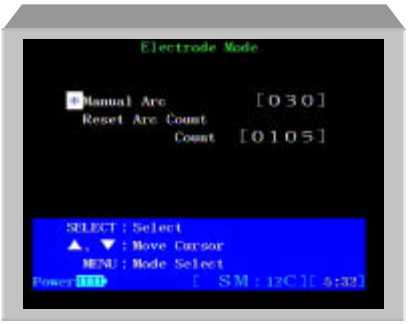


Figure 35. Electrode Mode

4. From the ELECTRODE MODE menu screen choose RESET ARC COUNT and press "**SELECT**" to reset the arc count.
5. As shown in Figure 35, choose MANUAL ARC and press "**SELECT**" to begin the process.
6. The electrodes will automatically arc 30 times and when complete return to the ELECTRODE MODE menu screen as shown in Figure 35.
7. Referring to Section 9.0 *Arc Test Procedure*, perform an arc test to adjust the arc conditions for the new set of electrodes.

15.0 Troubleshooting

US Only - 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**

This section provides troubleshooting information for the Type-65 fusion 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 13.4, *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

15.2.1f 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.

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 (offset, irregularity, gap error) 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.***

IRREGULARITY ERROR (μm)

- The difference between the longest fiber end-face, and the shortest fiber end-face, on a particular ribbon, is not within the specified limit.

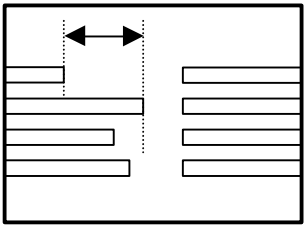


Figure 60. Irregularity Error

To correct Irregularity Errors, check the following:

- Fibers are seated in the fiber holders correctly
- Fibers holders are inserted properly
- Fiber holders are being held square in the cleaver
- Re-cleave the fibers. If problems persist it may be necessary to adjust the cleaver.

GAP ERROR (μm)

- The difference between the longest and shortest fiber end face gaps are not within the specified limit.

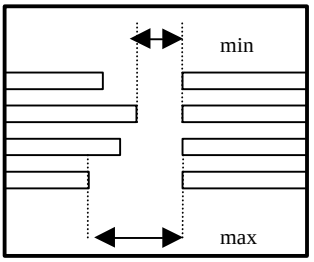


Figure 61. Gap Error

To correct Gap Errors, check the following:

- Fibers are seated in the fiber holders correctly
- Fiber holders are being held square in the cleaver
- Re-cleave the fibers. If problems persist it may be necessary to adjust the cleaver.

CLEAVE ANGLE ERROR LIMIT (degrees)

- The cleave angle on a fiber's end face has exceeded the maximum allowable limit.

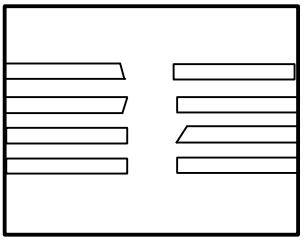


Figure 62. Cleave Angle Error

To correct Cleave Angle Errors, check the following:

- Re-cleave the fibers. If problems persist it may be necessary to adjust the cleaver.

ALIGNMENT ERROR (μm)

- The offset between two fiber centerlines has exceeded the specified limit.

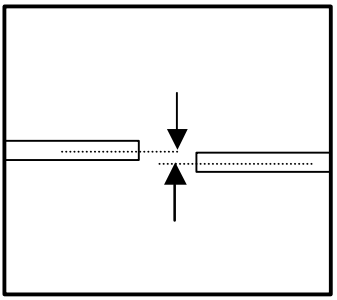


Figure 63. Offset Error Limit

To correct Gap Errors, check the following:

- Clean the v-grooves and bare fiber clamp pads.
- If problems persist it may be necessary to re-prepare the fibers.

ZL/ZR LIMIT

When the splicing process is started the fibers are moved into view of the microscope by the ZL and ZR motors. These motors have a rear and forward limit within which they can travel. If the microscope does not see the fibers a forward limit error will be given. Check for the following:

To correct ZL/ZR Limit Errors, check the following:

- Cleave length is 10mm.
- Secure the locking levers holding the fiber holders in place.
- Reseat the fiber holder and make sure it is positioned all the way forward.

16.0 Parameter List

No.	Name	Max.	Min.	Default	Unit	Remarks
001	FIBER No.1 FUSION TIME	030	000	006	SEC	*SM 1C Fiber*
002	FIBER No.1 PREFUSION TIME	3.0	0.0	0.2	SEC	*SM 1C Fiber*
003	FIBER No.1 ARC GAP	050	000	015	μm	*SM 1C Fiber*
004	FIBER No.1 OVERLAP	150	000	030	μm	*SM 1C Fiber*
005	FIBER No.1 ARC POWER	064	001	020	STEP	*SM 1C Fiber*
006	FIBER No.2 FUSION TIME	030	000	010	SEC	*SM 2C Ribbon*
007	FIBER No.2 PREFUSION TIME	3.0	0.0	0.3	SEC	*SM 2C Ribbon*
008	FIBER No.2 ARC GAP	050	000	020	μm	*SM 2C Ribbon*
009	FIBER No.2 OVERLAP	150	000	030	μm	*SM 2C Ribbon*
010	FIBER No.2 ARC POWER	064	001	024	STEP	*SM 2C Ribbon*
011	FIBER No.3 FUSION TIME	030	000	010	SEC	
012	FIBER No.3 PREFUSION TIME	3.0	0.0	0.1	SEC	
013	FIBER No.3 ARC GAP	050	000	020	μm	
014	FIBER No.3 OVERLAP	150	000	030	μm	
015	FIBER No.3 ARC POWER	064	001	024	STEP	
016	FIBER No.4 FUSION TIME	030	000	010	SEC	*SM 4C Ribbon*
017	FIBER No.4 PREFUSION TIME	3.0	0.0	0.3	SEC	*SM 4C Ribbon*
018	FIBER No.4 ARC GAP	050	000	020	μm	*SM 4C Ribbon*
019	FIBER No.4 OVERLAP	150	000	030	μm	*SM 4C Ribbon*
020	FIBER No.4 ARC POWER	064	001	032	STEP	*SM 4C Ribbon*
021	FIBER No.5 FUSION TIME	030	000	010	SEC	
022	FIBER No.5 PREFUSION TIME	3.0	0.0	0.1	SEC	
023	FIBER No.5 ARC GAP	050	000	020	μm	
024	FIBER No.5 OVERLAP	150	000	030	μm	
025	FIBER No.5 ARC POWER	064	001	032	STEP	
026	FIBER No.6 FUSION TIME	030	000	012	SEC	*SM 6C Ribbon*
027	FIBER No.6 PREFUSION TIME	3.0	0.0	0.4	SEC	*SM 6C Ribbon*

No.	Name	Max.	Min.	Default	Unit	Remarks
028	FIBER No.6 ARC GAP	050	000	020	µm	*SM 6C Ribbon*
029	FIBER No.6 OVERLAP	150	000	030	µm	*SM 6C Ribbon*
030	FIBER No.6 ARC POWER	064	001	036	STEP	*SM 6C Ribbon*
031	FIBER No.7 FUSION TIME	030	000	012	SEC	
032	FIBER No.7 PREFUSION TIME	3.0	0.0	0.2	SEC	
033	FIBER No.7 ARC GAP	050	000	020	µm	
034	FIBER No.7 OVERLAP	150	000	030	µm	
035	FIBER No.7 ARC POWER	064	001	036	STEP	
036	FIBER No. 8 FUSION TIME	030	000	012	SEC	*SM 8C Ribbon*
037	FIBER No. 8 PREFUSION TIME	3.0	0.0	0.4	SEC	*SM 8C Ribbon*
038	FIBER No. 8 ARC GAP	050	000	020	µm	*SM 8C Ribbon*
039	FIBER No. 8 OVERLAP	150	000	030	µm	*SM 8C Ribbon*
040	FIBER No. 8 ARC POWER	064	001	042	STEP	*SM 8C Ribbon*
041	FIBER No. 9 FUSION TIME	030	000	012	SEC	
042	FIBER No. 9 PREFUSION TIME	3.0	0.0	0.3	SEC	
043	FIBER No. 9 ARC GAP	050	000	020	µm	
044	FIBER No. 9 OVERLAP	150	000	030	µm	
045	FIBER No. 9 ARC POWER	064	001	042	STEP	
046	FIBER No. 10 FUSION TIME	030	000	015	SEC	*SM 10C Ribbon*
047	FIBER No. 10 PREFUSION TIME	3.0	0.0	0.3	SEC	*SM 10C Ribbon*
048	FIBER No. 10 ARC GAP	050	000	020	µm	*SM 10C Ribbon*
049	FIBER No. 10 OVERLAP	150	000	030	µm	*SM 10C Ribbon*
050	FIBER No. 10 ARC POWER	064	001	044	STEP	*SM 10C Ribbon*
051	FIBER No. 11 FUSION TIME	030	000	015	SEC	
052	FIBER No. 11 PREFUSION TIME	3.0	0.0	0.3	SEC	
053	FIBER No. 11 ARC GAP	050	000	020	µm	
054	FIBER No. 11 OVERLAP	150	000	030	µm	
055	FIBER No. 11 ARC POWER	064	001	044	STEP	

No.	Name	Max.	Min.	Default	Unit	Remarks
056	FIBER No. 12 FUSION TIME	030	000	015	SEC	*SM 12C Ribbon*
057	FIBER No. 12 PREFUSION TIME	3.0	0.0	0.5	SEC	*SM 12C Ribbon*
058	FIBER No. 12 ARC GAP	050	000	020	µm	*SM 12C Ribbon*
059	FIBER No. 12 OVERLAP	150	000	020	µm	*SM 12C Ribbon*
060	FIBER No. 12 ARC POWER	064	001	050	STEP	*SM 12C Ribbon*
061	FIBER No. 13 FUSION TIME	030	000	006	SEC	*MM 1C Fiber*
062	FIBER No. 13 PREFUSION TIME	3.0	0.0	0.2	SEC	*MM 1C Fiber*
063	FIBER No. 13 ARC GAP	050	000	015	µm	*MM 1C Fiber*
064	FIBER No. 13 OVERLAP	150	000	030	µm	*MM 1C Fiber*
065	FIBER No. 13 ARC POWER	064	001	017	STEP	*MM 1C Fiber*
066	FIBER No. 14 FUSION TIME	030	000	008	SEC	*MM 2C Ribbon*
067	FIBER No. 14 PREFUSION TIME	3.0	0.0	0.4	SEC	*MM 2C Ribbon*
068	FIBER No. 14 ARC GAP	050	000	015	µm	*MM 2C Ribbon*
069	FIBER No. 14 OVERLAP	150	000	025	µm	*MM 2C Ribbon*
070	FIBER No. 14 ARC POWER	064	001	023	STEP	*MM 2C Ribbon*
071	FIBER No. 15 FUSION TIME	030	000	008	SEC	
072	FIBER No. 15 PREFUSION TIME	3.0	0.0	0.4	SEC	
073	FIBER No. 15 ARC GAP	050	000	015	µm	
074	FIBER No. 15 OVERLAP	150	000	025	µm	
075	FIBER No. 15 ARC POWER	064	001	023	STEP	
076	FIBER No. 16 FUSION TIME	030	000	010	SEC	*MM 4C Ribbon*
077	FIBER No. 16 PREFUSION TIME	3.0	0.0	0.6	SEC	*MM 4C Ribbon*
078	FIBER No. 16 ARC GAP	050	000	020	µm	*MM 4C Ribbon*

No.	Name	Max.	Min.	Default	Unit	Remarks
079	FIBER No. 16 OVERLAP	150	000	025	µm	*MM 4C Ribbon*
080	FIBER No. 16 ARC POWER	064	001	028	STEP	*MM 4C Ribbon*
081	FIBER No. 17 FUSION TIME	030	000	010	SEC	
082	FIBER No. 17 PREFUSION TIME	3.0	0.0	0.5	SEC	
083	FIBER No. 17 ARC GAP	050	000	015	µm	
084	FIBER No. 17 OVERLAP	150	000	030	µm	
085	FIBER No. 17 ARC POWER	064	001	032	STEP	
086	FIBER No. 18 FUSION TIME	030	000	010	SEC	*MM 6C Ribbon*
087	FIBER No. 18 PREFUSION TIME	3.0	0.0	0.8	SEC	*MM 6C Ribbon*
088	FIBER No. 18 ARC GAP	050	000	020	µm	*MM 6C Ribbon*
089	FIBER No. 18 OVERLAP	150	000	030	µm	*MM 6C Ribbon*
090	FIBER No. 18 ARC POWER	064	001	037	STEP	*MM 6C Ribbon*
091	FIBER No. 19 FUSION TIME	030	000	010	SEC	
092	FIBER No. 19 PREFUSION TIME	3.0	0.0	0.8	SEC	
093	FIBER No. 19 ARC GAP	050	000	020	µm	
094	FIBER No. 19 OVERLAP	150	000	030	µm	
095	FIBER No. 19 ARC POWER	064	001	037	STEP	
096	FIBER No. 20 FUSION TIME	030	000	010	SEC	*MM 8C Ribbon*
097	FIBER No. 20 PREFUSION TIME	3.0	0.0	0.8	SEC	*MM 8C Ribbon*
098	FIBER No. 20 ARC GAP	050	000	020	µm	*MM 8C Ribbon*
099	FIBER No. 20 OVERLAP	150	000	030	µm	*MM 8C Ribbon*
100	FIBER No. 20 ARC POWER	064	001	037	STEP	*MM 8C Ribbon*
101	FIBER No. 21 FUSION TIME	030	000	010	SEC	

No.	Name	Max.	Min.	Default	Unit	Remarks
102	FIBER No. 21 PREFUSION TIME	3.0	0.0	0.8	SEC	
103	FIBER No. 21 ARC GAP	050	000	020	µm	
104	FIBER No. 21 OVERLAP	150	000	030	µm	
105	FIBER No. 21 ARC POWER	064	001	037	STEP	
106	FIBER No. 22 FUSION TIME	030	000	010	SEC	*MM 10C Ribbon*
107	FIBER No. 22 PREFUSION TIME	3.0	0.0	0.8	SEC	*MM 10C Ribbon*
108	FIBER No. 22 ARC GAP	050	000	025	µm	*MM 10C Ribbon*
109	FIBER No. 22 OVERLAP	150	000	040	µm	*MM 10C Ribbon*
110	FIBER No. 22 ARC POWER	064	001	049	STEP	*MM 10C Ribbon*
111	FIBER No. 23 FUSION TIME	030	000	010	SEC	
112	FIBER No. 23 PREFUSION TIME	3.0	0.0	0.8	SEC	
113	FIBER No. 23 ARC GAP	050	000	025	µm	
114	FIBER No. 23 OVERLAP	150	000	040	µm	
115	FIBER No. 23 ARC POWER	064	001	049	STEP	
116	FIBER No. 24 FUSION TIME	030	000	010	SEC	*MM 12C Ribbon*
117	FIBER No. 24 PREFUSION TIME	3.0	0.0	0.8	SEC	*MM 12C Ribbon*
118	FIBER No. 24 ARC GAP	050	000	025	µm	*MM 12C Ribbon*
119	FIBER No. 24 OVERLAP	150	000	040	µm	*MM 12C Ribbon*
120	FIBER No. 24 ARC POWER	064	001	049	STEP	*MM 12C Ribbon*
121	FIBER No. 25 FUSION TIME	030	000	012	SEC	*DSM 1C Fiber*
122	FIBER No. 25 PREFUSION TIME	3.0	0.0	0.2	SEC	*DSM 1C Fiber*
123	FIBER No. 25 ARC GAP	050	000	015	µm	*DSM 1C Fiber*
124	FIBER No. 25 OVERLAP	150	000	020	µm	*DSM 1C Fiber*
125	FIBER No. 25 ARC POWER	064	001	019	STEP	*DSM 1C Fiber*

No.	Name	Max.	Min.	Default	Unit	Remarks
126	FIBER No. 26 FUSION TIME	030	000	012	SEC	*DSM 2C Ribbon*
127	FIBER No. 26 PREFUSION TIME	3.0	0.0	0.2	SEC	*DSM 2C Ribbon*
128	FIBER No. 26 ARC GAP	050	000	015	µm	*DSM 2C Ribbon*
129	FIBER No. 26 OVERLAP	150	000	030	µm	*DSM 2C Ribbon*
130	FIBER No. 26 ARC POWER	064	001	023	STEP	*DSM 2C Ribbon*
131	FIBER No. 27 FUSION TIME	030	000	012	SEC	
132	FIBER No. 27 PREFUSION TIME	3.0	0.0	0.2	SEC	
133	FIBER No. 27 ARC GAP	050	000	015	µm	
134	FIBER No. 27 OVERLAP	150	000	030	µm	
135	FIBER No. 27 ARC POWER	064	001	023	STEP	
136	FIBER No. 28 FUSION TIME	030	000	015	SEC	*DSM 4C Ribbon*
137	FIBER No. 28 PREFUSION TIME	3.0	0.0	0.3	SEC	*DSM 4C Ribbon*
138	FIBER No. 28 ARC GAP	050	000	015	µm	*DSM 4C Ribbon*
139	FIBER No. 28 OVERLAP	150	000	030	µm	*DSM 4C Ribbon*
140	FIBER No. 28 ARC POWER	064	001	032	STEP	*DSM 4C Ribbon*
141	FIBER No. 29 FUSION TIME	030	000	015	SEC	
142	FIBER No. 29 PREFUSION TIME	3.0	0.0	0.2	SEC	
143	FIBER No. 29 ARC GAP	050	000	015	µm	
144	FIBER No. 29 OVERLAP	150	000	030	µm	
145	FIBER No. 29 ARC POWER	064	001	032	STEP	
146	FIBER No. 30 FUSION TIME	030	000	015	SEC	*DSM 6C Ribbon*
147	FIBER No. 30 PREFUSION TIME	3.0	0.0	0.4	SEC	*DSM 6C Ribbon*

No.	Name	Max.	Min.	Default	Unit	Remarks
148	FIBER No. 30 ARC GAP	050	000	015	µm	*DSM 6C Ribbon*
149	FIBER No. 30 OVERLAP	150	000	038	µm	*DSM 6C Ribbon*
150	FIBER No. 30 ARC POWER	064	001	032	STEP	*DSM 6C Ribbon*
151	FIBER No. 31 FUSION TIME	030	000	015	SEC	
152	FIBER No. 31 PREFUSION TIME	3.0	0.0	0.2	SEC	
153	FIBER No. 31 ARC GAP	050	000	015	µm	
154	FIBER No. 31 OVERLAP	150	000	038	µm	
155	FIBER No. 31 ARC POWER	064	001	032	STEP	
156	FIBER No. 32 FUSION TIME	030	000	015	SEC	*DSM 8C Ribbon*
157	FIBER No. 32 PREFUSION TIME	3.0	0.0	0.5	SEC	*DSM 8C Ribbon*
158	FIBER No. 32 ARC GAP	050	000	015	µm	*DSM 8C Ribbon*
159	FIBER No. 32 OVERLAP	150	000	025	µm	*DSM 8C Ribbon*
160	FIBER No. 32 ARC POWER	064	001	042	STEP	*DSM 8C Ribbon*
161	FIBER No. 33 FUSION TIME	030	000	015	SEC	
162	FIBER No. 33 PREFUSION TIME	3.0	0.0	0.3	SEC	
163	FIBER No. 33 ARC GAP	050	000	015	µm	
164	FIBER No. 33 OVERLAP	150	000	025	µm	
165	FIBER No. 33 ARC POWER	064	001	042	STEP	
166	FIBER No. 34 FUSION TIME	030	000	015	SEC	*DSM 10C Ribbon*
167	FIBER No. 34 PREFUSION TIME	3.0	0.0	0.5	SEC	*DSM 10C Ribbon*
168	FIBER No. 34 ARC GAP	050	000	020	µm	*DSM 10C Ribbon*
169	FIBER No. 34 OVERLAP	150	000	025	µm	*DSM 10C Ribbon*

No.	Name	Max.	Min.	Default	Unit	Remarks
170	FIBER No. 34 ARC POWER	064	001	047	STEP	*DSM 10C Ribbon*
171	FIBER No. 35 FUSION TIME	030	000	015	SEC	
172	FIBER No. 35 PREFUSION TIME	3.0	0.0	0.3	SEC	
173	FIBER No. 35 ARC GAP	050	000	020	µm	
174	FIBER No. 35 OVERLAP	150	000	025	µm	
175	FIBER No. 35 ARC POWER	064	001	047	STEP	
176	FIBER No. 36 FUSION TIME	030	000	015	SEC	*DSM 12C Ribbon*
177	FIBER No. 36 PREFUSION TIME	3.0	0.0	0.5	SEC	*DSM 12C Ribbon*
178	FIBER No. 36 ARC GAP	050	000	020	µm	*DSM 12C Ribbon*
179	FIBER No. 36 OVERLAP	150	000	025	µm	*DSM 12C Ribbon*
180	FIBER No. 36 ARC POWER	064	001	053	STEP	*DSM 12C Ribbon*
181	FIBER No. 37 FUSION TIME	030	000	012	SEC	
182	FIBER No. 37 PREFUSION TIME	3.0	0.0	0.0	SEC	
183	FIBER No. 37 ARC GAP	050	000	015	µm	
184	FIBER No. 37 OVERLAP	150	000	020	µm	
185	FIBER No. 37 ARC POWER	064	001	019	STEP	
186	FIBER No. 38 FUSION TIME	030	000	012	SEC	
187	FIBER No. 38 PREFUSION TIME	3.0	0.0	0.1	SEC	
188	FIBER No. 38 ARC GAP	050	000	015	µm	
189	FIBER No. 38 OVERLAP	150	000	030	µm	
190	FIBER No. 38 ARC POWER	064	001	023	STEP	
191	FIBER No. 39 FUSION TIME	030	000	012	SEC	
192	FIBER No. 39 PREFUSION TIME	3.0	0.0	0.1	SEC	

No.	Name	Max.	Min.	Default	Unit	Remarks
193	FIBER No. 39 ARC GAP	050	000	015	μm	
194	FIBER No. 39 OVERLAP	150	000	030	μm	
195	FIBER No. 39 ARC POWER	064	001	023	STEP	
196	FIBER No. 40 FUSION TIME	030	000	015	SEC	
197	FIBER No. 40 PREFUSION TIME	3.0	0.0	0.1	SEC	
198	FIBER No. 40 ARC GAP	050	000	015	μm	
199	FIBER No. 40 OVERLAP	150	000	030	μm	
200	FIBER No. 40 ARC POWER	064	001	032	STEP	
201	FIBER No. 41 FUSION TIME	030	000	015	SEC	
202	FIBER No. 41 PREFUSION TIME	3.0	0.0	0.1	SEC	
203	FIBER No. 41 ARC GAP	050	000	015	μm	
204	FIBER No. 41 OVERLAP	150	000	030	μm	
205	FIBER No. 41 ARC POWER	064	001	032	STEP	
206	FIBER No. 42 FUSION TIME	030	000	015	SEC	
207	FIBER No. 42 PREFUSION TIME	3.0	0.0	0.2	SEC	
208	FIBER No. 42 ARC GAP	050	000	015	μm	
209	FIBER No. 42 OVERLAP	150	000	038	μm	
210	FIBER No. 42 ARC POWER	064	001	032	STEP	
211	FIBER No. 43 FUSION TIME	030	000	015	SEC	
212	FIBER No. 43 PREFUSION TIME	3.0	0.0	0.2	SEC	
213	FIBER No. 43 ARC GAP	050	000	015	μm	
214	FIBER No. 43 OVERLAP	150	000	038	μm	
215	FIBER No. 43 ARC POWER	064	001	032	STEP	
216	FIBER No. 44 FUSION TIME	030	000	015	SEC	

No.	Name	Max.	Min.	Default	Unit	Remarks
217	FIBER No. 44 PREFUSION TIME	3.0	0.0	0.3	SEC	
218	FIBER No. 44 ARC GAP	050	000	015	μm	
219	FIBER No. 44 OVERLAP	150	000	025	μm	
220	FIBER No. 44 ARC POWER	064	001	042	STEP	
221	FIBER No. 45 FUSION TIME	030	000	015	SEC	
222	FIBER No. 45 PREFUSION TIME	3.0	0.0	0.3	SEC	
223	FIBER No. 45 ARC GAP	050	000	015	μm	
224	FIBER No. 45 OVERLAP	150	000	025	μm	
225	FIBER No. 45 ARC POWER	064	001	042	STEP	
226	FIBER No. 46 FUSION TIME	030	000	015	SEC	
227	FIBER No. 46 PREFUSION TIME	3.0	0.0	0.3	SEC	
228	FIBER No. 46 ARC GAP	050	000	020	μm	
229	FIBER No. 46 OVERLAP	150	000	025	μm	
230	FIBER No. 46 ARC POWER	064	001	047	STEP	
231	FIBER No. 47 FUSION TIME	030	000	015	SEC	
232	FIBER No. 47 PREFUSION TIME	3.0	0.0	0.3	SEC	
233	FIBER No. 47 ARC GAP	050	000	020	μm	
234	FIBER No. 47 OVERLAP	150	000	025	μm	
235	FIBER No. 47 ARC POWER	064	001	047	STEP	
236	FIBER No. 48 FUSION TIME	030	000	015	SEC	
237	FIBER No. 48 PREFUSION TIME	3.0	0.0	0.3	SEC	
238	FIBER No. 48 ARC GAP	050	000	020	μm	
239	FIBER No. 48 OVERLAP	150	000	025	μm	
240	FIBER No. 48 ARC POWER	064	001	053	STEP	

No.	Name	Max.	Min.	Default	Unit	Remarks
241	HEAT UP TEMPERATURE A No. 1	464	176	176	° F	*FPS-1*
242	FINISH TEMPERATURE No. 1	464	176	302	° F	*FPS-1*
243	HEATING DURATION A No. 1	999	000	000	SEC	*FPS-1*
244	HEATING DURATION B No. 1	999	000	060	SEC	*FPS-1*
245	HEAT UP TEMPERATURE A No. 2	464	176	374	° F	*FPS-5*
246	FINISH TEMPERATURE No. 2	464	176	257	° F	*FPS-5*
247	HEATING DURATION A No. 2	999	000	000	SEC	*FPS-5*
248	HEATING DURATION B No. 2	999	000	050	SEC	*FPS-5*
249	HEAT UP TEMPERATURE A No. 3	464	176	329	° F	*FPS-6*
250	FINISH TEMPERATURE No. 3	464	176	257	° F	*FPS-6*
251	HEATING DURATION A No. 3	999	000	040	SEC	*FPS-6*
252	HEATING DURATION B No. 3	999	000	060	SEC	*FPS-6*
253	HEAT UP TEMPERATURE A No. 4	464	176	401	° F	
254	FINISH TEMPERATURE No. 4	464	176	284	° F	
255	HEATING DURATION A No. 4	999	000	020	SEC	
256	HEATING DURATION B No. 4	999	000	030	SEC	
257	HEAT UP TEMPERATURE A No. 5	464	176	374	° F	
258	FINISH TEMPERATURE No. 5	464	176	257	° F	
259	HEATING DURATION A No. 5	999	000	035	SEC	
260	HEATING DURATION B No. 5	999	000	035	SEC	
261	HEAT UP TEMPERATURE A No. 6	464	176	374	° F	

No.	Name	Max.	Min.	Default	Unit	Remarks
262	FINISH TEMPERATURE No. 6	464	176	257	° F	
263	HEATING DURATION A No. 6	999	000	035	SEC	
264	HEATING DURATION B No. 6	999	000	035	SEC	
265	HEAT UP TEMPERATURE A No. 7	464	176	374	° F	
266	FINISH TEMPERATURE No. 7	464	176	257	° F	
267	HEATING DURATION A No. 7	999	000	035	SEC	
268	HEATING DURATION B No. 7	999	000	035	SEC	
269	HEAT UP TEMPERATURE A No. 8	464	176	374	° F	
270	FINISH TEMPERATURE No. 8	464	176	257	° F	
271	HEATING DURATION A No. 8	999	000	035	SEC	
272	HEATING DURATION B No. 8	999	000	035	SEC	
273	HEAT UP TEMPERATURE A No. 9	464	176	374	° F	
274	FINISH TEMPERATURE No. 9	464	176	257	° F	
275	HEATING DURATION A No. 9	999	000	035	SEC	
276	HEATING DURATION B No. 9	999	000	035	SEC	
277	HEAT UP TEMPERATURE A No. 10	464	176	374	° F	
278	FINISH TEMPERATURE No. 10	464	176	257	° F	
279	HEATING DURATION A No. 10	999	000	035	SEC	
280	HEATING DURATION B No. 10	999	000	035	SEC	
281	HEAT UP TEMPERATURE B No. 1	464	176	374	° F	*FPS-1*
282	HEAT UP TEMPERATURE B No. 2	464	176	374	° F	*FPS-5*

No.	Name	Max.	Min.	Default	Unit	Remarks
283	HEAT UP TEMPERATURE B No. 3	464	176	374	° F	*FPS-6*
284	HEAT UP TEMPERATURE B No. 4	464	176	419	° F	
285	HEAT UP TEMPERATURE B No. 5	464	176	374	° F	
286	HEAT UP TEMPERATURE B No. 6	464	176	374	° F	
287	HEAT UP TEMPERATURE B No. 7	464	176	374	° F	
288	HEAT UP TEMPERATURE B No. 8	464	176	374	° F	
289	HEAT UP TEMPERATURE B No. 9	464	176	374	° F	
290	HEAT UP TEMPERATURE B No. 10	464	176	374	° F	
291	UNDEFINED	000	000	000		
292	UNDEFINED	000	000	000		
293	UNDEFINED	000	000	000		
294	UNDEFINED	000	000	000		
295	UNDEFINED	000	000	000		
296	UNDEFINED	000	000	000		
297	UNDEFINED	000	000	000		
298	UNDEFINED	000	000	000		
299	UNDEFINED	000	000	000		
300	UNDEFINED	000	000	000		
301	ELECTRODE POSITION	345	230	260	DOT	
302	SPATTERING TIME	3.0	0.0	0.2	SEC	
303	ADDITIONAL ARC TIME	030	000	005	SEC	
304	ADDITIONAL ARC WAITING TIME	180	000	030	SEC	
305	MANUAL ARC TIME	015	000	005	SEC	
306	MANUAL ARC COUNT	200	000	030	NO.	

No.	Name	Max.	Min.	Default	Unit	Remarks
307	MANUAL ARC INTERVAL	060	015	030	SEC	
308	SLEEP TIMER	010	000	003	MIN	
309	AUTO POWER OFF TIMER	010	000	001	MIN	
310	PRINTOUT DELAY TIMER	999	000	005	SEC	
311	LANGUAGE SELECTION	001	000	001	-	
312	SAMPLING LINE DISPLAY	001	000	000	ON/ OFF	
313	PROCESS MESSAGE DISPLAY	001	000	000	ON/ OFF	
314	ARC PAUSE	001	000	000	ON/ OFF	
315	DATA MEMORY	002	000	000	A/M	
316	BUZZER BIT	001	000	001	ON/ OFF	
317	UNDEFINED	000	000	000		
318	UNDEFINED	000	000	000		
319	UNDEFINED	000	000	000		
320	UNDEFINED	000	000	000		
321	UNDEFINED	000	000	000		
322	UNDEFINED	000	000	000		
323	BAUD RATE	003	000	003	-	
324	SIO CONTROL	255	000	000	-	
325	SIO CONTROL 2	255	000	000	-	
326	SIO CONTROL 3	255	000	000	-	
327	SM IRREGULAR ERROR LIMIT	200	000	030	µm	
328	SM GAP ERROR LIMIT	300	000	060	µm	
329	SM CLEAVE ANGLE ERROR LIMIT	020	000	004	°	
330	SM OFFSET ERROR LIMIT	030	000	007	µm	
331	MM IRREGULAR ERROR LIMIT	200	000	030	µm	

No.	Name	Max.	Min.	Default	Unit	Remarks
332	MM GAP ERROR LIMIT	300	000	060	μm	
333	MM CLEAVE ANGLE ERROR LIMIT	020	000	004	°	
334	MM OFFSET ERROR LIMIT	030	000	010	μm	
335	DSM IRREGULAR ERROR LIMIT	200	000	030	μm	
336	DSM GAP ERROR LIMIT	300	000	030	μm	
337	DSM CLEAVE ANGLE ERROR LIMIT	020	000	003	°	
338	DSM OFFSET ERROR LIMIT	030	000	005	μm	
339	SP IRREGULAR ERROR LIMIT	200	000	030	μm	
340	SP GAP ERROR LIMIT	300	000	030	μm	
341	SP CLEAVE ANGLE ERROR LIMIT	020	000	003	°	
342	SP OFFSET ERROR LIMIT	030	000	005	μm	

Parameter Settings, Supplemental Description

<table>
<tr><th>No.</th><th>Name</th><th colspan="5">Description</th></tr>
<tr><td>308</td><td>SLEEP TIMER</td><td colspan="5">0 = NOTHING, 1 - 10 min</td></tr>
<tr><td>309</td><td>AUTO POWER OFF TIMER</td><td colspan="5">0 = NOTHING, 1 - 10 min</td></tr>
<tr><td>311</td><td>LANGUAGE SELECT</td><td colspan="5">0 = JAPANESE, 1 = ENGLISH(Standard Setting)</td></tr>
<tr><td>312</td><td>SAMPLING LINE DISPLAY</td><td colspan="5">0 = DISPLAY OFF(Standard Setting), 1 = DISPLAY ON</td></tr>
<tr><td>313</td><td>PROCESS MESSAGE DISPLAY</td><td colspan="5">0 = DISPLAY OFF, 1 = DISPLAY ON</td></tr>
<tr><td>314</td><td>ARC PAUSE</td><td colspan="5">0 = NON-STOP, 1 = STOP</td></tr>
<tr><td>315</td><td>DATA MEMORY</td><td colspan="5">0 = AUTO, 1 = MANUAL, 2 = NONE</td></tr>
<tr><td>316</td><td>BUZZER BIT</td><td colspan="5">0 = BUZZER OFF, 1 = BUZZER ON</td></tr>
<tr><td rowspan="2">323</td><td rowspan="2">BAUD RATE</td><td>VALUE</td><td>0</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td>BAUD RATE (bps)</td><td>2400</td><td>4800</td><td>9600</td><td>19200</td></tr>
<tr><td>324</td><td>SIO CONTROL
Used to output data via the RS-232 port.</td><td colspan="5">000 No data output
001 Diameter #1
002 Diameter #2
004 Edge #1
008 Edge #2
016 Angle
032 Offset #1
064 Offset #2
128 Brightnes
To output more than one maintenance function, add each setting number together and enter the sum.</td></tr>
<tr><td>325</td><td>SIO CONTROL 2
Used to output data via the RS-232 port.</td><td colspan="5">000 No data output
001 Offset or misalignment in field X, Y
002 Cladding edge position in each sample line
004 End face angle, Camera angle position
008 End face position, Gap, Offset or misalignment
016 Estimation loss
032 End face position address
064 End face crack
128 Cladding diameter around the spliced point after discharge
To output more than one maintenance function, add each setting number together and enter the sum.</td></tr>
<tr><td>324</td><td>SIO CONTROL
Used to output</td><td colspan="5">000 No data output
001 End face position after ARC test</td></tr>
</table>

	data via the RS-232 port.	002 Splice conditions 004 Proof test *To output more than one maintenance function, add each setting number together and enter the sum.*

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

Additional Notes