KSP75-FP-004706(4)

INSTRUCTION MANUAL

ARC FUSION SPLICER

FSM-50S

Read this instruction manual carefully before operating the equipment.

Adhere to all safety instructions and warnings contained in this manual.

Keep this manual in a safe place.

Fujikura

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The FSM-50S has been designed for splicing Silica-based optical fibers for telecommunications. Do not attempt to use this machine for other applications. Fujikura Ltd. gives much consideration and regard to personal injury. Misuse of the machine may result in electric shock, fire and/or serious personal injury.

Follow all safety instructions

Read and understand all safety instructions.

Stop using it when it malfunctions

Ask our service centers for repair as soon as possible.

Instruction Manual

Read this instruction manual carefully before operating this machine.
Store this instruction manual in a safe place.

The following alert symbols are used in this instruction manual and machine to indicate warnings and caution for safe use. Understand the meanings of these symbols.

WARNING
There is a possibility of death or serious injury resulting from improper use by ignoring this indication.

CAUTION
There is a possibility of personal injury or physical loss resulting from improper use by ignoring this indication.

Symbol means “Pay attention”


Pay attention to hot surface!


Symbol means “Must not do”


You must not disassemble!


Symbol means “Must do”


You must disconnect a plug!

⚠ WARNINGS
 Disconnect the AC power cord from the AC adapter inlet or the wall socket (outlet) immediately if user observes the following or if the splicer receives the following faults: • Fumes, bad smell, noise, or over-heat occurs. • Liquid or foreign matter falls into cabinet. • Splicer is damaged or dropped. If this occurs, ask our service center for repair. Leaving the splicer in a damaged state may cause equipment failure, electric shock or fire and may result in personal injury, death or fire.
 Use only the AC adapter / battery charger (ADC-11) designed for this splicer. Using an improper AC power source may cause fuming, electric shock or equipment damage and may result in personal injury, death or fire.
 Use the supplied AC power cord. Do not place heavy objects on the AC power cord. Use of an improper cord or a damaged cord may cause fuming, electric shock or equipment damage and may result in personal injury, death or fire.
 Do not disassemble or modify the splicer, AC adapter or battery. In particular, do not remove or bypass any electrical or mechanical device (e.g. a fuse or safety switch) incorporated into the design and manufacturing of this equipment. Modification could cause damage that may result in personal injury, death, electric shock or fire.
 Never operate the splicer in an environment where flammable liquids or vapors exist. Risk of dangerous fire or explosion could result from the splicer's electrical arc in such an environment.
 Do not use compressed gas or canned air to clean the splicer. They may contain flammable materials that could ignite during the electrical discharge.

⚠ WARNINGS

Do not touch the electrodes when the splicer is on and power is supplied to the unit. The electrodes generate high voltage and high temperatures that may cause a severe shock or burn.

Note Arc discharge stops when wind protector is opened. Turn the splicer off and disconnect the AC power cord before replacing electrodes.

Safety glasses should always be worn during fiber preparation and splicing operation. Fiber fragments can be extremely dangerous if it comes into contact with the eye, skin, or is ingested.

Use only proper power source.

- Proper AC power source is AC100-240V, 50-60Hz. Check the AC power source before use. Proper DC power source is DC10-12V. Improper AC or DC power source may cause fuming, electric shock or equipment damage and may result in personal injury, death or fire.
- AC generators commonly produce abnormally high AC output voltage or irregular frequencies. Measure the output AC voltage with a circuit tester before connecting the AC power cord. Such abnormally high voltage or frequency from a generator may cause fuming, electric shock or equipment damage and may result in personal injury, death or fire. Make sure the generator is regularly checked and serviced.
- When an AC generator that AC voltage is 220-240V turns on the "HIGH AC INPUT" lamp of the AC adapter, or when it breaks the AC adapter several times, it outputs dangerous high voltage. Fujikura Ltd. recommends following measures.
  (1) Connect a step down transformer between the generator and the AC adapter in order to lower the AC voltage from AC220-240V to AC100-120V.
  (2) Or, use an AC generator that AC voltage is AC100V.
  (3) Or, use an AC generator that has an inverter circuit to stabilize the output.

Do not modify, abuse, heat or excessively pull on the supplied AC cord. The use of a damaged cord may cause fuming, electric shock or equipment damage and may result in personal injury, death or fire.

The FSM-50S uses a three-prong (core) AC cord that contains an earthed ground safety mechanism. The splicer MUST be Grounded. Use only the supplied three-prong (core) AC power cord. NEVER use a two-prong (core) power cord, extension cable or plug.

⚠ WARNINGS

Connect AC power cord properly to the splicer (inlet) and wall socket (outlet). When inserting the AC plug, make sure there is no dust or dirt on the terminals. Engage by pressing the female plug into the splicer (inlet) and the male plug into the wall socket (outlet) until both plugs are fully seated. Incomplete engagement may cause fuming, electric shock or equipment damage and may result in personal injury, death or fire.
Do not short-circuit the terminals of AC adapter (ADC-11) and optional battery (BTR-06). Excessive electrical current may cause personal injury due to fumes, electric shock and equipment damage.
Do not touch the splicer, AC power cord and AC plugs with wet hands. This may result in electric shock.
Do not operate splicer near hot objects, in hot temperature environments, in dusty / humid atmospheres or when water-condensation is present on the splicer. This may result in electric shock, splicer malfunction or poor splicing performance.
When using optional battery (BTR-06), follow the instructions below. Failure to follow these may result in explosion or personal injury. • Do not charge battery with other methods than instructed. • Do not discard battery into an incinerator or fire. • Do not charge or discharge battery near a flame or under direct sunlight. • Do not excessively shake or jar the battery. • If battery leaks of liquid residue, be careful handling the battery so the liquid does not get in skin or eye contact. If it reaches contact, immediately wash skin or eyes thoroughly and see the doctor. Dispose of the battery and call the service center for replacement. • Do not stack battery on top of AC adapter while charging. • If charge did not complete in three hours or the "CHARGE" LED does not turn ON, immediately stop charging and call the service center for repair.
When transporting the carrying case using the shoulder belt, check the belt and hooks for damage before use. Carrying the case with a damaged shoulder belt may cause the belt to break or come off and result in personal injury or equipment damage.

CAUTIONS
Do not store splicer in any area where temperature and humidity are extremely high. Possible equipment failure may result.
Do not touch protection sleeve or tube-heater during heating or immediately after completion of heating. Their surfaces are very hot and touching these may result in skin burn.
Do not place the splicer in an unstable or unbalanced position. The splicer may shift or lose balance, causing the unit to fall. Possible personal injury or equipment damage may result.
The splicer is precision adjusted and aligned. Do not allow the unit to receive a strong shock or impact. Possible equipment failure may result. Use supplied carrying case for transportation and storage. The carrying case protects the splicer from damage, moisture, vibration and shock during storage and transportation.
Follow the below listed instructions for handling electrodes. • Use only specified electrodes. • Set the new electrodes in the correct position. • Replace the electrodes as a pair. Failure to follow the above instructions may cause abnormal arc discharge. It can result in equipment damage or degradation in splicing performance.
Do not use any chemical other than pure alcohol (99% or greater) to clean the objective lens, V-groove, mirror, LCD monitor, etc., of the splicer. Otherwise blurring, discoloration, damage or deterioration may result.
The splicer requires no lubrication. Oil or grease may degrade the splicing performance and damage the splicer.
The equipment must be repaired or adjusted by a qualified technician or engineer. Incorrect repair may cause fire or electric shock. Should any problems arise, please contact your nearest sales agency.

Core alignment fusion splicer FSM-50S with PAS technology is designed for splicing many types of optical fibers. It is small in size and light in weight, making it suitable for any operating environment. It is easy to operate and it splices fast while maintaining low splice loss. In order to achieve the splicer's full capabilities, read the following important information.

Splice mode

The splice mode [SM] is the fastest mode in the FSM-50S. It completes a fusion splice after 9 seconds. However, the [SM] mode splices only standard SM fibers (ITU-T G652). It cannot splice Non-Zero Dispersion Shifted Fibers (ITU-T G655) at low splice loss. Fujikura recommends using [AUTO] mode when longer splice time is acceptable for the following reasons:

(1) When selecting [AUTO] mode, the splicer analyzes the fiber profile, and determines the fiber type. Next, it loads the proper core observation methods and arc conditions. Then it completes the splice. The [AUTO] mode can splice all types of fibers, such as SMF(G652), NZDSF(G655), MMF(G651), etc. The [AUTO] mode is recommended when the fiber type is not certain.

(2) When using the [AUTO] mode, the automatic arc calibration function is enabled. It monitors and applies adequate heat power to the optical fiber.

Automatic arc calibration function

This function calibrates the arc power at every splice. Performing the [Arc calibration] function before a splice operation is not necessary. The automatic arc calibration function works in [AUTO] mode only. It doesn't work in [SM], [NZ], [MM], [DS], [SM-SM] and other splice modes. When using those modes, performing [Arc calibration] before splicing is strongly recommended.

Useful function

(1) Change of operating direction

The FSM-50S has the ability to operate when the monitor is in the front or rear of the splicer. The right figure shows the operation setting when the monitor is positioned to the rear. To change the monitor position, refer to "**Change of Operating Direction**" on page 62.

(2) Protection sleeve centering device

The FSM-50S has a built in centering device to center the fiber protection sleeve in the tube heater. Refer to "**Removing spliced fiber**" on page 26.

Notes

LCD (Liquid Crystal Display) monitor

The FSM-50S splicer is equipped with a LCD monitor, manufactured in a high quality-controlled factory environment. However, some black dots may appear, or red/blue/green dots may remain on the screen. The screen brightness may not appear uniform, depending on viewing angle. Note that these symptoms are not defects, but are natural on LCDs.

Recycling

To recycle this product, disassemble it first, sort each part separately by material components and follow your local recycling and disposal regulations.

Related patents of FSM-50S

US Patent No.
4878933, 4900114*, 4948412, 5122638, 5142603*, 5228102, 6294760

EPC No.
174428, 186819, 215145, 235992*, 340042*

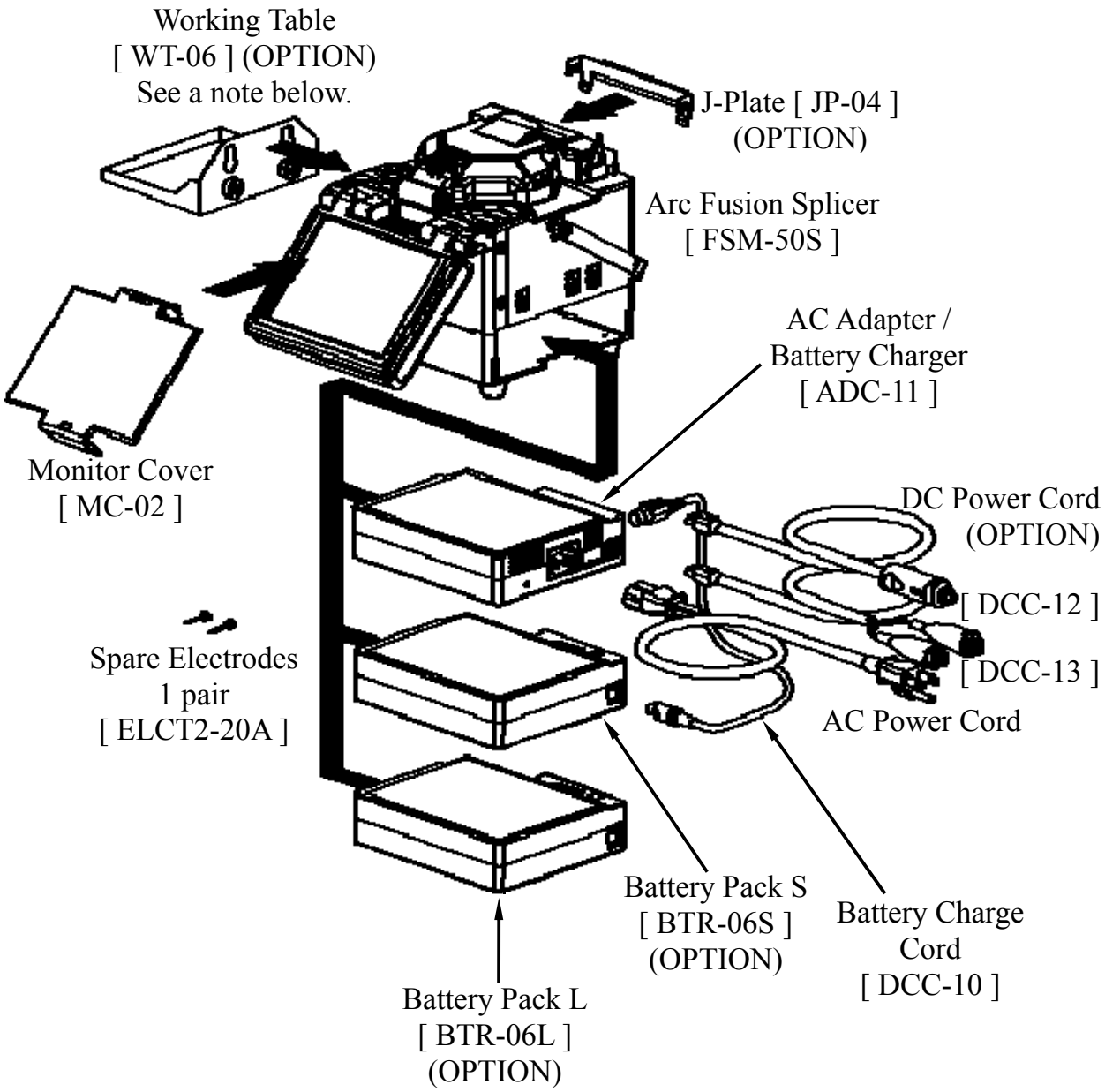
Canada Patent No.
1235890, 1274395, 1288223, 1294806* 1317803*

China Patent No.
85109701,4, 1294/96*(Hong Kong)

Korea Patent No.
33651

* License from British Telecommunication plc

1. Components of Splicer



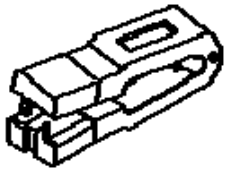
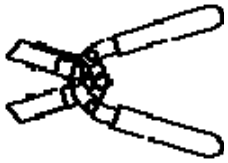
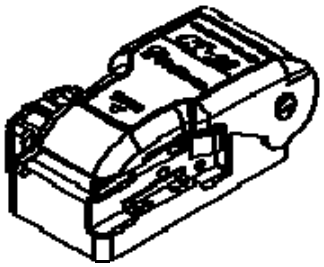
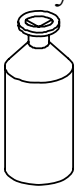
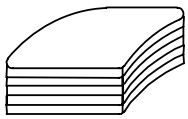
Other Attached Items

- Carrying Case [CC-12]
- Instruction Manual

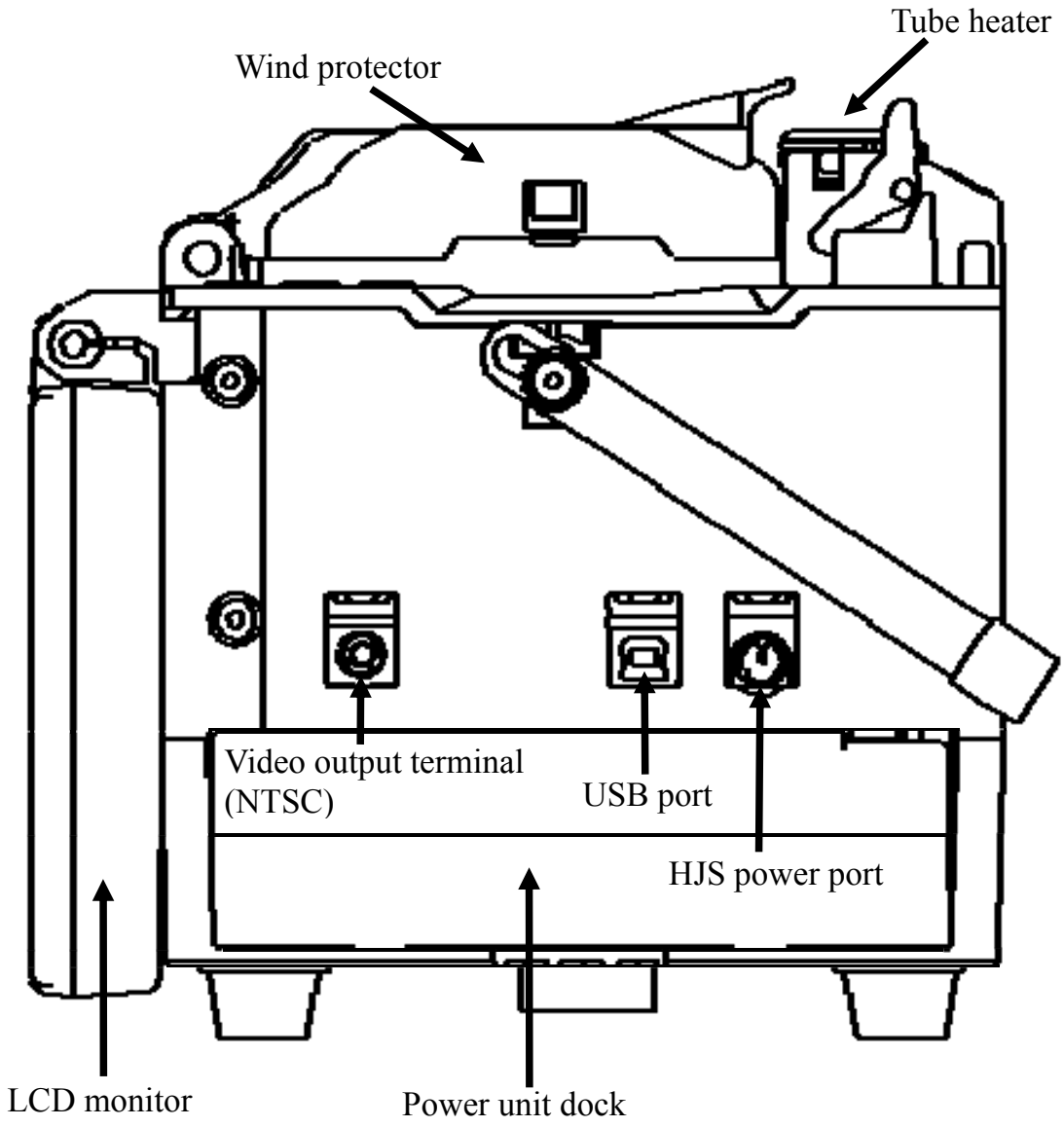
Note

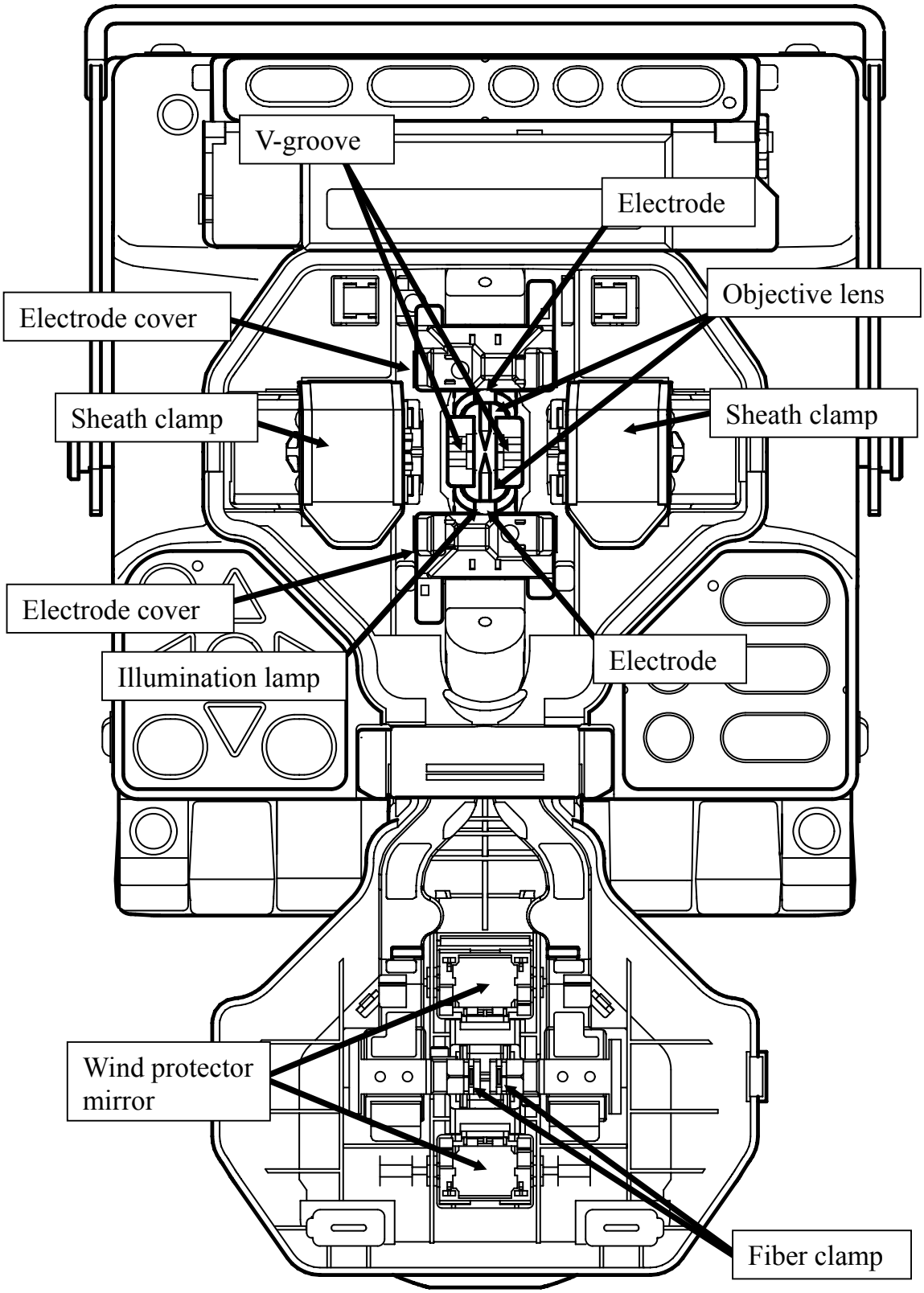
To attach the working table [WT-06], a working table support [WTS-06] is also necessary.

2. Other Necessary Items for Splicing Operation

<table>
<tr><td>Fiber coating diameter</td><td>0.25mm</td><td>0.9mm</td></tr>
<tr><td rowspan="2">Fiber protection sleeves</td><td colspan="2">Standard sleeve
60mm length [FP-03]
40mm length [FP-03 (L = 40)]
  </td></tr>
<tr><td>Micro sleeve
20mm length [FPS01-250-20]
25mm length [FPS01-250-25]
34mm length [FPS01-250-34]
  </td><td>Micro sleeve
45mm length [FPS01-900-45]
  </td></tr>
<tr><td>Fiber stripping tools</td><td>Primary coat stripper [PS-02]
  </td><td>Jacket stripper [JS-01]
  </td></tr>
<tr><td rowspan="2">Fiber cleaving tools</td><td colspan="2">Fiber Cleaver [CT-20]
  </td></tr>
<tr><td>Fiber Plate [AD-11]
Cleave length : 16mm fixed
Fiber Plate [AD-12]
Cleave length : 8 to 20mm</td><td>Fiber Plate [AD-11]
Cleave length : 16mm fixed
Fiber Plate [AD-12]
Cleave length : 16 to 20mm</td></tr>
<tr><td>Fiber cleaning tools</td><td>Alcohol dispenser with alcohol (purity > 99%)
  </td><td>Lint-free tissue or gauze
  </td></tr>
</table>

3. Description and Function of Splicer

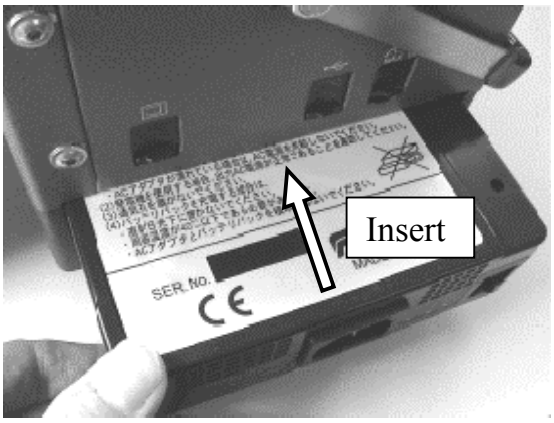




1. Inserting Power Supply into Splicer

For AC operation or DC operation with external battery, use AC adapter (ADC-11). For battery operation, use detachable battery (BTR-06S/L). The Power Unit Dock, located on the splicer body, can accommodate both power supplies (ADC-11 and BTR-06S/L).

1-1. Inserting or detaching power unit

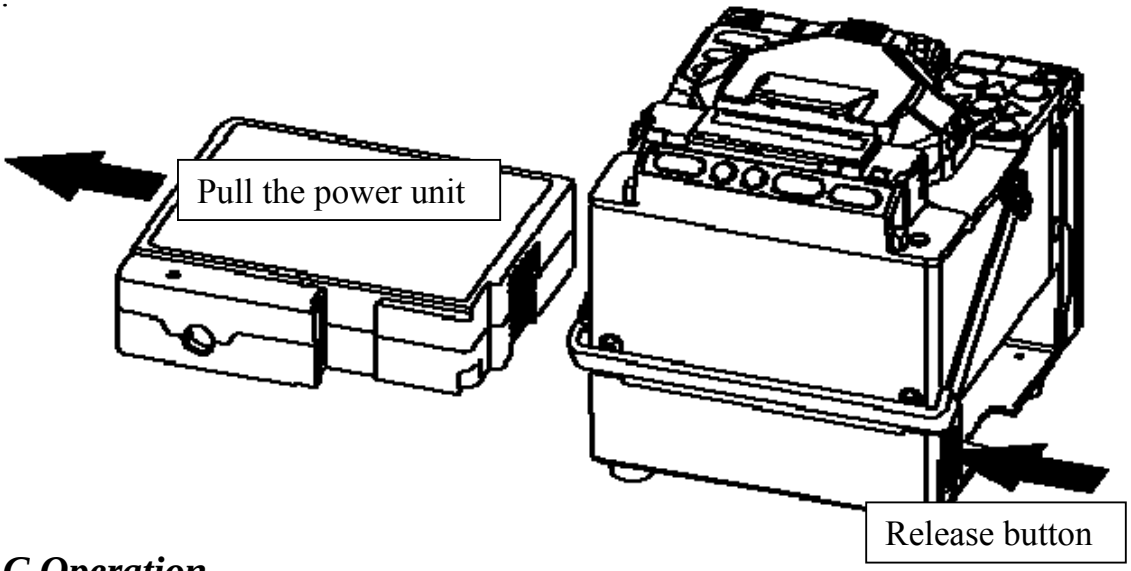


Inserting power supply unit

Insert power unit into Power unit dock until it clicks into place.

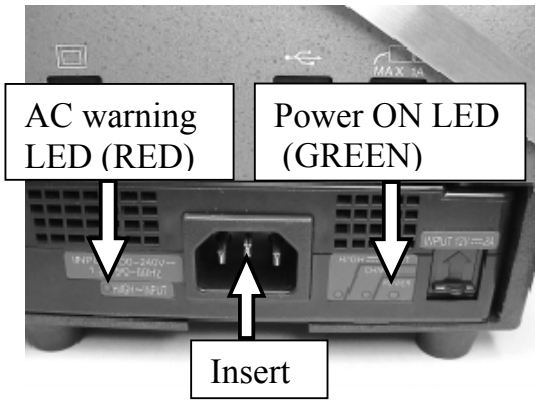
Detaching power supply unit.

Turn off the splicer. Push the release button, located on the side of the splicer body, and remove the power supply out of the splice body.



1-2. AC Operation

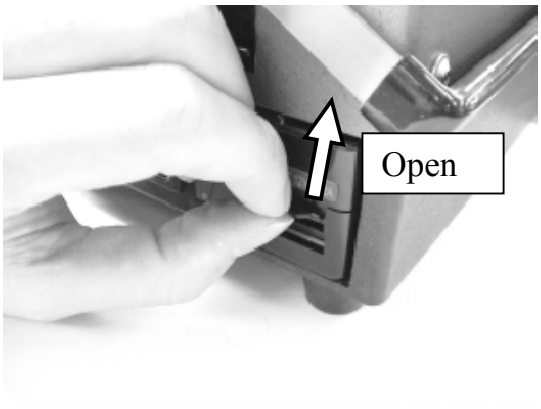
Plug the supplied AC cord into the AC inlet of the AC adapter. The power ON LED in the AC adapter turns on (green color) when suitable AC voltage is supplied. In case of AC350V **(**Peak Voltage: 490V**)** or greater is supplied, the AC adapter protection circuit shuts down the AC output and the AC Warning LED [HIGH ~ INPUT] turns on (red color). And, in case of AC400V (Peak Voltage: 560V) or greater is supplied, the AC adapter will be immediately broken.



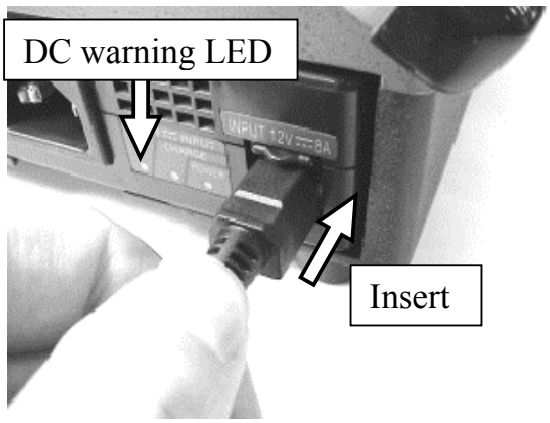
• Do not cover any of the AC adapter vents. Allow at least one-inch air gap between wall and splicer in order to circulate fresh air.

1-3. DC operation with external battery

Open shutter for DC inlet of AC adapter.



Plug DC cord (DCC-12 or DCC-13) into DC inlet of AC adapter. The ON LED turns on (green color) when suitable DC voltage is supplied. In case DC16V or greater is supplied, or polarity (positive / negative) is wrong, The AC adapter protection circuit shuts down the DC output and DC Warning LED [HIGH ~ INPUT] turns on (red color).



1-4. Battery operation

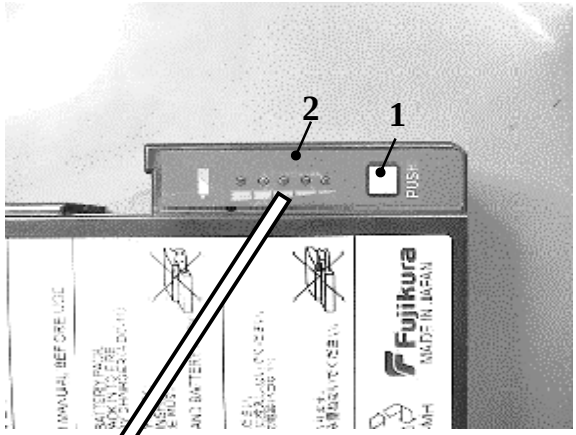
Check and make sure the remaining battery capacity is 20% or greater before operation otherwise few splices can be made. To prevent battery degradation due to the memory effect, discharge it completely at least once a month. See [Battery Discharge] (page 69) for more details.

Two ways to check remaining battery capacity

- If battery is already inserted in the splicer, turn splicer ON. Power source of "Battery" is automatically identified and the remaining battery capacity is displayed on the "READY" screen.
- Or press battery check button (1) on the battery pack. The remaining battery capacity is indicated on the LED indicator (2).

READY screen

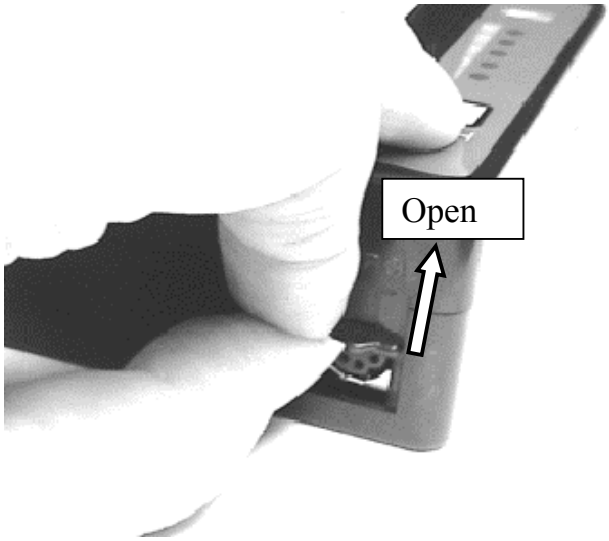
Remaining battery capacity indicator

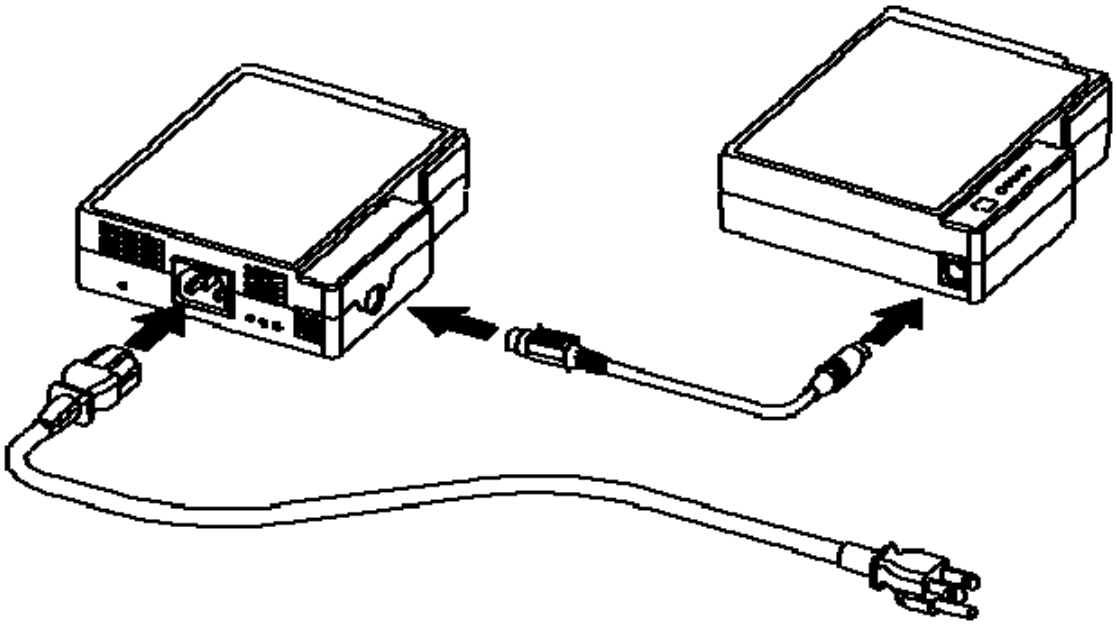


Remaining battery capacity display	Remaining battery capacity indicator	Remaining battery
(Blue Color)	5 LED	80～100%
(Green Color)	4 LED	60～80%
(Green Color)	3 LED	40～60%
(Yellow Color)	2 LED	20～40%
(Red Color)	1 LED	Less than 20%
	1 LED Flashing	Less than 10%
	No LED	5% or less

How to charge battery

Open shutter for battery charge plug inlet of the AC adapter (ADC-11). Plug the supplied battery charge cord (DCC-11) into both the battery charge inlet of the AC adapter (ADC-11) and the battery charge terminal located on the battery (BTR-06S/L) side. Do not place battery on top of AC adapter or vise-versa. The CHARGE LED turns ON (orange color) and battery charging begins. Battery charge is completed in approximately three hours. After completion, disconnect AC cord, then charge cord.

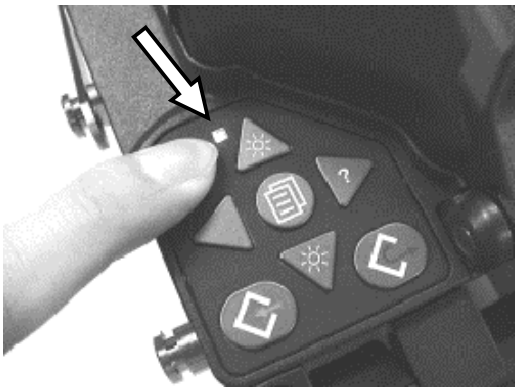




- Battery can be charged while AC adapter (ADC-11) is in power unit dock but splicer cannot be turned ON.
- CHARGE LED turns off when battery charge is completed. If CHARGE LED flashes, replace the battery with a new one.
- If battery charge does not complete in three hours or CHARGE LED does not turn ON, the battery, AC adapter or both need replacement. Ask your service agent for further instruction.

2. Turning splicer "ON"

Press ⏻ and hold it until LED on the keypad turns "ON" (green color). The READY screen is displayed after all the motors reset to their initial positions. The power source type is then identified. If the battery is used, the remaining battery capacity is displayed.



Monitor Angle

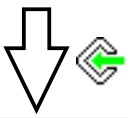
Adjust the monitor angle to visibly see the view screen.

Monitor brightness

Monitor visibility is sometimes low depending on environmental conditions. To change monitor brightness, press ▼ or ▲ to change value and press ↵ to set value.

READY

Monitor brightness control menu



Decided

Splice Mode

Select appropriate splicing mode for the specific fiber combination. Current mode is displayed on the READY screen.

> • AUTO mode is recommended for splicing SM, DS, NZDS and MM fibers. Arc calibration is automatically performed for consistent splicing performance.

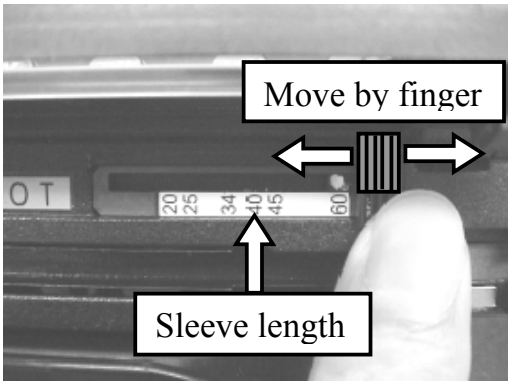
Heat Mode

Select appropriate heating mode for the specific protection sleeve used. Current mode is displayed on the READY screen.

> • To change splice mode, press ↵ at READY screen. To change to heater mode, press ↵ again. Screen image will go to [Splice Mode Select] menu and [Heater Mode Select] menu respectively.

3. Setting sleeve centering device

Open tube heater lid, and slide gauge indicator to match the length of protection sleeve used.

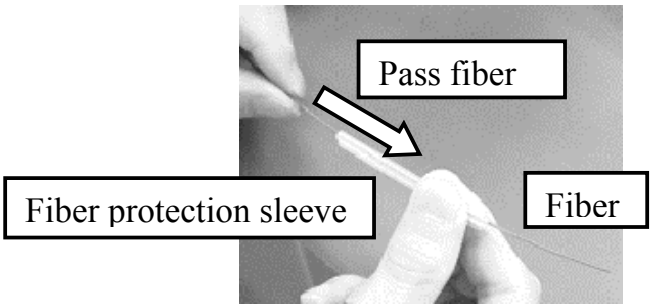


4. Cleaning optical fiber

Clean optical fiber with alcohol-impregnated gauze or lint-free tissue approximately 100mm from the tip. Dust particulates from the fiber coating surface can enter inside the protection sleeve and might result in a future fiber break or attenuation increase.

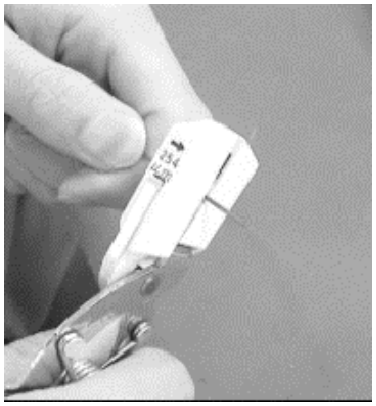
5. Placing protection sleeve over fiber

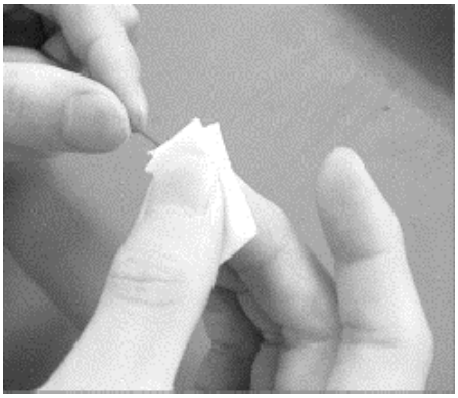
Place the protection sleeve over the fiber.



6. Stripping and cleaning fiber

Strip outer coating 30 to 40 mm from its tip with a stripping tool. Clean the fiber with alcohol impregnated gauze or lint-free tissue thoroughly. Use fresh gauze or wipe only. Do not use gauze or wipe twice.

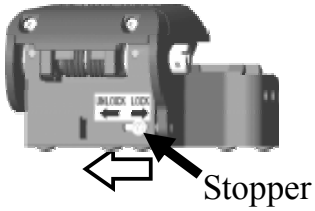

Stripping

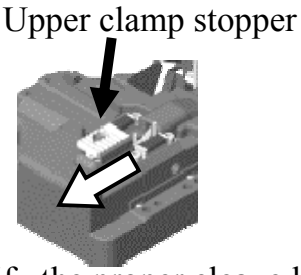

Cleaning

• Use a high quality alcohol, greater than 99% pure.

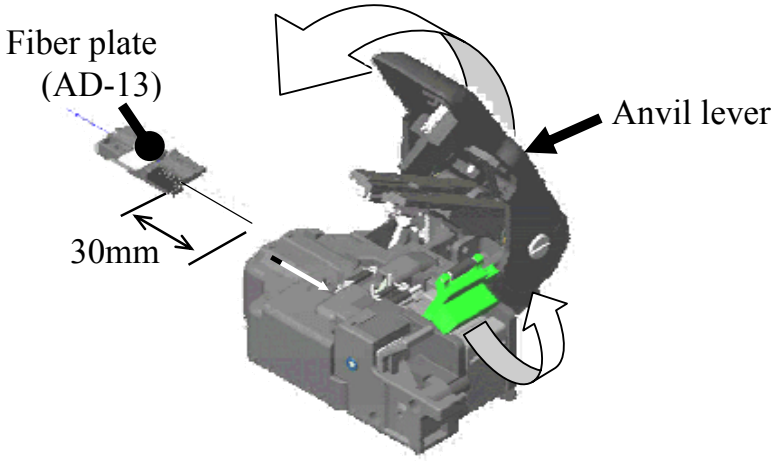
7. Fiber Cleaving

(1) To unlock the anvil lever, press the cleaver lid down gently. Next, slide the stopper to the unlock position to open the cleaver lid. Then slide the upper clamp stopper.





(2) Set the stripped optical fiber on the cleaver. Verify the proper cleave length.
(3) Press down the anvil lever slowly until the cleave blade scratches the fiber.
(4) Press down the anvil lever quickly like striking when the anvil cleaves the fiber.
(5) Slowly release the pressure on the anvil lever . A spring force will bring it to its open position.



• Proper operation of the anvil lever can be seen at URL
http://www.fujikura.co.jp/splicer/ct20/operate.mpg

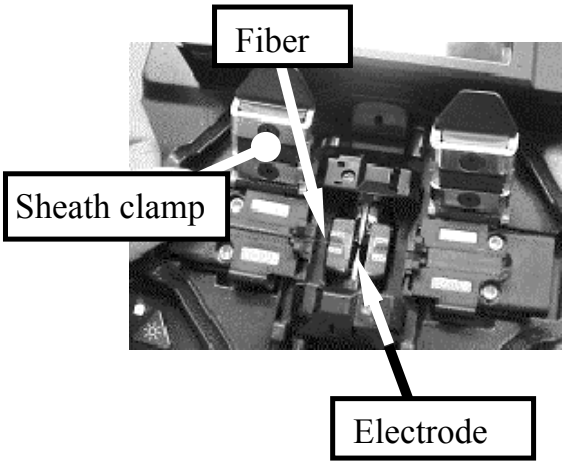
(6) Remove and discard fiber fragments and put into a proper disposal container.

(7) Attach the fiber clamp cover to the upper fiber clamps.

(8) Press the anvil lever down, until the stopper can slide into place to lock the anvil lever.

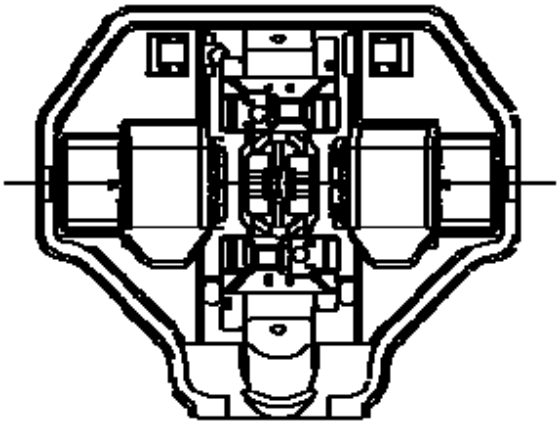
8. Loading fiber to splicer

(1) Open wind protector and sheath clamps.
(2) Place prepared fiber onto v-groove so that the fiber tip is located between the v-groove edge and tip of electrode.



- If fiber coating has some memory curl, place fiber so that the curve of memory is turned upwards.
- Be careful to not bump the prepared fiber tips into anything to maintain fiber end-face quality.

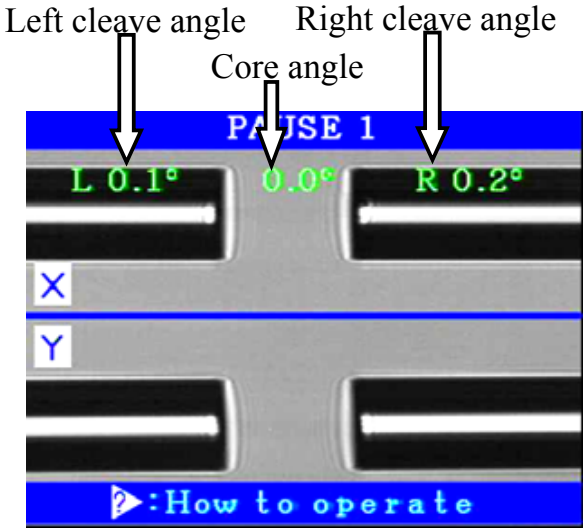
(3) Hold fiber with fingers and close sheath clamp so that the fiber does not move. Make sure the fiber is placed in the bottom of the v-grooves. If fiber is not placed properly, reload fiber.
(4) Load another fiber in the same manner as in step (3) above.
(5) Close wind protector.

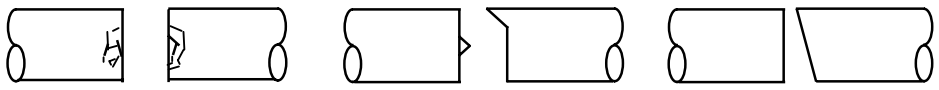


9. Splicing procedure

To assure a good splice, the optical fiber is observed with the image processing system equipped in the FSM-50S. However, there are some cases when the image processing system cannot detect a faulty splice. Visual inspection with the monitor is often necessary for better splicing yield. Procedure below describes standard operating procedure.

(1) Fibers loaded in the splicer move forward toward each other. The fiber forwarding motion stops at a certain position shortly after the cleaning arc is performed. Next, the cleave angle and end-face quality are checked. If the measured cleave angle is greater than its set threshold or fiber chipping is detected, the buzzer will sound and an error message warns the operator. The splicing procedure pauses.
If no error message is displayed, the below stated end-face conditions are used for visual inspection. If observed, remove the fiber from the splicer and repeat fiber preparation. These visual defects may cause a faulty splice.

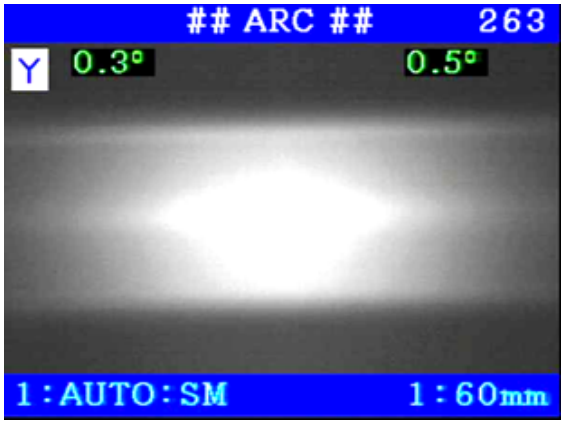




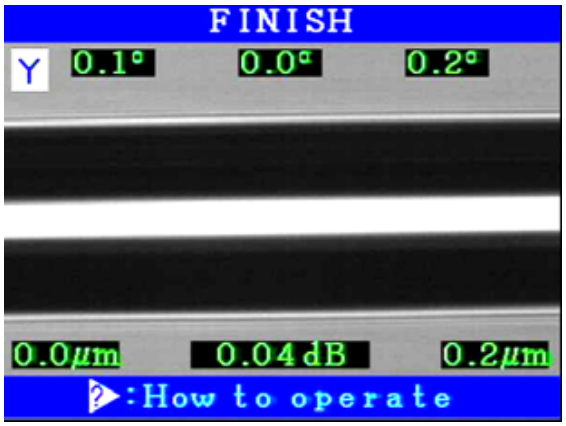
(2) After fiber inspection, the fibers are aligned core-to-core or cladding-to-cladding. Cladding axis offset and core axis offset measurements can be displayed.

- Pause after cleave angle check and fiber alignment can be set to disabled. See [Splice Option] (Page 46) for details.
- The cleave angle threshold can be changed. See [Splice Option] (Page 46) for details.
- The cleave angle error message can be ignored by pressing **SET** to go on to the next step. To disable the cleave angle error, see [Splice Option] (Page 46) for details.
- Cleave angle, cladding axis offset and core axis offset during the splicing operation can be hidden. See [Splice Option] (Page 46) for details.

(3) After completion of fiber alignment, arc discharge is performed to splice the fibers.



(4) Estimated splice loss is displayed upon completion of splicing. Splice loss is affected by certain factors stated in the next page. These factors are taken into account to calculate, or estimate, splice loss. The calculation is based on certain dimensional parameters, such as MFD.



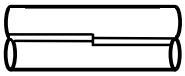
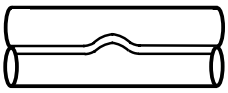
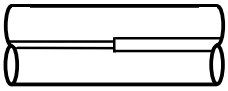
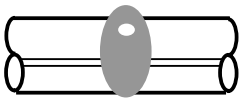
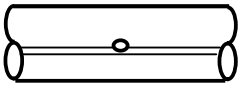
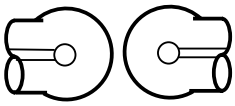
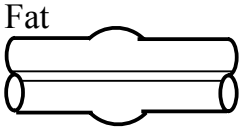
If either the cleave angle measured or the estimated splice loss exceeds its set threshold, an error message is displayed. If the spliced fiber is detected as abnormal, such as "Fat", "Thin" or "Bubble", an error message is displayed. If no error message is displayed but the splice looks poor by visual inspection through the monitor, it is strongly recommended to repeat the splice from the beginning.

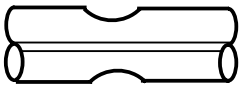
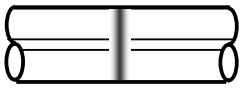
- Splice point sometimes looks a bit fatter than other parts. This is considered a normal splice, and does not affect splice loss.
- To change threshold for estimated splice loss or cleave angle, see [Splice Mode] (Page 26) for details.
- Error messages, such as "Estimated splice loss", "Splice angle", "Fat", "Thin" and "Bubble" can be ignored. This function can be set to "disabled". See [Splice Mode] (Page 26) for details.

Splice loss may be improved in some cases by additional arc discharges. Press ***ARC*** for an additional arc discharge (re-arc). Splice loss estimate and splice check are performed again.

- Splice loss may be worsened in some cases by additional arc discharges (re-arcs). Additional arc discharge can be set to "disabled", or limited to the number of additional arcs. See [Splice Option] (Page 46) for details.

Splice loss increase : Cause and remedy

Symptom	Cause	Remedy
Core axial offset 	Dust on v-groove or fiber clamp chip	Clean v-groove and fiber clamp chip.
Core angle 	Dust on v-groove or fiber clamp chip	Clean v-groove and fiber clamp chip.
	Bad fiber end-face quality	Check if fiber cleaver is well conditioned.
Core step 	Dust on v-groove or fiber clamp chip	Clean v-groove and fiber clamp chip.
Core Curve 	Bad fiber end-face quality.	Check if fiber cleaver is well conditioned.
	Prefuse power too low, or prefuse time too short.	Increase [Prefuse Power] and/or [Prefuse Time].
MFD Mismatch 	Arc power too low	Increase [Arc Power] and/or [Arc Time].
Combustion 	Bad fiber end-face quality	Check the cleaver
	Dust still present after cleaning fiber or cleaning arc.	Clean fiber thoroughly or Increase [Cleaning Arc Time]
Bubbles 	Bad fiber end-face quality	Check if fiber cleaver is well conditioned.。
	Prefuse power too low, or prefuse time too short.	Increase [Prefuse Power] and/or [Prefuse Time].
Separation 	Fiber stuffing too small	Perform [Motor Calibration]
	Prefuse power too high, or prefuse time too long.	Decrease [Prefuse Power] and/or [Prefuse Time].
Fat 	Fiber stuffing too much	Decrease [Overlap] and perform [Motor Calibration].

Symptom	Cause	Remedy
Thin 	Arc power not adequate	Perform [Arc Calibration].
	Some arc parameters not adequate	Adjust [Prefuse Power], [Prefuse Time] or [Overlap].
Line 	Some arc parameters not adequate	Adjust [Prefuse Power], [Prefuse Time] or [Overlap].

• A vertical line sometimes appears at the splice point when MM fibers, or dissimilar fibers (different diameters) are spliced. This does not affect splice quality, such as splice loss or tensile strength.

Storing splicing results

Splicing results can be stored in memory. Follow the storing procedure below.

• After the 2000th result is stored, 2001st splice result is written over 1st result.

Storing results automatically (No comment is inputted)

The splicing result is automatically stored in memory when ***SET*** or ***RESET*** is pressed upon completion of the splice at the [Finish] screen, or when the wind protector is opened upon completion of the splice at the [Finish] screen.
Once a certain comment is inputted, the same comment is inputted into subsequent splice results. To change comments, see next paragraph.

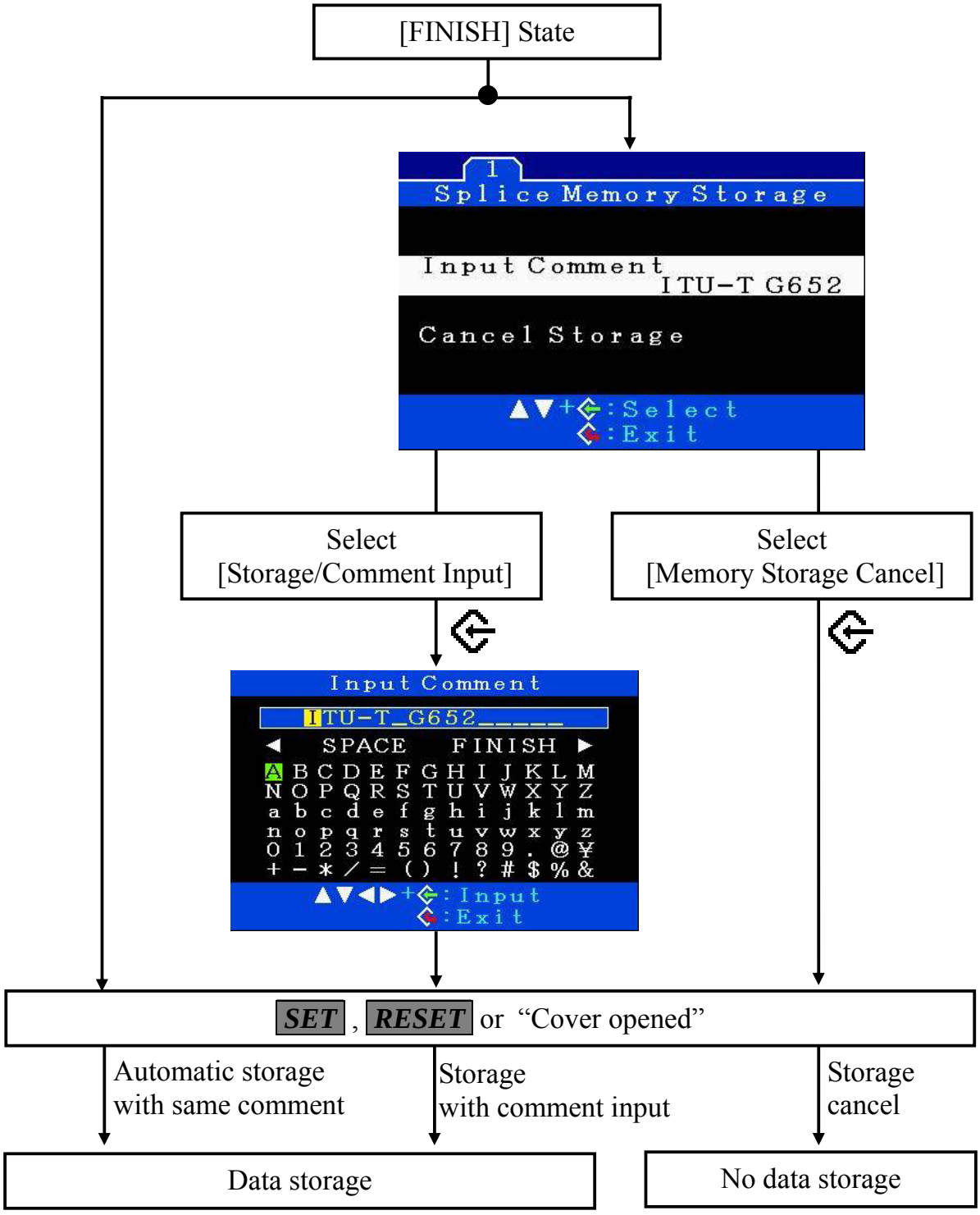
Storing results with some comments

Press ↵ at [Finish] screen upon completion of the splice to display [Memory Storage Menu]. Move cursor to [Storage/Comment Input] and press ↵ to display [Input Comment] screen, then input comment. Press ***SET*** , ***RESET*** or open wind protector at the [Finish] screen to store splicing results with some comments.

No storing splicing results

Press ↵ at the [Finish] screen upon completion of the splice to display [Memory Storage Menu]. Move cursor to [Memory Storage Cancel] and press ↵ to enter. No splicing results are stored even though ***SET*** or ***RESET*** is pressed, or wind protector is opened at the [Finish] screen upon completion of the splice.

• [Memory Storage Cancel] function can be set to "disabled". See [Management Menu] (Page 52) for details.



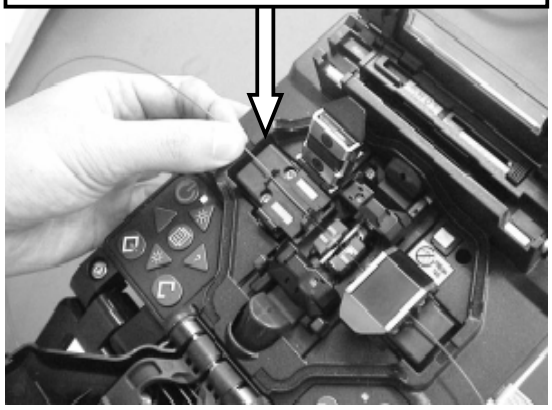
10. Removing spliced fiber

(1) Open lids of tube heater.
(2) Open wind protector.
(3) Hold left fiber with left hand at the edge of wind protector and open left sheath clamp.

> • Keep on holding fiber until fiber is completely transferred to tube heater.

(4) Open right sheath clamp.
(5) Hold right fiber with right hand, and remove spliced fiber from the splicer.

Hold left fiber with left hand at the edge of wind protector.

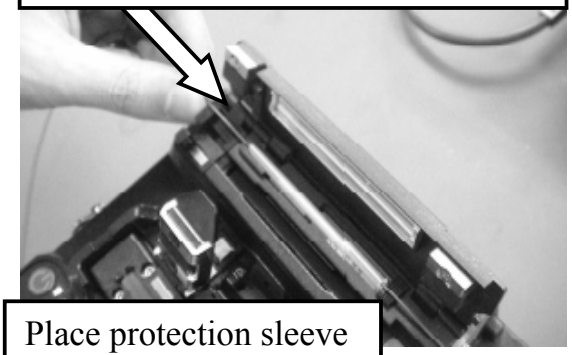


11. Hold left fiber with left hand here

Place protection sleeve on the centering device located on the tube heater. Length gauge is set according to sleeve length in advance. Slide spliced fiber slowly to the right until left hand reaches the edge of the tube heater. Protection sleeve is placed in the center of the tube heater.

> • Splicing point can be set in the center of the protection sleeve using the centering device located on the tube heater.

Slide spliced fiber to the right until left hand reaches the edge of tube heater.

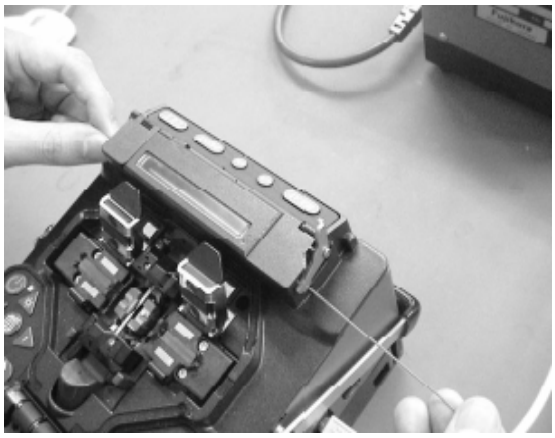


Place protection sleeve in centering device.

12. Heating protection sleeve

(1) Transfer fiber with protection sleeve from centering device to tube heater
(2) Place fiber with protection sleeve in tube heater. While placing it in the tube heater, apply some tension on the fiber so the tube heater lids automatically close.

> •Make sure the splice point is located at the center of the protection sleeve.
> •Make sure the strength member in the protection sleeve is placed downwards.



(3) Press ***HEAT*** to start tube heating. The buzzer beeps and the HEAT LED (orange color) turns off when tube heating is completed.

> • If ***HEAT*** is pressed during tube heating, the HEAT LED blinks.
> If ***HEAT*** is pressed again, the tube heating process is aborted.

(4) Open tube heater lids and remove protected fiber from the tube heater. Apply some tension to the fiber while removing it from the tube heater.

> • Protection sleeve may stick to bottom plate of heater. Use a cotton swab to help remove sleeve from heater.

(5) Visually inspect the finished sleeve to verify no bubbles or debris/dust is present in the sleeve.

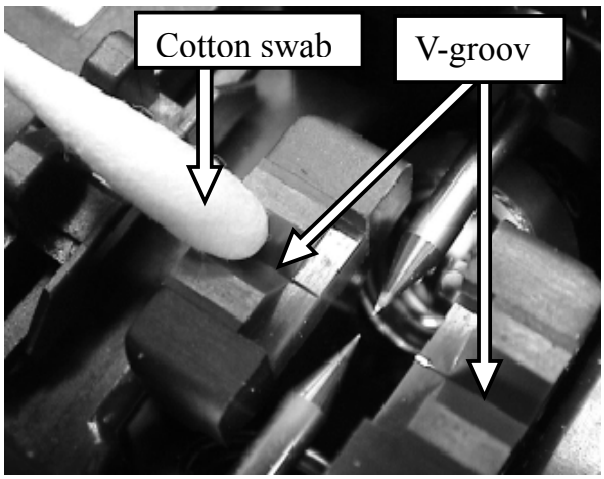
1. Cleaning and Checking before Splicing

Critical cleaning points and maintenance checks are described below.

1-1. Cleaning V-grooves

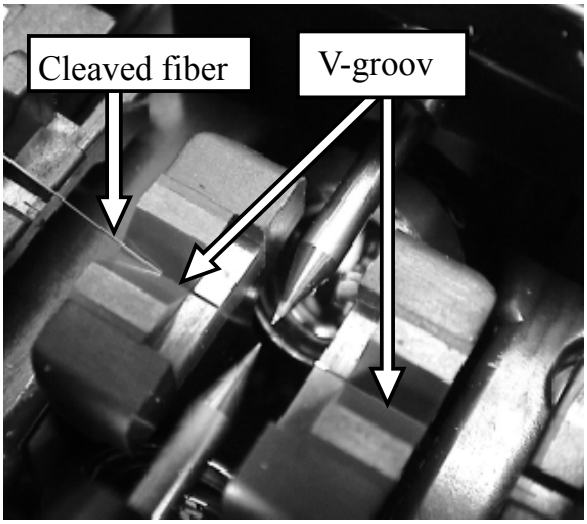
If contaminants are present in the V-grooves, proper clamping may not occur, resulting in higher splice loss. The V-grooves should be frequently inspected and periodically cleaned during normal operation. To clean the V-grooves, do the following:

(1) Open the wind protector.
(2) Clean the bottom of the V-groove with an alcohol-impregnated thin cotton swab. Remove excess alcohol from the V-groove with a clean dry swab.



- Be careful to not contact the electrode tips.
- Do not use excessive force when cleaning the V-groove. The V-groove arm may get damaged.

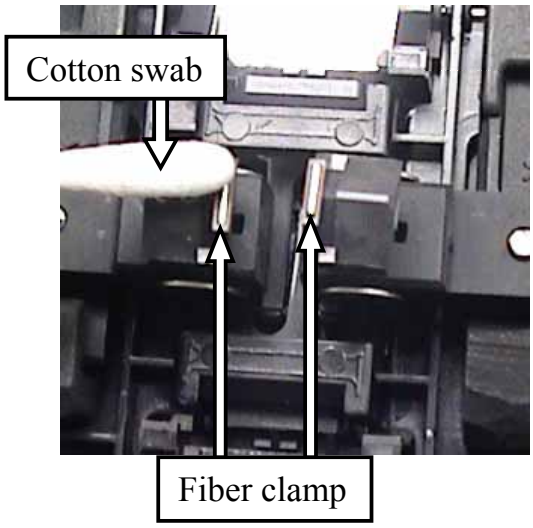
(3) If the contaminants in the V-groove cannot be removed with an alcohol-impregnated thin cotton swab, use a cleaved fiber end-face to dislodge contaminants from the bottom of the V-groove. Repeat step (2) after this procedure.



1-2. Cleaning Fiber Clamp Chips

If contaminants are present on the clamp chips, proper clamping may not occur, resulting in poor quality splices. The fiber clamp chips should be frequently inspected and periodically cleaned during normal operation. To clean the clamp chips, do the following:

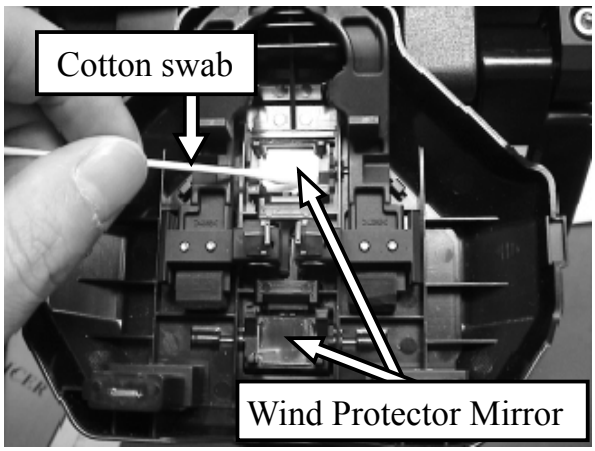
(1) Open the wind protector.
(2) Clean the surface of the chip clamp with an alcohol-impregnated thin cotton swab. Remove excess alcohol from the chip clamp with a clean dry swab.



1-3. Cleaning Wind Protector Mirrors

If the wind protector mirrors become dirty, the fiber core position may be incorrect due to decreased optical path clarity, resulting in higher splice loss. To clean the mirrors, do the following:

(1) Clean the mirror surface with an alcohol-impregnated thin cotton swab. Remove excess alcohol from the mirror surface with a clean dry swab.
(2) Mirror should look clean with no streaks or smudges.

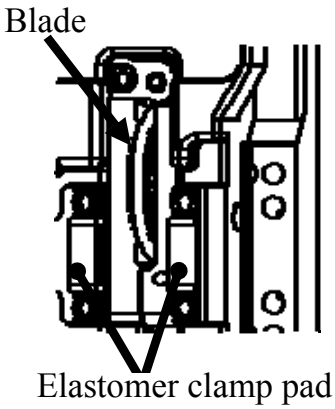


1-4. Cleaning Fiber Cleaver

If the cleave blade or clamp pads of the fiber cleaver become contaminated, the cleaving quality could degrade. This may lead to fiber surface or end-face contamination, resulting in higher splice loss. Clean the cleave blade and clamp pads with an alcohol-impregnated thin cotton swab.

Arc Power Calibration

Refer to [Arc Calibration] (Page 52).



2. Periodical Checking and Cleaning

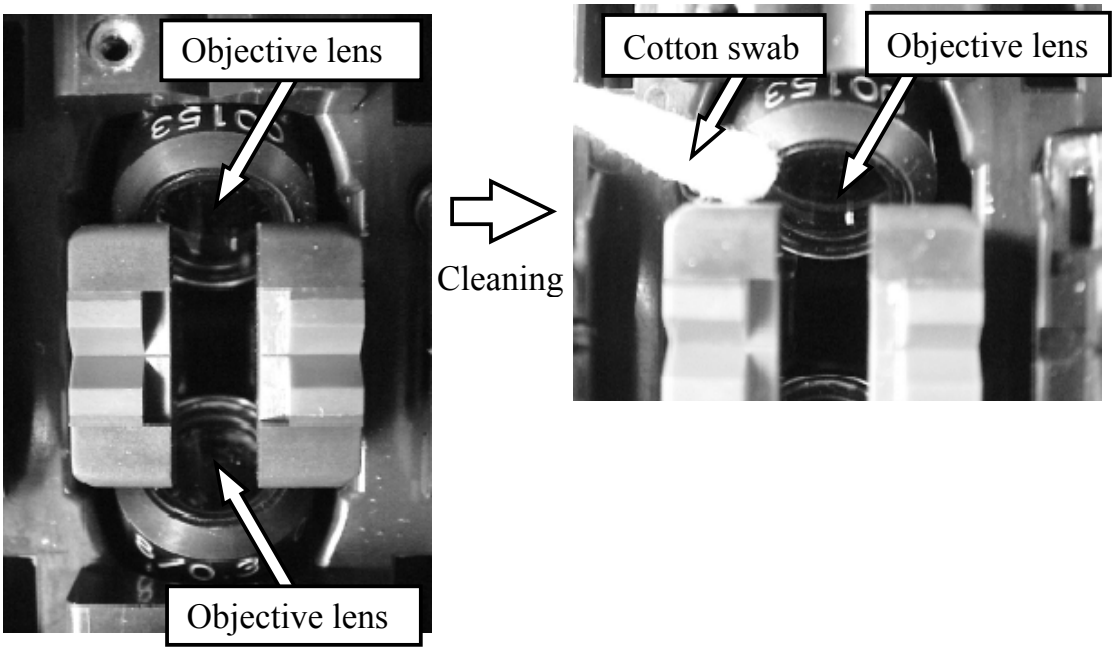
In order to maintain the splicing quality of the splicer, periodical inspection and cleaning are recommended.

2-1. Cleaning Objective Lenses

If the objective lens's surface becomes dirty, normal observation of the core position may be incorrect, resulting in higher splice loss or poor splicer operation. Therefore, clean both of them at regular intervals. Otherwise, dirt may accumulate and become impossible to remove. To clean the objective lenses, do the following:

(1) Before cleaning the objective lenses, always turn off the splicer.
(2) Gently clean the lenses' (X-axis and Y-axis) surface with an alcohol-impregnated thin cotton swab. Using the cotton swab, start at the center of the lens and move the swab in a circular motion until you spiral out to the edge of the lens surface. Remove excess alcohol from the mirror surface with a clean dry swab.

- Remove electrode before cleaning objective lens.
- Do not hit or touch tip of electrode when cleaning it.



(3) The lens surface should be clean and free of streaks or smudges.
(4) Turn on the power and make sure no smudges or streaks are visible on the monitor screen. Press ***X/Y*** to change the screen and check the state of the lens surface on both the X- and Y-screens. Perform dust check.

2-2. Rotating Cleaver Blade

If the cleaver does not cleave properly, rotate the blade 1/16th of a turn to replace the worn out blade position with a sharp blade position. To rotate blade, do the following:

(1) Remove the blade cover.
(2) Using a small slotted screwdriver, loosen the blade lock screw.
(3) Rotate the circular blade 1/16th of a turn.

> • When rotating the blade, do not touch the cutting edge. Move the blade with a thin cotton swab, for easy and safe rotation.

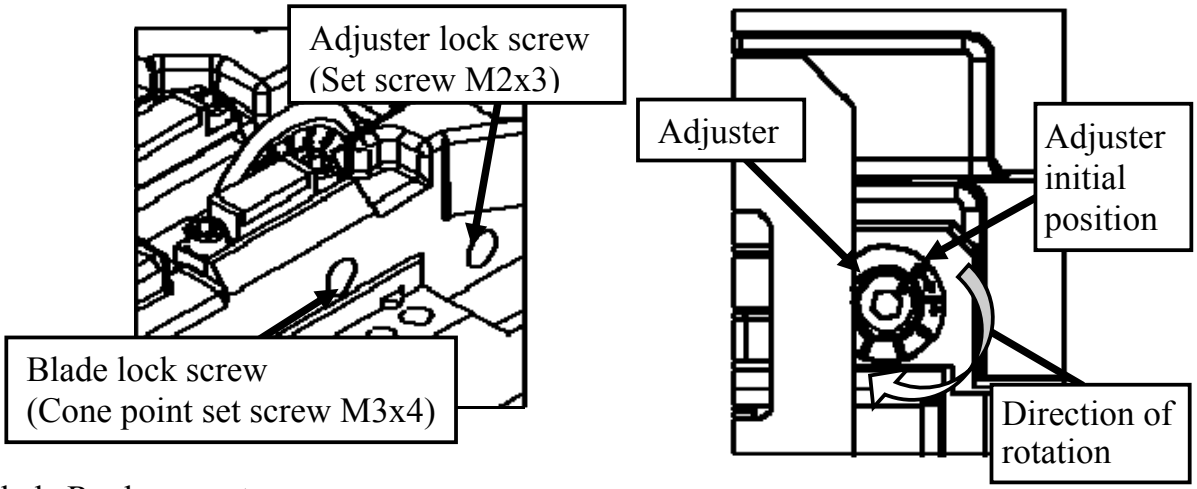
(4) Tighten the blade lock screw.
(5) Attach the blade cover.

Blade Height Adjustment

After the circular blade has been rotated a complete revolution (16 positions), blade height needs to be adjusted to compensate for blade wear. Do the following:

(1) Loosen the blade lock screw.
(2) Using a .89mm hex wrench, loosen the adjuster lock screw.
(3) Using a 1.5mm hex wrench, turn the adjuster clockwise so that the reference dot aligns with the next position mark. Never attempt to rotate the adjuster more than 2 position marks.
(4) Tighten the adjuster lock screw.
(5) Tighten the blade lock screw.

> • After blade height adjustment, the 16 blade positions can be used again. If the cleaver does not cleave properly, rotate the blade.



Blade Replacement

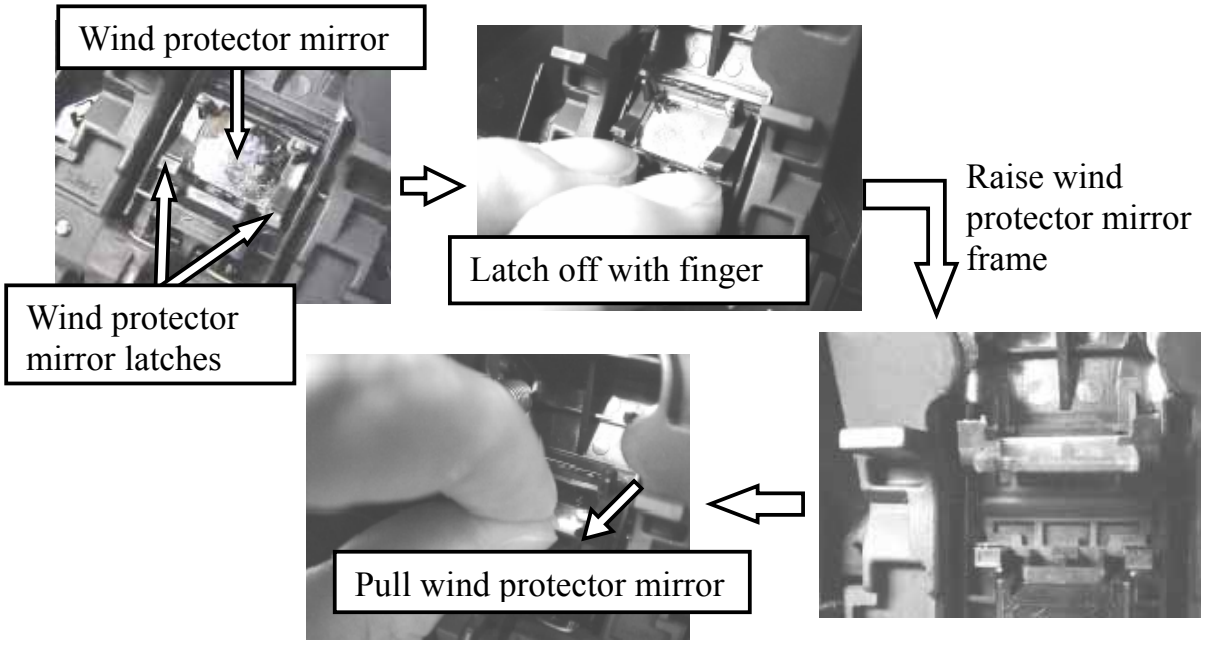
After the circular blade is raised 3 times, it needs to be replaced. Contact your Fujikura splicer distributor.

2-3. Replace Wind Protector Mirrors

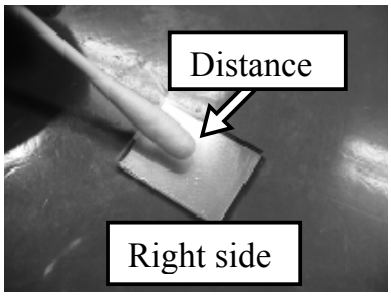
Replace the wind protector mirror if it cannot be cleaned or if it remains clouded. To replace, do the following:

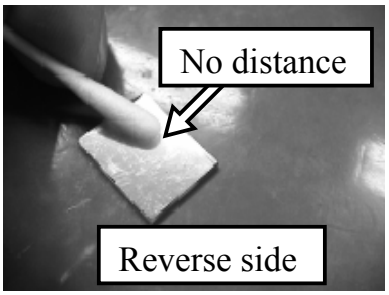
(1) Turn the splicer power off.

(2) Open the wind protector. With fingers, pull and unlock wind protector mirror latch. While still pulling on mirror latch, use other hand's fingers to pull on wind protector mirror frame. The frame should raise and rotate back. Pull out the mirror from its frame.



(3) Insert new mirror into the frame. The clear glass side should face upward while inserting mirror into the frame. The opposite side of the mirror is not covered with clear glass. To identify the clear side of mirror put a cotton swab on one of the mirror sides. If it is the clear side, there will be some distance found between the cotton swab and the mirror base because the clear glass cover is located in between the cotton swab and mirror.





• Make sure the wind protector mirror is inserted the correct way. If not, the fiber cannot be observed correctly.

(4) Clean Wind Protector Mirrors.

(5) Turn on the power and make sure no smudges or streaks are visible on the monitor screen. Press ***X/Y*** to change the screen and check the state of the lens surface on both the X- and Y-screens. Perform dust check.

2-4. Electrode Replacement

Refer to Page 67 [Replace Electrode].

2-5. Diagnostic Test

Refer to Page 71 [Diagnostic Test Function].

2-6. Complete Discharge of Battery Pack

Refer to Page 69 [Battery Discharge].

2-7. Adjust Monitor Angle Adjuster

(1) The monitor hinge may become too loose and does not maintain the monitor position. To fix this problem, tighten monitor hinge screws shown in following picture.

(2) The monitor hinge may become difficult to adjust the monitor angle. To fix this problem, apply oil into a position shown in the following picture. Do not tighten the screws.

1. Splice Mode

The optimum splice setting for a specific fiber combination consists of the below listed splicing parameters. In other words, the optimum splicing parameters depend on the fiber combinations, and are different from fiber to fiber.

- Parameters for controlling arc discharge / heating.
- Parameters for calculating estimated splice loss.
- Parameters for controlling fiber alignment and splicing procedures.
- Threshold for error messages.

A series of optimum splice parameters for major fiber combinations are already stored in the splicer. These parameters are stored in the database area and can be copied to the user-programmable area. These splice parameters can be edited for a specific fiber combination.

Database

Splice Mode	Description
AUTO	This splice mode observes the core profile of the optical fiber, and automatically identifies the fiber type being SM, MM or NZDS. A set of splicing parameters is selected for the identified fiber type and the fibers are automatically spliced. This is beneficial if the fiber type is uncertain. The identified fiber type is displayed in the lower left hand corner of the monitor. The heat amount applied to the fiber is calibrated in real time by analyzing the cladding illumination during arc discharge then adjusting the arc current accordingly. This splice mode does not require operator to perform an arc calibration. points to note of AUTO mode (1) Fiber types that can be identified are standard SM, MM and NZDS. However, some fibers with unique core profile may not be correctly identified. If this is the case, the recommendation is to use the other splice modes. (2) NZDS fiber is spliced using the splicing mode for standard NZDS. However, for best results, it is recommended that the optimum splice mode be selected for a specific type of NZDS fiber. This is due to the variation in the NZDS fiber properties and optimum splicing parameters are different from one type of NZDS fiber to the next. (3) DS fiber is identified as NZDS when using AUTO mode.

Splice Mode	Description
SM	For splicing standard Single-mode fiber (ITU-T G652). The MFD is 9 to 10 um at wavelength of 1310 nm. Automatic arc calibration doesn't work in this splice mode.
NZ	For splicing Non-zero dispersion-shifted fiber (ITU-T G655). The MFD is 9 to 10 um at wavelength of 1550 nm. Automatic arc calibration doesn't work in this splice mode.
DS	For splicing Dispersion-shifted fiber (ITU-T G653). The MFD is 7 to 9 um at wavelength near 1550 nm. Automatic arc calibration doesn't work in this splice mode.
MM1	For splicing Multi-mode fiber (ITU-T G651). Core diameter : 50.0 to 62.5 um This mode is programmed to splice all types of MM fibers. Failure rate by a bubble is low even if the cleaver or electrode condition is not good. But, the appearance of splice point looks little fat. And, the splice loss is little worse (typical < 0.01dB increase). The AUTO mode is using this splice condition when splicing the MM fibers. When a bubble still occurs, use the MM-MM mode, and increase [Prefuse Time] and [Prefuse Power]. Automatic arc calibration doesn't work in this splice mode. Note: This new mode is added from software version 01.07.
MM2	For splicing Multi-mode fiber (ITU-T G651). Core diameter : 50.0 to 62.5 um This mode is programmed to achieve the best splice loss. The appearance of splice point doesn't look fat. But, a bubble sometimes occurs when the cleaver or electrode condition is not good. Automatic arc calibration doesn't work in this splice mode. Note: This mode was called as MM before software version 01.07.
SM AUTO	For splicing standard Single-mode fiber (ITU-T G652). The MFD is 9 to 10 um at wavelength of 1310 nm. Automatic arc calibration works in this splice mode.
NZ AUTO	For splicing Non-zero dispersion-shifted fiber (ITU-T G655). The MFD is 9 to 10 um at wavelength of 1550 nm. Automatic arc calibration works in this splice mode.
DS AUTO	For splicing Dispersion-shifted fiber (ITU-T G653). The MFD is 7 to 9 um at wavelength of 1550 nm. Automatic arc calibration works in this splice mode.
Other splice modes	There are many types of splice modes in this splicer, other than the ones stated above, stored in the splicer database. Select a "BLANK" splice mode, and press ▷. Then press ⏎. Nearly 60 splice modes stored in the database are displayed. Select one splice mode to be used.

1-1. Splice mode selection

Select an appropriate splice mode for type of fiber to be spliced.

(1) Press ▤ at [READY], [PAUSE1], [PAUSE2] or [FINISH] state to open [Splice Menu]. Select [Select Splice Mode] and the [Select Splice Mode] menu is displayed.

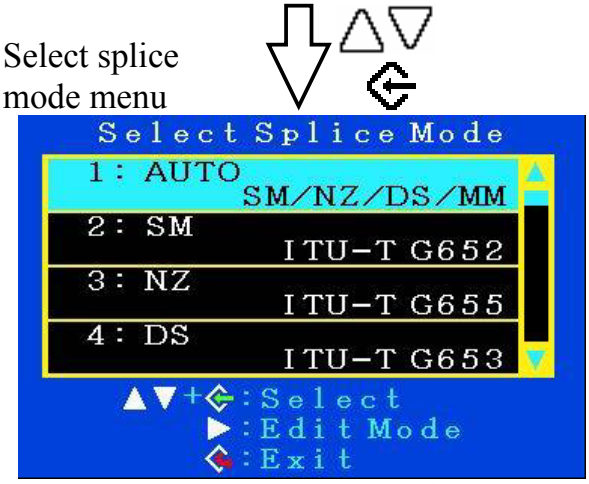
(2) Move cursor by pressing △, ▽ and press ↵ to select [Splice mode].

> • The Short-cut to [Select Splice Mode] is to press the ↵ key.

READY

Splice Menu

Select splice mode menu



Decided

1-2. Creating or erasing splice mode

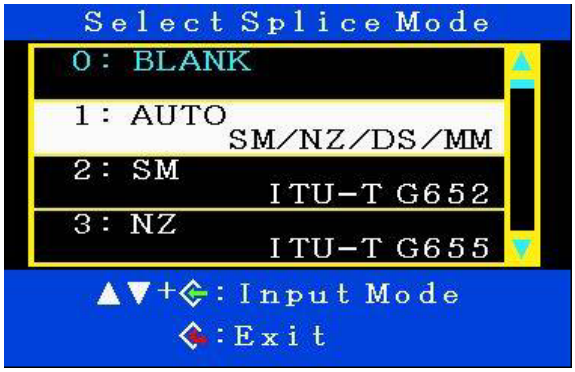
How to create splice mode

There are 8 splice modes stored when the splicer is first delivered, and all the other modes are displayed [BLANK]. Follow the below steps to add splice mode.

Select a "BLANK" splice mode and press ▷. Then press ↵. Nearly 60 splice modes stored in the splicer database are displayed. Select one splice mode to be copied. Press ↵ to execute. Press ↵ to verify the fiber type is named in the specific splice mode.

Select the "BLANK" in the [Select Splice Mode]

Fiber type select menu



△▽ ↵

Decided

How to erase splice mode

Splice mode can be erased. Follow the below steps to erase splice mode.

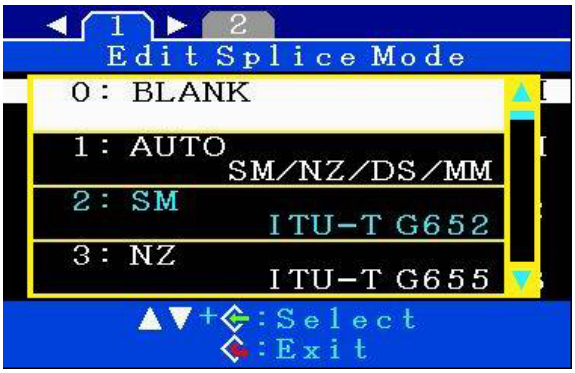
(1) Select the specific splice mode and press ▷ to go to [Edit Splice Mode] menu. Select [Fiber Type] by pressing ↵.

(2) Select the "0:BLANK" and press ↵ twice to execute.

- Mode No.1 cannot be erased.
- Mode No.1 is automatically selected after erasing a splice mode.

Select the "Fiber Type" in the [Edit Splice Mode] Menu

Fiber type select menu



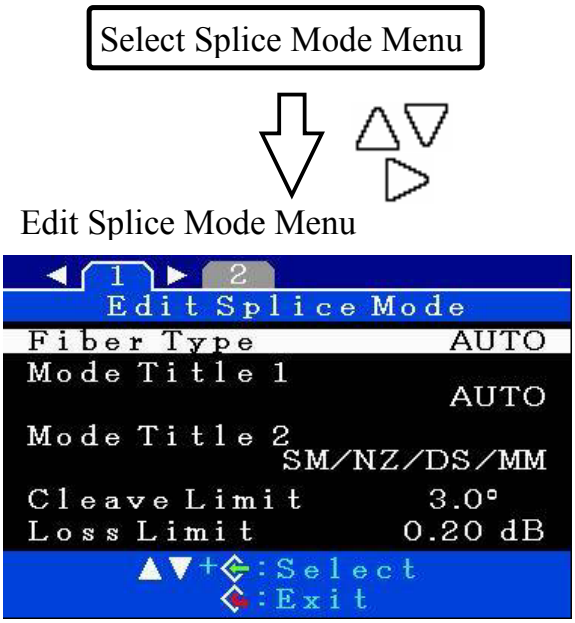
↵

Erase mode

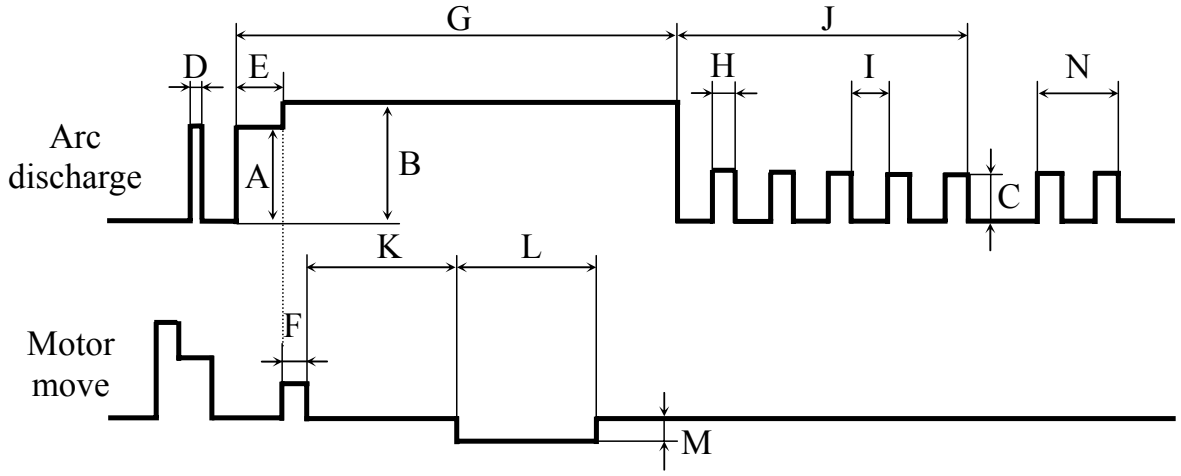
1-3. Referring or editing splice mode

Splicing parameters in each splice mode can be modified. Arc power and Arc time are considered the two most vital parameters. To edit parameters do the following:

(1) In [Select Splice Mode] menu, move cursor to a splice mode to be modified. Press ▷ button to display [Edit Splice Mode] menu.
(2) Move cursor by pressing △▽ buttons to a parameter to be changed.
(3) Press ↵ to select parameter.
Press ◁▷ to change its values.
Press ↵ to accept changed values.



Below is a figure showing the Arc discharge conditions (relationship between "Arc power" and "Motor motion"). The conditions can be edited by changing the splicing parameters listed below. Depending on splice mode, certain parameters cannot be changed.



A: Prefuse Power, B: Arc1 Power, C: Arc2 Power,
D: Cleaning Arc, E: Prefuse Time,
F: Forward Time related to Overlap, G: Arc1 Time,
H: Arc2 ON Time, I: Arc2 OFF Time, J: Arc2 Time,
K: Taper Wait Time, L: Taper Time related to Taper Length,
M: Taper Speed, N: Rearc Time

Below is a list of Splicing parameters for AUTO, SM, DS, MM and NZ modes

Only a limited number of parameters listed below are displayed for AUTO, SM, DS, MM and NZ modes to simplify the operation. Additional hidden parameters are all fixed values set at the factory.

Parameter	Description
Fiber Type	List of splice modes stored in database is displayed. A selected splice mode stored in the database area is copied to a selected splice mode in the user-programmable area.
Mode Title1	Title for a splice mode expressed in up to seven characters.
Mode Title2	Detail explanation for a splice mode expressed in up to 15 characters. Title2 is displayed at the [Splice Mode Select] menu.
Cleave Limit	An error message is displayed if the cleave angle of either the left or right fiber ends exceeds the selected threshold (cleave limit).
Loss Limit	An error message is displayed if the estimated splice loss exceeds selected threshold (loss limit).
Arc Power	The Arc Power is fixed at 40 bits for AUTO modes. The Arc Power is changed automatically SM / DS / MM / NZ modes.
Arc Time	Arc Time is fixed at 1500 ms for SM and DS modes, 2000ms for NZ mode, and 3000 ms for MM mode. This is automatically set depending on the fiber type when AUTO mode is selected.
Cleaning Arc	A cleaning arc burns out micro dust on the surface of the fiber with an arc discharge for a short period of time. The duration of the cleaning arc can be changed by this parameter.
Rearc Time	Splice loss may be improved by an additional “rearc” discharge in some cases. The duration of this additional arc can be changed by this parameter.

• Menus change when [Fiber Type] is set other splice modes, e.g. SM-SM mode.

Splicing parameters : other splice modes, e.g. SM-SM

In other splice modes in the user-selectable database, the user has the freedom to select from a series of pre-loaded splicing modes for various splicing combinations. Below are the descriptions of the various parameters used in these modes.

Parameter	Description
Fiber Type	A list of splice modes stored in the splicer database is displayed. Upon inputting the appropriate mode, the selected splice mode stored in database area is copied to a selected splice mode in user-programmable area.
Mode Title1	Title for a splice mode expressed in up to seven characters.
Mode Title2	Detail explanation for a splice mode expressed in up to 15 characters. Title2 is displayed at the [Splice Mode Select] menu.
Align	Sets the aligning method for the fibers. "Core" : Aligns fibers by core position. "Clad" : Aligns fibers by center position of the cladding of the fiber. "Manual" : Aligns fibers manually.
Focus-L Focus-R	Sets the focal point for fiber observation. The focal point moves closer to the core when [Focus] value is increased. "Auto" focus is strongly recommended, as [Focus] optimization is very difficult. Left and right fibers are focused independently even if they are a different fiber type (dissimilar fiber splicing). If the fiber core cannot be observed (e.g. MM fiber), use the "Edge" parameter. [Align] and [Est. Mode] are automatically fixed to the "Clad" setting. [ECF] and [Auto Power] are automatically fixed to the "OFF" setting.
ECF	Sets the axial offset ratio for ECF. Refer to [ECF] (page 45) for detail. For a splice mode in which arc time is 5 sec. or longer, setting [ECF] "OFF" is recommended. If [Align] is set to "Edge", "Clad" or "Manual", [ECF] is automatically fixed to "OFF". If [ECF] is set "OFF", [Auto Power] is automatically fixed to "OFF".
Auto Power	Optimizes Arc power according to core concentricity-error. This function is used in combination with ECF. If [ECF] is set to "OFF", [Auto Power] is automatically fixed to "OFF"
Proof Test	If [Proof Test] is set to "ON", a proof-test is performed upon opening the wind protector after splicing or by pressing the ***SET*** .

Parameter	Description
Cleave Limit	An error message is displayed if the cleave angle of either the left or right fiber ends exceed the selected threshold (cleave limit).
Loss Limit	An error message is displayed if the estimated splice loss exceeds the selected threshold (loss limit).
Core Angle Limit	An error message is displayed if the bend angle of the two fibers spliced exceeds the selected threshold (Core Angle Limit).
Cleaning Arc	A cleaning arc burns out micro dust on the surface of the fiber with an arc discharge for a short period of time. The duration of the cleaning arc can be changed by this parameter.
Gap	Sets the end-face gap between the left and right fibers at the time of aligning and pre-fusion discharge.
Gapset Pos.	Sets the relative position of the splicing location to the center of electrodes. Splice loss may be improved in the case of dissimilar fiber splicing by shifting [Gapset Pos] towards a fiber whose MFD is bigger than the other fiber MFD.
Prefuse Power	Sets the power of the prefuse arc, which is an arc discharge occurring from the beginning until the fibers begin stuffing. If [Prefuse Power] is set too low, axial offset may occur if cleaved angles are relatively poor. If [Prefuse Power] is set too high, fiber end faces are fused excessively and splice loss gets worse.
Prefuse Time	Sets the duration of the prefuse arc, which is arc discharge occurring from the beginning until the fibers begin stuffing. Longer [Prefuse Time] is synonymous with higher [Prefuse Power].
Overlap	Sets the overlap amount of fibers at the fiber stuffing stage. Relatively small [Overlap] is recommended if the [Prefuse Power] is low, while relatively large [Overlap] is recommended if the [Prefuse Power] is high.
Arc1 Power	Arc discharge can be separated into two stages. Arc1 Power is the first stage. This sets Arc1 Power.
Arc1 Time	Sets Arc1 time. Caution If Arc1Time is set 1 sec. or less and Arc2 Power is set to "OFF", the splice may break during proof-test stage.

Parameter	Description
Arc2 Power	Arc2 is the second arc discharge stage. This sets Arc2 Power.
Arc2 Time	Sets the total Arc2 time. Usually set this value to “OFF”. It is possible to set a very long arc time. However, when the total of the Arc 1 time and Arc2 time exceeds 30 seconds, always adjust the function [Arc2 ON Time] and [Arc2 OFF Time] to weaken the arc power. A continuous arc over 30 seconds, without weakening the arc power, may damage the arc discharge unit.
Arc2 ON Time	During Arc2 discharge, arc power can be pulsed by turning the arc on and off. This sets the amount of time that Arc2 is ON.
Arc2 OFF Time	Sets Arc2 OFF Time during Arc2. When the Arc2 discharge is intermittent, re-arc discharge is also intermittent. When continuous re-arc discharge is necessary, set this parameter to “OFF”.
Rearc Time	Sets Rearc Time. In other splice modes, the Re-arc power is automatically fixed to the same arc power of [Arc2 Power]. If Arc2 is set ON and OFF, Re-arc is automatically set ON and OFF.
Taper Splice	Splice loss is sometimes improved when the fiber is tapered (pulled) during arc discharge to make the splice thinner. This sets taper function "ON". The following three parameters determine the taper shape.
Taper Wait	Sets the taper wait time from the end of fiber stuffing until the start of pulling fiber.
Taper Speed	Sets the fiber pulling speed.
Taper Length	Sets the fiber pulling length.
Est. Mode	Selects splice loss estimation mode to "OFF", "CORE", or "CLAD". When MM fibers are spliced, select "CLAD".
MFD-L	Sets MFD of the left and right fibers. Both MFD-L & R are taken into account for estimating splice loss.
MFD-R	
Minimum Loss	This amount is added to the estimated splice loss originally calculated. When splicing specialty or dissimilar fibers, a high actual splice loss may occur even with optimized arc conditions. To make the actual splice loss concur with the estimated splice loss, set the minimum value of estimate to the minimum optimized actual splice loss.
Core Step	Determines how Core step, Core curve and MFD mismatch influences splice loss estimate. If Est. Mode is set "OFF" or "CLAD", these Core step, Core curve and MFD mismatch are automatically set "OFF". If the estimated splice on certain fiber combinations need adjustment, Core step, Core curve and MFD mismatch are used. These are advanced splicer functions and should be discussed with your Fujikura representative before changing.
Core Curve	
MFD Mismatch	

How to input Mode title / Comments / Password

Character list below is displayed by selecting Mode Title / Comments / Password.

(1) Move the cursor by pressing △▽◁▷, and press ↵ to input the selected character. If an incorrect character is inputted, move the cursor to ◁ and press ↵ to highlight the character, then input the proper character over it.

(2) Move cursor to [FINISH] and press ↵ on completion of inputting characters.
In the case of Password input, the next screen image is displayed if the correct password is inputted. If the input password is incorrect, the previous screen image is displayed.

Manual Splice Mode

This mode is to manually align and splice fibers. The following procedure is required, and is different from standard automatic splicing.

(1) Press ***SET*** button to drive the fibers forward. The fibers stop moving forward at the gapset position.
(2) Select a motor to be manually moved by pressing ◁▷. The name of the motor to be moved is displayed in the monitor. Motor speed can be selected "fast" or "slow" by pressing ⇦.
(3) Press △▽ to move the selected motor and drive the fibers forward or backward.
(4) After manual alignment is completed, press ***ARC*** to arc and splice the fibers.

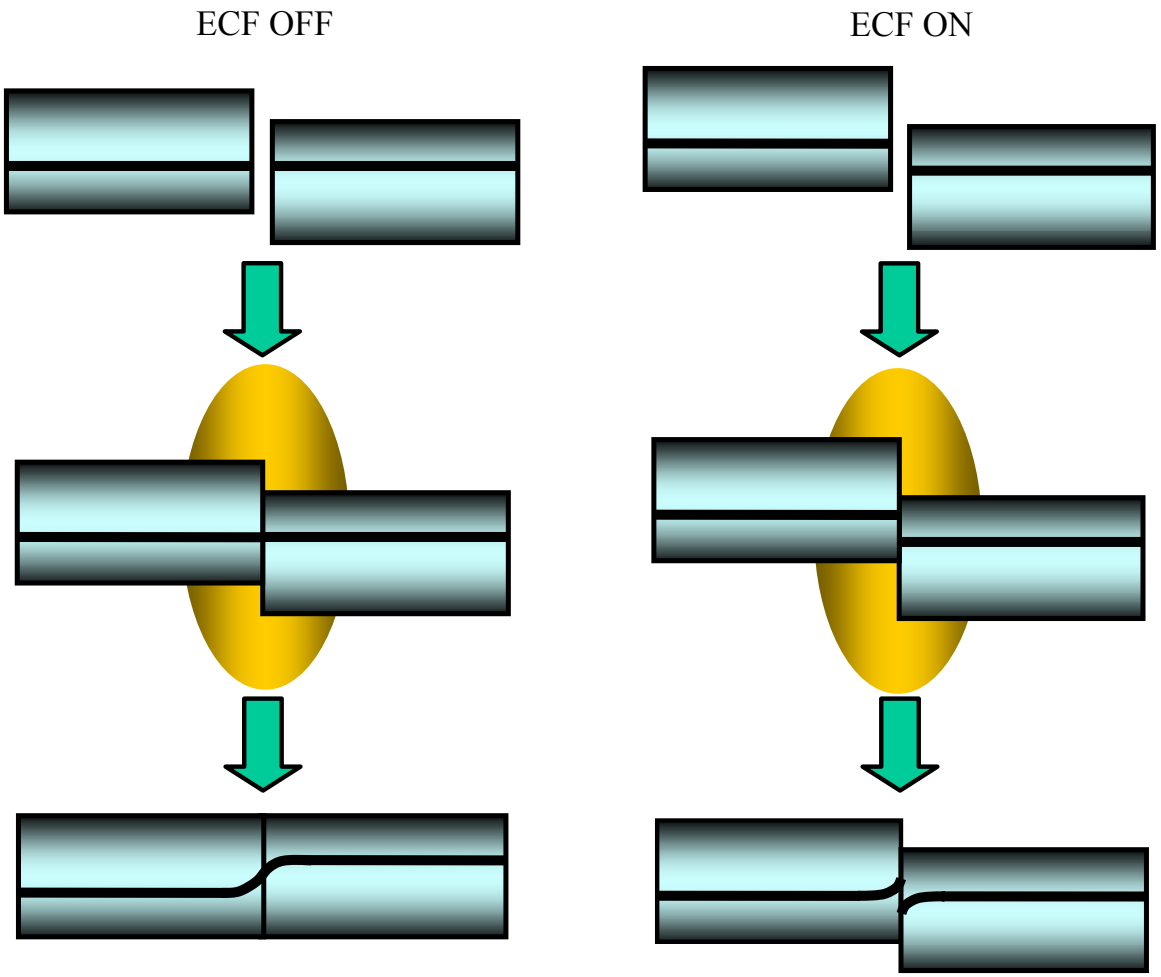
- The beeper beeps if motor stroke comes to its limit and the motor stops. Press the opposite arrow key to move the motor again.
- Display messages can be erased by pressing 🗐. The message can be displayed by pressing 🗐 again.

Motor	△	▽
ZL/ZR	Forward	Backward
X/Y	Upward	Downward
Focus X Focus Y	Lens moves nearer fiber.	Lens moves away from fiber.

ECF splice

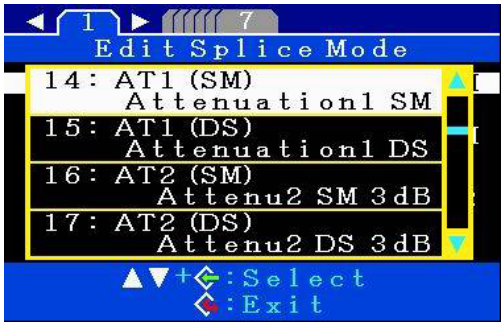
When fibers having some core concentricity-error are aligned using the core-to-core method, their outer claddings are not aligned in line with each other as shown below. However, surface tension created during arc discharge aligns the fibers cladding-to-cladding due to the viscous self-centering effect. This results in a high splice loss due to the fact that the cores of the fibers are offset during the process.

The ECF (Eccentricity Correct Function) function in the splicer prevents this from happening. The amount of offset expected due to this surface tension phenomenon is calculated in advance, and this is taken into account to determine an intentional core axis offset amount that is added after the fiber cores are aligned. With this function, the fibers are core-to-core spliced even with the effect mentioned above. Some “Core step” may remain at splice point but this gives much lower splice loss than core axial offset. A long arc discharge counteracts ECF, because surface tension eventually aligns and splices fibers cladding-to-cladding. Canceling [ECF] by setting this "OFF" reduces core step amount and increases core axial offset.



1-4. Attenuation splice mode

Attenuation splice mode makes an intentional core axial offset to create attenuation at the splice point. Two types of attenuation splice modes are included in the splicer as stated below.



Select either "AT1(SM)", "AT1(DS)", "AT2(SM)", "AT2(DS) or AT2(MM) in data base area at [Fiber Type].

[AT1] mode

[AT1] creates an intentional core axial offset and splices fibers. [AT1] mode provides an estimated splice loss, but this should be regarded as a reference as the estimated splice loss may not be correct in some cases, depending on fiber properties. A power meter is recommended for correct splice loss measurements.

Splicing parameters

Parameter	Description
Target Loss	Sets target splice loss.
MFD	Sets MFD of fibers to be spliced.
Coefficient	If actual splice loss measured does not match [Target Loss], the "coefficient" can be used to adjust this. This is often more practical than "Target loss" or "MFD" in terms of accuracy.
Other Parameters	Refer to other splice modes for complete description.

[AT2] mode

This mode allows the users to set a starting core offset value and a finishing core offset value. Set [Start Offset] manually and then splicing starts. Re-arcing is performed continuously / automatically until the axial offset reaches [Stop Offset] value. A splice loss estimate is not performed.

Splicing parameters

Parameter	Description
Start Offset	Sets axial offset amount before splicing.
Stop Offset	Re-arc is continuously performed until axial offset reaches specific offset amount [Stop Offset]. Axial offset amount decreases as splicing occurs, so [Stop Offset] must always be smaller than [Start Offset]. The maximum amount of [Stop Offset] is 80% of [Start Offset].
Other Parameters	Refer to other splice modes for complete description.

- [AT2] mode provides more stable performance than [AT1] mode, but some variation may inevitably occur. To decrease variation, set the [Cleave Limit] as low as possible.
- Attenuation splices made with [AT1]/[AT2] modes are not as accurate as power meter attenuation feedback splicing.
- [AT2-MM] mode is for attenuation splicing with MM fiber. Cladding alignment is performed with [AT2-MM] mode.

2. Heater Mode

There are 10 user-programmable heating modes. Select one best suitable for the protection sleeve used.

Each tube-heating mode is optimized for a type of Fujikura protection sleeve. These modes can be found in database area for reference. Copy the appropriate one and paste it to the user-programmable area. The operator can edit the user-programmable modes.

Data Base

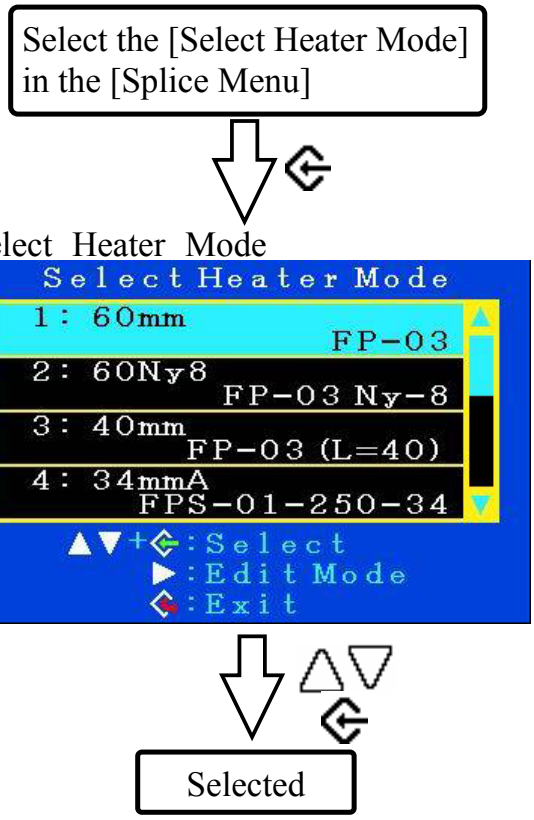
Parameter	Description
60mm	For standard 60mm protection sleeve, such as Fujikura FP-03 or FP-03M protection sleeves.
40mm	For standard 40mm protection sleeves, such as Fujikura FP-03 (L=40).
34mmA	For 34mm micro sleeves, such as Fujikura FPS01-250-34.
25mmA	For 25mm micro sleeves, such as Fujikura FPS01-250-25.
20mmA	For 20mm micro sleeves, such as Fujikura FPS01-250-20.
40mmB	For 40mm micro sleeves, such as Fujikura FPS01-400-40.
34mmB	For 34mm micro sleeves, such as Fujikura FPS01-400-34.
25mmB	For 25mm micro sleeves, such as Fujikura FPS01-400-25.
20mmB	For 20mm micro sleeves, such as Fujikura FPS01-400-20.
45mmC	For 45mm micro sleeves, such as Fujikura FPS01-900-45.
34mmC	For 34mm micro sleeves, such as Fujikura FPS01-900-34.
25mmC	For 25mm micro sleeves, such as Fujikura FPS01-900-25.

2-1. Selecting Heater mode

Select the heater mode most suitable for the protection sleeve to be used.

(1) Select [Select Heater Mode] in [Splice Menu]. [Select Heater Mode] menu is displayed.

(2) Move cursor by pressing △▽ and press ◁ to select a heater mode.



> • Press ◁ button twice in READY screen to jump to [Select Heater Mode] menu, but detailed parameters cannot be displayed if the parameters are accessed in this manner.

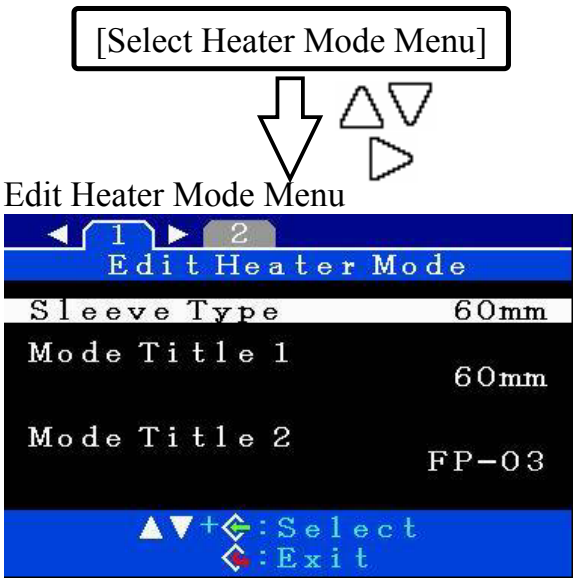
2-2. Referring or editing Heater Mode

Tube-heating conditions stored in heater mode can be edited or changed.

(1) Move cursor and select a mode to be edited in [Select Heat Mode] menu. Press ▷ to display [Edit Heat Mode] menu.

(2) Press △▽ buttons to move cursor to a parameter to be changed, then press ◁ button to enter.

(3) Change value by pressing ◁▷, then press ◁ to enter.



Heater mode parameters

Parameter	Description
Sleeve type	Sets sleeve type. List of all heating modes are displayed. Select a mode in the list and this is copied to a user-programmable mode.
Mode Title1	Title of a heater mode that is displayed in the lower right part of the monitor during the splicing/heating process. Max number of characters used is 5.
Mode Title2	Description of a heater mode in the [Sleeve Type] screen. Max number of characters used is 13.
Heater Control	Sets the heater control sequence. Long1: For 60mm protection sleeve. Long2: For 60mm protection sleeve used with Ny coated fiber / 8mm cleave length. Middle: For 40mm protection sleeve. Micro1: For micro sleeves for 900µm outer diameter fiber. Micro2: For 34mm micro sleeves or longer ones. Micro3: For 34mm micro sleeves or shorter ones.
Heat Time	Sets heating time from the beginning to the end (cool-down completion). Heating time is automatically adjusted with atmospheric conditions, such as ambient temperature. Heating time may be longer or shorter than [Heat time] set.
Heat Temp	Sets heating temperature. In the case that Ny coated fiber is used with 8mm cleave length, the Ny coating may melt if [Heat Temp] is over 190 degrees Celsius.
Finish Temp	Sets the finish temperature. When heater approaches this temperature, the buzzer beeps announcing the sleeve is cooled down and is ready to be taken out of the heater. Caution If the [Finish Temp] is set for over 100 degrees Celsius, the buzzer beeps before sleeve is cooled down and ready. Hot sleeves easily deform and can cause some residual stress at the splice point once the sleeve is finally cool.

BLANK PAGE

3. Arc Calibration

Atmospheric conditions such as temperature, humidity, and pressure are constantly changing, which creates variability in the arc temperature. This splicer is equipped with temperature and pressure sensors that are used in a constant feedback monitoring control system to regulate the arc power at a constant level.
Changes in arc power due to electrode wear and glass adhesion cannot be corrected automatically. Also, the center position of arc discharge sometimes shifts to the left or right. In this case, the fiber splicing position has to be shifted in relation to the arc discharge center. It is necessary to perform an arc power calibration to eliminate both of these issues.

- Arc calibration is performed automatically using [AUTO] mode only. So arc calibration does not have to be performed when splicing in this mode.
- Performing the [Arc Calibration] function changes the arc power "factor" value. The factor value is used in the algorithm program for all splicing. The arc power value will not change in the splice modes.

Operation procedure

(1) Select [Arc Calibration] in [Splice Menu] to display Arc Calibration screen.
(2) Set prepared fibers in the splicer.

- Use standard SM or DS fiber for arc calibration.
- Use well prepared fibers for arc calibration. Dust on the fiber surface affects arc calibration.

(3) The following is performed after pressing .
1. Arc discharge is performed without fibers in the view screen to detect the center of arc discharge and adjust the gapset position.
2. Fibers are spliced with an intentional axis offset for arc power calibration.

- Cleave angle threshold does not link to the parameter "Cleave Limit" in splicing modes. Cleave angle threshold is independently set for arc calibration. See [Other Option] (Page 56) to change cleave angle threshold.

3. Axial offset decreases by the surface tension effect when multiple re-arcs are performed. During the process, the change of axial offset amount is measured and this is taken into consideration to calibrate arc power.

(4) The calibration result is displayed after completion.

"Test Finished" message

Arc power and splicing position calibration are successfully completed.
Press ↵ to exit.

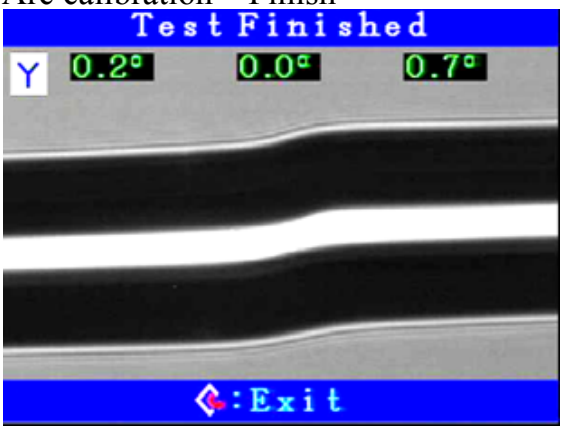
"Test Again" message

Arc power and splicing position calibration are completed but further calibration is strongly recommended, as the change from the previous arc calibration is too large.
Press ↵ to perform arc calibration, or ↵ to exit even though arc calibration is not completed.

Select the [Arc Calibration] in the [Splice Menu]

Arc calibration

Arc calibration " Finish "

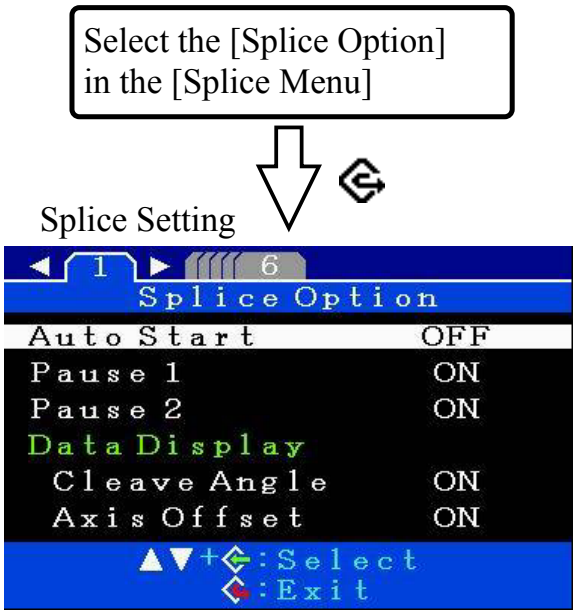


- In some cases, multiple iterations of arc calibration are needed until the calibration process is successfully completed and the "Test Finish" message is displayed. Arc calibration can be considered almost completed if multiple iterations are completed without receiving the message.
- Number threshold can be set so that "Test Finish" message is displayed after specific number of arc calibrations are performed. See [Other Option] (Page 59) for detail.

4. Splice Option

Common parameters for all the modes for splicing and tube heating can be set.

(1) Select [Splice Option] in [Splice Menu] to display [Splice Option] menu.
(2) Select a parameter to be changed.
(3) Press ◁▷ to change values, and press ↵ to enter.



Setting parameters

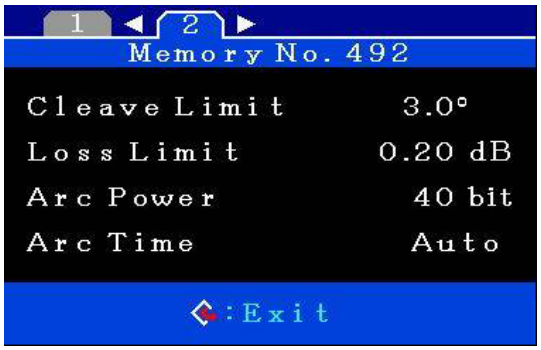
Parameter	Description
Auto Start	If "Auto Start" is set to "ON", splicing starts automatically as soon as the wind protector is closed. Fibers should be prepared and placed into the splicer in advance.
Pause1	If "Pause1" is set to "ON", splicing operation pauses when fibers are forwarded to gap-set position. Cleave angles are displayed during the pause.
Pause2	If "Pause 2" is set to "ON", splicing operation pauses after fiber alignment is completed. With ECF "ON", core-to-core alignment is made after this pause.
Data Display	
Cleave Angle	"ON" displays the results of cleave angle measurement of the left and right fibers. In other splice modes, the results of core angle measurement are also displayed.
Axis Offset	"ON" displays the amount of core axial offset and the amount of cladding axial offset on the screen.

Parameter	Description
Ignore Splice Error	
Cleave	Setting to "Disable" prevents the splicer from continuing a splice even if the message "Cleave Angle Error" is disregarded.
Core Angle	
Loss	Setting to "Disable" prevents the splicer from normally finishing its operation even if the message "Loss Error," "Core Angle Error," "Bubble Error," "Fat Error" or "Thin Error" is disregarded.
Bubble	
Fat	
Thin	
Arc Compensation	
Pressure	Setting to "OFF" turns off arc power compensation by pressure and temperature changes.
Temperature	
Fiber Image on Screen	
Gapset	Sets the method of displaying the fiber image on the screen during splicing operation. X : Enlarged display of X-axis image Y : Enlarged display of Y-axis image X▲▼Y : Composite display vertically of X-axis and Y-axis images X◄►Y : Composite display horizontally of X-axis and Y-axis images X►Y : Change from Y-axis enlarged image to X-axis enlarged image during operation Y►X : Change from Y-axis enlarged image to X-axis enlarged image during operation
Pause1	
Align	
Pause2	
Arc	
Estimate	
Fiber Image on Screen	
Auto Fiber Forward	If "Auto Fiber Forward" is set to "ON", fibers are automatically moved closer to gapset as soon as wind protector is closed.
Cleave Shape Error	Error message is displayed if the cleaved end face of either left or right fiber exceeds the selected threshold (cleave shape).
Realign after Pause2	After a long time in the [PAUSE2] state, alignment may be lost. Therefore, the splicer performs the realigning function after the end of [PAUSE2] state. Setting this function to "OFF" prevents the realignment function. When splicing fibers and making axial offset at [PAUSE2], it is recommended to use the manual splice mode instead of setting this function to "OFF."
Max. Number of Rearcs	The re-arcing process sometimes improves the splice loss, but sometimes worsens it. Re-arcing decreases the splice strength. With this function, it is possible to limit the number of re-arcs or to disable re-arc discharge.

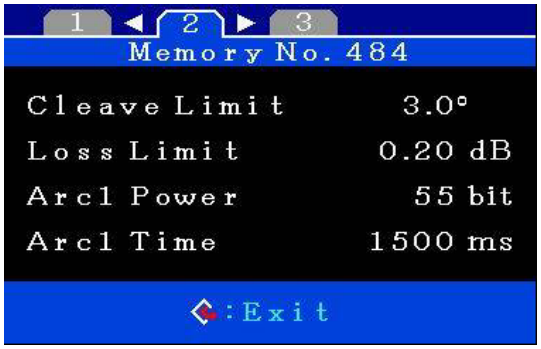
5. Splice Result

This splicer stores up to 2,000 splicing results. See [Splicing procedure] (Page 20) for detail. Contents of data stored are different depending on splicing mode. No results are stored for "attenuation splicing".

SM / NZ / DS / MM / AUTO



Others



5-1. Displaying splicing results

Splicing results stored in the memory can be displayed. Comments can be added or edited.

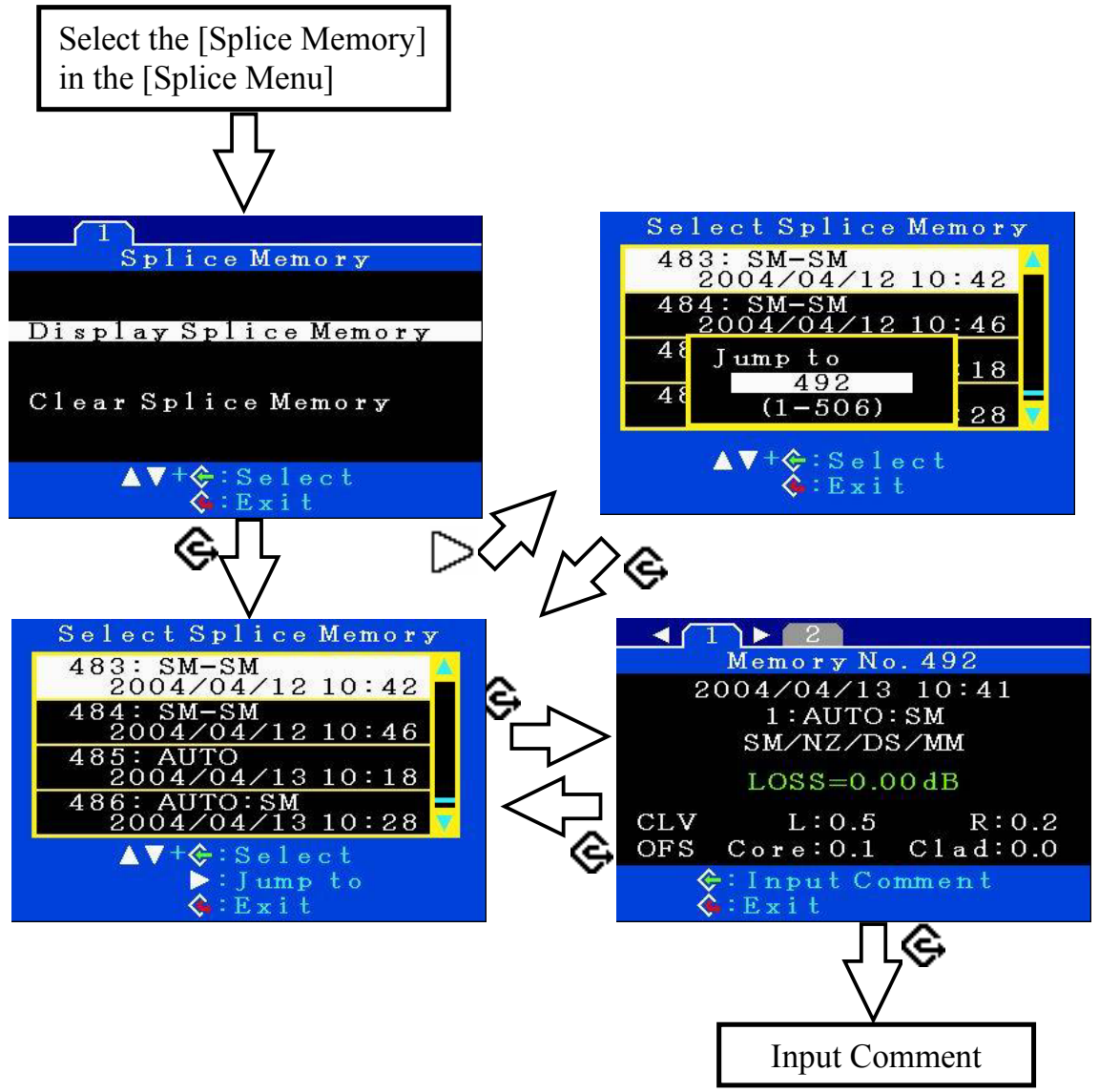
> • Memory Data can be download By USB. Consult your nearest sales agency to learn how.

(1) Select [Splice Memory] in [Splice Menu].

(2) Select [Display Splice Memory] and press ◁ button to display [Select Splice Memory] Menu.

(3) Select memory number by either one of the below stated methods. One method is to move cursor to a specific memory number and press ◁. The other method is to press ▷ to display [Jump to] screen. Input a specific memory number and press ◁. Press ◁ to display the data.

(4) The selected splicing result is displayed. For adding or editing comments, press ◁ to display [Input Comment] screen.



5-2. Clearing splicing results in memory.

Splicing results can be cleared by part or whole.

(1) Select [Clear Splice Memory] at [Splice Memory] menu to display [Memory clear] menu.

Clearing all splicing results in memory

(2) Move cursor to [Clear All Memory] and press ↵ to display [All Memory Clear].

(3) Press ↵ to clear all splicing results in memory.

Clear selected splicing results in memory

(2) Move cursor to [Clear Partial Memory] and press ↵ to display [Partial Memory Clear].

(3) Input specific number (begin-number and end-number) of splicing results to be cleared by pressing △▽◁▷ and ↵ to enter. Selected splicing results are cleared. Cleared results are replaced with following splicing results.

• If [Begin-number] is bigger than [End-number], selected splicing results cannot be cleared. Input appropriate number again.

Select the [Clear Splice Memory] in the [Splice Memory]

Select the [Clear Partial Memory]

Select the [Clear All Memory]

[Clear Partial Memory]

[Clear All Memory]

Management Menu

This menu is used to change settings in detail, or for an administrator to limit functions for operator to select or change.

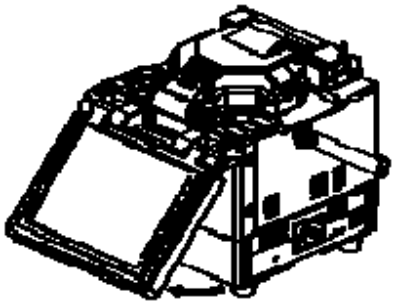
(1) Press in [READY], [PAUSE1], [PAUSE2], [FINISH] state and press ◁▷ to display [Management Menu].
(2) Select a parameter to be changed.

Splice Menu

Management Menu

Parameter	Description
Language	Sets a language to be displayed on the screen. Select a language to be displayed.

Parameter	Description
Monitor Position	Sets the operational direction of splicer. [Front] is for front monitor operation. [Rear] is for rear monitor operation. Refer to next page for detail.



Monitor Front

Monitor Rear

Parameter	Description
Power Save	Sets the power saving mode.
Power On Option	Sets the start-up screen image and function. This menu is secured by password.
Menu Lock	Used for an administrator to limit functions for the operator to select or change. This menu is secured by password.
Other Option	Sets other parameters not included in [Power On Option] and [Menu Lock]. This menu is secured by password.

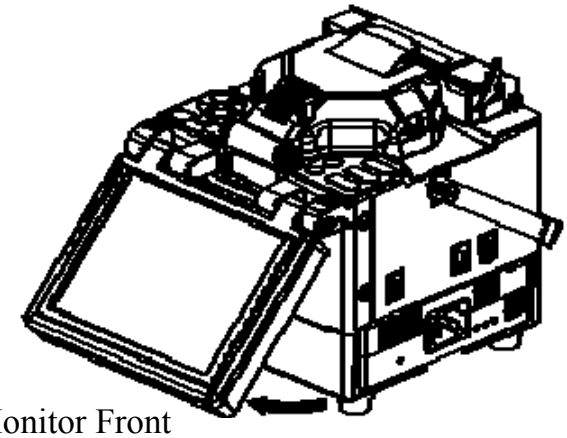
1. Change of Operating Direction

The splicer is shipped from the factory with settings for the "Monitor Front" operation style. This can be changed to "Monitor Rear" operation style. The sheath clamp direction can also be changed for a selected style. When [Monitor Position] is changed, the direction of the four arrow keys is reversed.

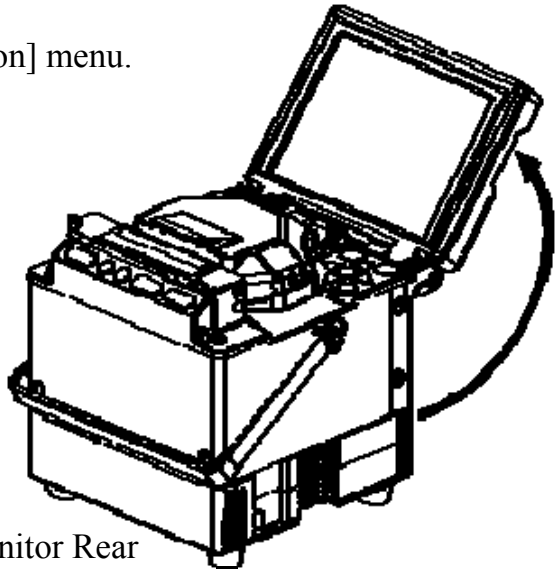
Changing monitor position

(1) Select a monitor position in [Monitor Position] menu.

(2) Turn off splicer and change monitor angle.



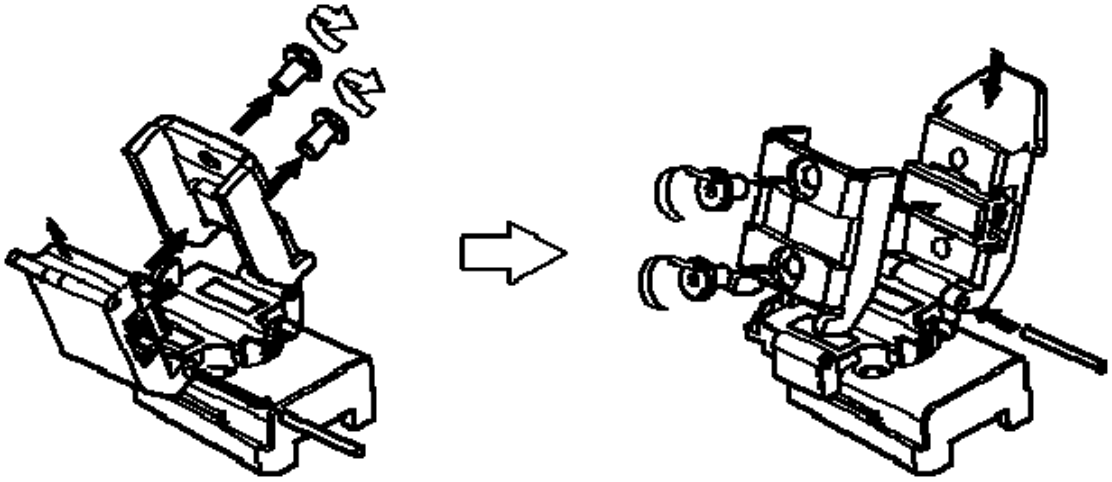
Monitor Front



Monitor Rear

(3) Change direction of sheath clamps.

1. Open sheath clamp and loosen and remove screws with a 1.5 mm hexagonal wrench, and remove sheath clamp cover to expose the shaft.
2. Remove the shaft. A paper clip is helpful to remove the shaft, and tweezers are helpful for holding the shaft.
3. Take sheath clamps off.
4. Reverse direction of sheath clamp, insert shaft and tighten screws.



(4) Turn splicer Power on.

2. Power Save

This function is important for energy conservation. If the power saving function is not set during battery pack use, the number of splice cycles will be decreased. The splicer automatically identifies the type of power supply unit. In addition, it can program an independent power saving setting. Utilizing these features enables automatic turning on or off of the power saving function after detecting the power supply units.

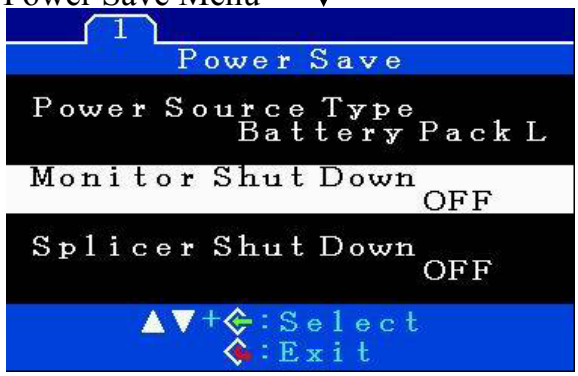
Setting Power Save

(1) Insert a power unit and turn splicer power on.
(2) Select [Power Save] in the [Management Menu]. [Power Save] is displayed for the type of power supply used.
(3) Change value of [Monitor Shut Down] and [Splicer Shut Down].

• The value can be changed for power unit used

Select the [Power Save] in the [Management Menu]

Power Save Menu



Parameter	Descriptions
Power Source Type	The type of power supply identified (used).
Monitor Shut Down	Setting this function turns off the power supply to the LCD monitor if the splicer performs no operation after a certain period of time. Always set this function to a specific shutdown time when using the battery pack. When the power supply to the LCD monitor turns off, the LED near the ⏻ key blinks. Pressing any key turns on the LCD monitor.
Splicer Shut Down	Automatically turns off the power supply to the splicer if it performs no operation for a certain period of time. The function serves to prevent the battery capacity from running low if the splicer is left on for an extended period of time.

3. Menu Lock / Power On Option / Other Option

(1) Select [Power On Option], [Menu Lock] or [Other Option] in the [Management Menu]. Password input screen is displayed.
(2) Input Password.
Refer to [Password] (Page 43) on how to input password.
(3) Change a parameter value.

3-1. Menu Lock

Used for Administrator to limit operator from selecting or changing certain functions.

Parameter	Descriptions
Splice Mode	
Edit	Setting to "Disable" prevents unauthorized editing and selecting of splice modes.
Select	
Heater Mode	
Edit	Setting to "Disable" prevents unauthorized editing and selecting of heater modes.
Select	
Splice Option	
Page2-6	Pages 2 to 6 in [Splice Option] Menu cannot be edited if this is set to "Disable".
Splice Memory	
Clear	Setting to "Disable" prevents unauthorized erasing of splice result data on the memory.
Cancel Data Storage	Setting to "Disable" prevents unauthorized canceling of storage of splice result data on the [FINISH] screen.
Power Save Edit	
Monitor	Setting to "Disable" prevents unauthorized changing of the power saving function.
Splicer	
Maintenance	
Arc Calibration	Setting to "Disable" prevents various functions related to maintenance.
Replace Electrodes	
Stabilize Electrode	
Clear Arc Count	
Battery Discharge	
Set Calendar	
Diagnostic Test	
Dust Check	
Motor Calibration	
Motor Drive	

3-2. Power On Settings

Set Opening title and Password Lock function

Parameter	Descriptions
Opening Title1	Sets the message to be displayed when the power is turned on. Max. number of characters : 15 (Opening Title1) 15 (Opening Title2) To edit Title, refer to P43 [Title] on how to input title.
Opening Title2	
Dust Check	Setting to "ON" executes the [Dust Check] function when the power is turned on.
Password Lock from	From selected date set and beyond, a password is required at splicer boot up in order to operate it. Password is common to the Password for [Other Option] (Page 65).

3-3. Other Option

Sets other parameters other than what are in [Power On Setting] and [Menu Lock Setting] menus.

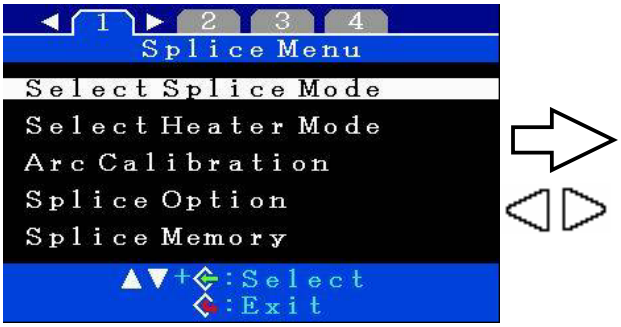
Parameter	Descriptions
System Settings	
Password	Changes the password to access the [Power On Option], [Menu Lock], [Other Option], [Password Lock from] menus. Maximum Characters : 8 At the time of shipment from factory, the password is set at "0". In the event you have forgotten your password, contact the nearest sales agency.
Buzzer Vol.	Sets the sound volume of the buzzer.
Electrode Caution	When the number of splices made exceeds 1,000, the caution message prompting for electrode replacement is displayed when the power is turned on. When the number of splices exceeds 2,000, the caution message changes to the warning message. The number of arc discharges at which to start these messages is set in this field.
Electrode Warning	
Last Maintenance	The date of last maintenance and the scheduled date for next maintenance are entered in the respective fields. This information is displayed on the [Maintenance Info.] screen. Refer to the next section.
Next Maintenance	
Arc Calibration	
Cleave Limit	Sets the threshold of cleave angle error in the [Arc Calibration].
Max. Num. of Tests	Sets the number of tests to finish the [Arc Calibration] with "Test Finished" message.

Maintenance Menu

The splicer has the ability to perform routine maintenance. This section describes how to use the maintenance menu.

(1) Press in [READY], [PAUSE1], [PAUSE2], [FINISH] state. Press ◁▷ to display [Maintenance Menu1], [Maintenance Menu2].
(2) Select a function to perform.

Splice Menu



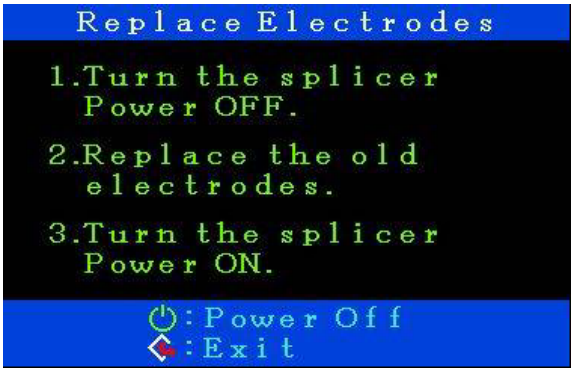
Management Menu

1. Replace Electrode

Electrodes wear with use and also must be cleaned periodically due to silica oxide buildup. It is recommended that the electrodes should be replaced after 1,000 arc discharges. When the number of arc discharges reaches a count of 1,000, a message prompting to replace the electrodes is displayed immediately after turning on the power. Using the electrodes without a replacement will result in greater splice loss and reduced splice strength.

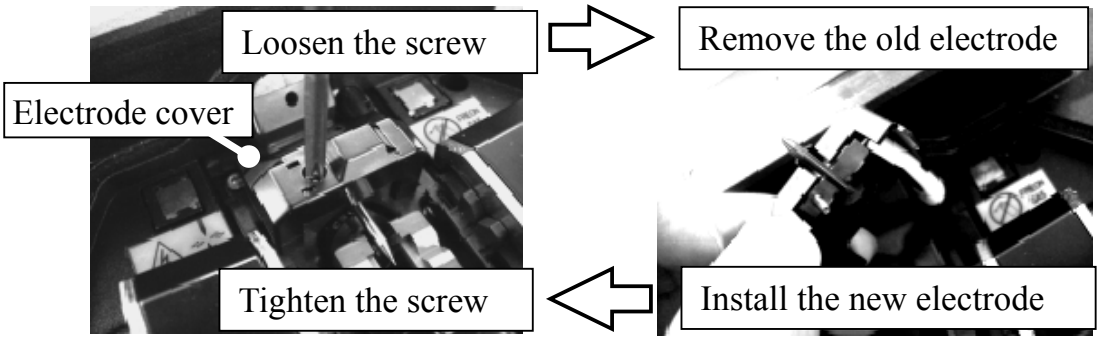
Replacement Procedure

(1) Execute [Replace Electrode] in [Maintenance Menu 1].
(2) Instruction messages will appear on the screen to turn off the power. Press and hold ⏻ till the LED color changes from green to red.
(3) Remove the old electrodes.



To remove and replace the electrodes:

(i) Loosen screw located on electrode cover.
(ii) Take electrode out of electrode cover. (Electrode is fit in electrode cover)



(4) Clean the new electrodes with alcohol-impregnated clean gauze or lint-free tissue and install them in the splicer.
(i) Fit the electrode in the electrode cover.
(ii) Place the electrode cover on the splicer and tighten screw.

- Do not pull out wiring when replacing electrode.
- Apply tightening torque of 2kgf-cm when tightening screw to fix electrode cover.

(5) Turn on the power, prepare and load fibers into the splicer and press ↵. After executing the arc calibration, the splicer will repeat arc discharge 45 times in succession to stabilize the electrodes.

(6) Upon completion of repeated arc discharge, the splicer executes an arc calibration again. The operator should repeat arc calibration until the "Test Finish" message appears. For details of the arc calibration process, see page 52.

2. Stabilizing Electrodes

In the event of sudden change in environmental conditions, etc., the arc power sometimes becomes unstable, resulting in higher splice loss. Especially when the splicer is moved from lower altitudes to higher altitudes, it takes time for the arc power to stabilize. In this case, stabilizing electrodes will expedite the process of making the arc power stable. If many tests are needed until the "Test OK" message appears in [Arc Calibration], use this function as well.

Operation Procedure

(1) Select the [Stabilize Electrodes].
(2) Set prepared fibers in both sides of the splicer as in the case of splicing.
(3) Press ↵ and the splicer begins to stabilize the electrodes in the following ways:
- Repeats short arc discharge four times to measure the arc position.
- Performs [Arc calibration] to calibrate the arc power.
- Perform 45-cycle continuous discharge to stabilize the electrodes.

(4) After completing stabilization, always perform an additional [Arc Calibration].

3. Clearing Arc Count

This function enables the stored number of arc discharges to be reset.

(1) Select the [Arc Count Clear].
(2) As the confirmation screen "Is it OK to clear?" appears, press ↵ to clear.

- This function is included in the [Replace Electrodes] function.
- The number of arc discharges in the "Total Arc Count" field displayed on the [Maintenance Info.] screen cannot be reset.

4. Battery Discharge

The battery pack (BTR-06) uses NiMH cells. If the battery pack is recharged repeatedly even though a sufficient capacity still remains, a memory effect would make it seem as if the battery capacity has decreased. If such a phenomenon occurs, execute [Battery Discharge] to reduce the remaining capacity to zero. Then, recharge the battery pack to restore the capacity. It is recommended that complete discharge of the battery pack should be performed every month.

- If the splicer is left in the normal power-on state, the splicer will shut down before the battery is discharged completely. Therefore, it is necessary to use the [Battery Discharge] function to discharge the battery pack completely.
- The power saving function turns off automatically during [Battery

Operation Procedure

(1) Insert the battery pack inside the splicer that is intended to discharge completely, and turn on the power.
(2) Change the screen from [Main Menu] to [Maintenance Menu1] and execute [Battery Discharge].
(3) The [Battery Discharge] screen is displayed, and the remaining battery voltage is indicated.
(4) Upon completion of full discharge, the buzzer sounds and the power turns off.

- If the battery pack is almost fully charged, it will take a significant amount of time to discharge it completely. It is recommended that this function be used after considerable time of use when the capacity is low.

(5) Recharge the battery pack.

5. Set Calendar

This function sets the date and time in the calendar incorporated in the splicer.

Operation Procedure

(1) Select the [Calendar Set]

(2) As the year, month, day and time are displayed, press ◁ or ▷ to move the cursor to the parameters, and press △ or ▽ to adjust numerical values.

(3) After completion of calendar setting, press ↵. The date and time are stored.

6. Sensor Value

Displays the values measured by different sensors.

The value measured by the temperature sensor sometimes is displayed higher than that of the ambient temperature due to self-heating of the splicer.

7. Diagnostic Test Function

The FSM-50S has a built in diagnostic test feature that allows the operator to perform a simple one step evaluation of splicer performance covering several different critical variables. Perform this function in the event of splicer operation trouble.

Operation Procedure

(1) Select the [Diagnostic Test] in the [Maintenance Menu] and execute [Diagnostic Test]. The following checks will be made.

	Check Item	Description
1	LED Check	Measures and adjusts the brightness of the illumination LED.
2	Motor Check	Check the Motor Limit Sensor.
2	Dust Check	Checks the optical path for dust or dirt and judges whether they disturb fiber observation. If contamination exists, this function indicates the location.
3	Motor Calibration	Automatically calibrates the 6 Motor Speed.
4	Arc Calibration	Automatically calibrates the arc power factor and fiber splicing position.
5	I/O Port Check	Checks for normal operation of the input and output terminals of the internal circuit.
6	Memory Check	Checks the memory of the internal circuit.

- Before the start of the test, remove the fibers from the splicer.
- When item 2 (dust check) is completed, prepare and load the fibers into the splicer and press ↵.

(2) Upon completion of all checks and adjustments, a list of results is displayed. If the dust check result is not good, clean the objective lenses. In the case that cleaning cannot eliminate contamination, there is a possibility that the contamination may have entered the inside of the optical path. Please contact your nearest sales agency for additional instructions.
The dust check and Motor Calibration functions exist as independent instructions in [Maintenance Menu]. It is possible to execute them independently.

8. Dust Check

The splicer observes fibers through image processing. Dust or contaminants on the cameras, lenses and wind protector mirrors disturbs normal observation of fibers and may result in improper splicing. This function checks the optical path for the presence or absence of contaminants and judges whether they cause trouble for fiber splicing.

Operation Procedure

(1) Select the [Dust Check] in the [Maintenance Menu].
(2) If fibers are set in the splicer, remove them and press . again. The splicer begins the dust check.
(3) The message "Now Checking" is displayed in the middle of the screen. After observation, the location of contamination judged as a potential problem blinks. If contamination is discovered, clean the wind protector mirrors and objective lenses and redo [Dust Check]. Refer to the section of [Maintenance of Splicing Quality] (Page 28) for cleaning instructions.
(4) Press to finish dust check.

• In case you have cleaned or replaced the wind protector mirrors, and have cleaned the objective lenses, and dirt or dust still remain, contact your nearest sales agency.

9. Motor Calibration

Motors were adjusted at the factory before shipping. However, settings could change due to various reasons. This function automatically calibrates the speed of all six motors.

Operation Procedure

(1) Select the [Motor Calibration] in the [Maintenance Menu].
(2) Load prepared fibers in the splicer and press button.
(3) Speeds for all motors are automatically calibrated. Upon completion, [Maintenance Menu 2] is displayed.

• Perform this function when "Fat" or "Thin" error has occurred, or fiber aligning or focusing is taking too much time.

10. Motor Drive

The six motors incorporated in the splicer can be manually operated individually. In the course of splicing, the motors can also be operated by calling this menu in the [PAUSE1], [PAUSE2] or [FINISH] state.

(1) Select the [Motor Drive].
(2) Pressing ◁▷ changes motor selection. The name of the selected motor is displayed in the upper section of the screen.
(3) Press △▽ to drive the motor in the desired direction.

Motor	△	▽
ZL/ZR	Forward.	Backward.
X/Y	Upward.	Downward.
Focus X Focus Y	Lens moves nearer fiber.	Lens moves away from fiber.

- When the motor reaches the limit of the operating range, the buzzer sounds and the motor stops. Press the opposite arrow key to reverse and move the motor again.
- Display messages can be erased by pressing . The message can be displayed by pressing again.
- If you finish this operation by pressing ***RESET***, the motor will return to the reset position. To finish the operation with the motor held in the adjusted position, press .
- If the motor is moved too much with respect to the spliced fiber, the fiber may break.

11. Maintenance Info

Select the [Maintenance Info]. The following information is displayed.

Parameter	Description	
Serial Num.	Displays the serial number of the splicer.	
ROM Version	Displays the version number of the software.	
Arc Count	Displays the number of arc discharges after electrode replacement. Performing the function [Replace Electrodes] or [Arc Count Clear] resets this parameter to zero.	
Total Count	Displays the total number of arc discharges.	
Last Maintenance	Displays the date of last maintenance.	To enter the date, refer to [Other Option] (Page 65).
Next Maintenance	Displays the scheduled date of next maintenance.	

Press ▷ when an error is shown on the monitor. The [HELP] screen displays the following:

- If error does not have an error code, such as "Cleave Shape NG", the keystrokes are displayed with information explaining what each keystroke does if pressed.
- If error has an error code, additional information according to the Error Code and Message is displayed.

Follow the solution precisely as shown in the list below. If it is not possible to eliminate the problem, the splicer may require service by a qualified service center. Consult your nearest sales agency with the following information:

- Model name of the splicer
- Serial number of the splicer
- Error message
- Error code (if shown)
- Situation when the error occurs

Error Code		Error Message	Reason	Solution
01	01	L-Too Long Fiber	• The fiber end-face is placed on the electrode centerline, or beyond it. • The cleave length (bare fiber part) is too long. • Dust or dirt is on the objective lens or the wind protector mirror.	• Press ***RESET***, and set the fiber end-face between the electrode centerline and the V-groove edge. • Confirm the setting position of the stripped fiber end on the fiber cleaver. Check the cleave length. • Execute the [Dust Check]. Clean the lens or the mirror when dust or dirt exists.
	02	R-Too Long Fiber		
	03	LR-Too Long Fiber		
02	01	X-Dark BackGround	Dust or dirt is on the objective lens or the wind protector mirror.	Execute the [Dust Check]. Clean the lens or the mirror if dust or dirt exists.
	02	Y-Dark BackGround		
	11	X-Dark BackGround	The LED or Camera might be damaged.	Consult your nearest sales agency.
	12	Y-Dark BackGround		

Error Code		Error Message	Reason	Solution
03	01	L-Too Dusty Fiber	• Dust or dirt is on the fiber surface.	•Completely prepare the fiber again (strip, clean and cleave).
			• Dust or dirt is on the objective lens or the wind protector mirror.	• Execute the [Dust Check]. Clean the lens or the mirror if dust or dirt exists.
			• [Cleaning Arc] time is too short or "OFF."	• Set the [Cleaning Arc] time to "30ms." When splicing carbon coated fibers, set to "100ms."
	02	R-Too Dusty Fiber	• Splicing indistinct core fibers with the SM or DS modes.	• Use the MM mode to splice indistinct core fibers (i.e. MM fiber).
			• [Align] is set to "Core" to splice indistinct core fibers when using other splice modes.	• Set [Align] to "Clad" to splice indistinct core fibers (i.e. MM fiber).
			• [Focus] is incorrectly set when using other splice modes.	• Set [Focus] to "Edge" to splice indistinct core fibers (i.e. MM fiber). To splice distinct core fibers, "Auto" or the correct focus value should be entered.

Error Code		Error Message	Reason	Solution
04	01	ZL Motor Overrun (Forward)	• The fiber is set too far back and does not reach the splice point. • The fiber is not set correctly at the bottom of the V-groove. The fiber is not located in the Camera's field of view.	• Press ***RESET*** , re-position the fiber again with the end-face closer to the electrodes. • Press ***RESET*** , and set the fiber again to seat it correctly at the bottom of the V-groove.
	11	ZR Motor Overrun (Forward)	• The cleave length (bare fiber part) is too short.	• Confirm the setting position of the stripped fiber end on the fiber cleaver. Check the cleave length.
	02	ZL Motor Overrun (Backward)	The taper speed or taper time is set too high.	Adjust the taper parameters in the splice mode.
	12	ZR Motor Overrun (Backward)	Only occurs in manual motor operation.	
	21	X motor Overrun (Forward)	The fiber is not set correctly at the bottom of the V-groove. The fiber is offset too far and it exceeds the X or Y motor range.	Press ***RESET*** and re-position the fiber again to seat it correctly at the bottom of the V-groove.
	22	X motor Overrun (Backward)		
	31	Y Motor Overrun (Forward)		
	32	Y Motor Overrun (Backward)		

Error Code		Error Message	Reason	Solution
04	41	Focus X Motor Overrun (Forward)	• The fiber is not set correctly at the bottom of the V-groove. The fiber position is out of focus range.	• Press ***RESET***, and re-position the fiber again to seat it correctly at the bottom of the V-groove.
	42	Focus X Motor Overrun (Backward)		
	51	Focus Y Motor Overrun (Forward)	• Dust or dirt is on the fiber surface resulting in focus failure.	• Completely prepare the fiber again (strip, clean and cleave).
	52	Focus Y Motor Overrun (Backward)	• Dust or dirt is on the objective lens or the wind protector mirror.	• Execute the [Dust Check]. Clean the lens or mirror if dust or dirt exists.
05		Close Cover	Unable to start splicing when the wind protector opens.	The splicer automatically starts splicing after closing the wind protector.
06		Cover Open	The wind protector is opened during splicing operation.	Press ***RESET*** after closing the wind protector.
07	01	ZL Motor Trouble	Motor might be damaged.	Consult your nearest sales agency.
	02	ZR Motor Trouble		
	03	X-Motor Trouble		
	04	Y-Motor Trouble		
	05	Focus X Motor Trouble		
	06	Focus Y Motor Trouble		

Error Code		Error Message	Reason	Solution
08		Cannot detect fiber in AUTO mode	Dust or dirt is on the fiber surface.	Completely prepare the fiber again (strip, clean and cleave).
			The left and right fiber types are different.	Select the suitable splice mode. Pressing the ***SET*** key cancels the error and continues the splice operation.
			Splicing non-standard fibers.	The AUTO mode can identify standard SM, DS, MM and NZDS fiber only.
09	01	Strong Arc Power	Unable to calibrate due to strong arc.	Replace the electrodes by using the [Electrode Replace] function. If this does not eliminate the problem, consult your nearest sales agency.
	02	Weak Arc Power	Unable to calibrate due to weak arc.	
	03	Too Left Arc	Unable to calibrate due to poor arc field position (too far left).	
	04	Too Right Arc	Unable to calibrate due to poor arc field position (too far right).	
10		Fiber Separation	The fiber stuff amount is insufficient.	Execute the [Motor Calibration] function. If using other splice modes, check the [Overlap] setting in the splice mode.
			The pre-fuse power or pre-fuse time is set too high.	Check the [Prefuse Power] and [Prefuse Time] settings in the splice mode.
11	01	L-Bad Fiber Position	The fiber is not set correctly at the bottom of the V-groove.	Press ***RESET*** , and re-position the fiber again to seat it correctly at the bottom of the V-groove.
	02	R-Bad Fiber Position		
12		No Arc Discharge	Arc Discharge did not occur.	• Assure the electrodes are in proper position. • Replace the electrodes. • Consult your nearest sales agency.

Error Message	Reason	Solution
Large Cleave Angle	Bad fiber end-face.	Check the condition of the fiber cleaver. If the blade is worn, rotate the blade to a new position.
	[Cleave Limit] is set too low.	Increase the [Cleave Limit] to an adequate limit.
Large Fiber Angle	[Core Angle Limit] is set too low.	The splicer measures the core angle only when using other splice modes. Increase the [Core Angle Limit] to an adequate limit. (1.0 degree is standard)
	Dust or dirt is on the V-groove or the clamp chip.	Clean the V-groove and clamp chip, and set the fibers again. If the error occurs again, strip, clean and cleave the fibers.
	Bad fiber end-face.	Check the condition of fiber cleaver. If the blade is worn, rotate the blade to a new position.
Cleave Shape NG	Bad fiber end-face.	Check the condition of fiber cleaver. If the blade is worn, rotate the blade to a new position.
Arc Discharge Delayed	Arc Discharge is delayed	• Assure the electrodes are in proper position. • Execute the [Stabilize Electrode] function. • Replace the electrodes.
Thin Fiber	Inadequate arc power	Calibrate the arc power with the [Arc Calibration] function.
	Prefuse power or time is set too high	If using the Other mode, adjust or initialize [Prefuse Power] or [Prefuse Time] settings. For normal splice mode, the prefuse is fixed and cannot be adjusted.
	Insufficient [Overlap] setting	• If using the Other mode, adjust or initialize [Overlap] setting. For normal splice mode, the overlap is fixed and cannot be adjusted. • Execute [Motor Calibration] function in the maintenance menu to calibrate the stuff amount.
Fat Fiber	Too much [Overlap] setting	
Too Tapering Fiber	Too much fiber taper.	If using the taper splice function, the error message may appear meaning the fiber is tapered too much.
Bubble	Bad fiber end-face.	Check the condition of fiber cleaver. When the blade is worn, rotate the blade.
	Prefuse power or time is set too low	If using the Other mode, adjust or initialize [Prefuse Power] or [Prefuse Time] settings. For normal splice mode, the prefuse is fixed and cannot be adjusted.
Large Dust Burn	Bad fiber end-face.	Check the condition of the fiber cleaver. If the blade is worn, rotate the blade to a new position.
	[Cleaning Arc] time is too short or "OFF."	Dust still present after cleaning fiber or cleaning arc. Clean fiber thoroughly or Increase [Cleaning Arc Time]

Error Message	Reason	Solution
High Estimated Loss	Insufficient fiber cleaning.	Dust or dirt on the fiber surface results in bad splice loss and low tensile strength. • Clean the fiber surface sufficiently. • Do not clean the fiber after cleaving to prevent dust on the fiber end-face. • Avoid any contact with the fiber end-face.
	Bad fiber end-face.	• Check the condition of fiber cleaver. If the blade is worn, rotate the blade to a new position. • Confirm the [Cleave Limit] setting. 2.0° or less is recommended.
	Dust or dirt is on the V-groove or the clamp chip.	Dust or dirt on the V-groove or clamp chip causes poor fiber movement during fiber stuffing. Clean them periodically.
	Dust or dirt is on the lens or mirror	Execute the [Dust Check]. If dust or dirt exists, clean the lenses or mirrors.
	Bad electrode condition.	Replace the electrodes if they appear worn (rounded tip shape), dirty or bent.
	Inadequate arc power.	Calibrate the arc power with the [Arc Calibration] function.
	Using unsuitable splice mode	Select a suitable splice mode for the fibers to be spliced.
	[Loss Limit] is set too low.	Increase [Loss Limit] to an adequate limit.
	Fibers were spliced after Error 08 was canceled.	Select the appropriate splice mode from the Other modes.
	Inadequate arc parameters in other splice modes	Confirm the arc parameters are adequate to splice the fibers.
	Inadequate estimating parameters in Other mode	Confirm the estimating parameters are adequate to estimate the loss. The MFD mismatch function does not work for certain types of specialty fibers. In these cases, set the [MFD Mismatch] to “OFF”.

Error Message	Reason	Solution
There is dust after executing Dust Check function	Dirt or dust exists in optical path.	• Clean the wind protector mirrors by referring page 29. If it is not possible to remove the dirt or dust on the mirror, replace the wind protector mirror by referring page 32. • Clean the objective lenses by referring page 30. • When the above processes cannot remove the dirt or dust, consult your nearest sales agency.
X Camera Y Camera Trouble	The Camera may be damaged.	Consult your nearest sales agency.
Heater Oven Trouble	Heater does not heat.	Consult your nearest sales agency.
AC Adapter Fan NG	FAN of AC Adapter may be damaged.	Replace the AC Adapter.
Pressure Sensor NG	Pressure Sensor may be damaged.	Consult your nearest sales agency.
Temperature Sensor NG	Temperature Sensor may be damaged.	Consult your nearest sales agency.

1. Power Supply

(1) Power does not turn off when pressing ⏻
- Press and hold the key until the LED color changes from green to red.

(2) Few splices can be made with a fully charged battery pack
- If the power saving function is not enabled, battery power degrades faster. Refer to [Power Save] (Page 63). Always enable it to conserve power usage.
- If degradation appears (memory effect), or if the battery pack is stored for an extended period of time, completely discharge it. Refer to [Battery Discharge] (Page 69). After discharge completion, recharge the battery pack.
- The battery pack has reached the end of its service life. Install a new battery pack.
- The battery pack uses chemical reaction. The capacity decreases at low temperature, especially at lower than 0 degree C.
- At high altitude, the arc discharge current is increased. In this condition, battery power degrades faster due to large power consumption.
- The AC adapter does not charge the battery pack correctly. Refer to next item.

(3) "CHARGE" LED on AC adapter blinks during battery recharge
- Atmospheric temperature is too high (more than 40 degrees C), or the battery pack is charged under exposure to sunlight.
- The battery pack has a fault or has reached the end of its service life. Install a new battery pack. If the LED blinks again after install, contact your nearest sales agency.

(4) Method to change the power saving function settings
- Refer to [Power Save] function on page 63.

(5) Battery indicator is not displayed / Power saving function does not work
- If using the AC adapter, the function does not work.
- Battery pack indicator on the battery pack does not work correctly.

(6) Incorrect indication of battery indicator
- The indicator display serves as a reference only.
- Battery Pack Indicator on the battery does not work correctly.

(7) "POWER ON" LED on AC adapter blinks
- ADC-11 has a cooling fan. If the cooling fan stops running, the "POWER ON" LED will blink. Contact your nearest sales agency.

2. Splicing Operation

(1) Error message appears on monitor
- Refer to [Error Message List] (Page 74).

(2) Inconsistent splice loss / High splice loss
- Clean the V-grooves, fiber clamps, wind protector mirrors, and objective lenses. Refer to [Maintenance of Splicing Quality] (Page 28).
- Replace the electrodes. Refer to [Electrode Replacement] (Page 33).
- Refer to the "High Estimated Loss" error message section in the [Error Message List] (Page 74).
- If the fiber has curl or bend memory, position the fiber so the crown (curve) of the memory is turned upward.
- The splice loss varies according to the cleave angle, arc conditions and fiber cleanliness.
- If the splice loss is still too high or inconsistent after performing the above-mentioned remedies, contact your nearest sales agency. Regular service (at least once a year) is recommended to maintain high splicing quality.

(3) Confirmation of splicing procedures
- Refer to [Splicing procedure] (Page 20).

(4) Monitor suddenly turned off
- The power saving function is automatically enabled when using a battery pack. The splicer switches to the power saving state after an extended period of splicer inactivity. Press any key to return to the normal state. To change the length of time before the splicer switches to the power saving state, refer to [Power Save] (Page 63).

(5) Splicer power suddenly turned off without "Low Battery" message
- The power saving function is automatically enabled when using a battery pack. The splicer turns the splicer power off after an extended period of splicer inactivity. Press ⏻ to turn on the splicer again. To change the length of time before the splicer turns the splicer power off, refer to [Power Save] (Page 63).

(6) Method to initialize arc condition of Splice mode
- Refer to [Referring or editing splice mode] (Page 38).

(7) Method to change error thresholds for Cleave angle, Splice loss and Fiber angle
- Refer to [Referring or editing splice mode] (Page 38) when using the SM, NZ, MM or AUTO mode. There is no fiber angle threshold in these modes.
- Refer to [Referring or editing splice mode] (Page 38) when using the OTHER mode.

(8) Error message can be over-ridden
- Refer to [Splice Option] (Page 54) to not allow error message override.

(9) Unable to change Arc Power and Arc Time
- The settings cannot be changed in SM, NZ, MM or AUTO modes.
- Performing [Arc Calibration] maintains adequate arc power in these modes.
- If using the Other mode, the Arc Power and Arc Time may be locked by administrator, preventing them from being changed.

(10) Method to set Pause
- Refer to [Splice Option] (Page 54).

(11) Method to display Cleave Angle, Fiber Angle and Core / Cladding Offsets
- Refer to [Splice Option] (Page 54). The fiber angle is not displayable in the SM, DS, MM or AUTO mode.

(12) Incorrect splice mode selected and used in AUTO mode
- The AUTO mode can detect only standard SM, DS, MM and NZDS fibers. When splicing specialty fibers, the AUTO mode may identify them incorrectly. For other possible troubles in AUTO mode, refer to [Splice Mode] (Page 34).

(13) Mismatch between Estimated splice loss and Actual splice loss
- The estimated loss is a calculated loss, so it can be used for reference only.
- The optical components of the splicer may need to be cleaned.
- When splicing specialty fibers, adjust [MFD-L], [MFD-R], [Core Step] and [Core Curvature]. When splicing dissimilar fibers, adjust also [Min. Loss] and [MFD Mismatch]. To adjust these parameters, refer to parameter settings of the other splice modes stored in the database area.

(14) If using the Other mode, Re-arc discharge becomes intermittent
- Set the [Arc2 OFF Time] to "OFF." Refer to [Referring or editing splice mode] (Page 38).

(15) Method to operate Focus motor after splicing
- Use the [Motor Drive] function in [Maintenance Menu] while in [PAUSE1], [PAUSE2] or [Finish] states. Press △ or ▽ key to adjust the focus.

(16) Realignment performed after manual aligning in Pause2
- To disable the realignment, refer to [Splice Option] (Page 54). An alternative option is to use the manual splice mode. Refer to [Manual Splice Mode] (Page44).

3. Tube-heating Operation

(1) Fiber protection sleeve does not shrink completely
- Extend the heating time. Refer to [Referring or editing Heater Mode] (Page 49).

(2) Heater LED on panel keyboard blinks
- Pressing the ***HEAT*** key during heating causes the LED to blink. The tube heater is turned off if the HEAT key is pressed again. If, after 2 seconds have gone by without pressing the HEAT key again, the LED stays on continuously and the heater returns to its normal state. The LED will turn off when the heat cycle is completed.
- If the heating temperature does not reach its inputted setting, the LED blinks and the alarm sounds. If this happens, contact your nearest sales agency.

(3) Fiber protection sleeve adhered to heating plate after shrinking
- Use a cotton swab or a similar soft tip object to push and remove the sleeve.

(4) Method to initialize heating condition of Heater mode
- Refer to [Referring or editing Heater Mode] (Page 49).

(5) Method to cancel heating process
- ***RESET*** does not cancel the heater. Press ***HEAT*** twice to cancel the heating process.

4. Supervising

(1) What functions can be disabled
- Refer to [Menu Lock] (Page 64).

(2) Method to lock “selection” or “editing” of Splice or Heater mode
- Refer to [Menu Lock] (Page 64).

(3) Method to set parameters of Splice or Heater mode from a PC
- To set or change the parameters, contact your nearest sales agency.

(4) Forgot password
- Contact your nearest sales agency.

5. Other Functions

(1) Method to execute [Dust Check] automatically after turning power on
- Refer to [Power On Settings] (Page 65).

(2) Method to hide messages on [READY] screen
- Change the fiber image from X/Y view to X magnified view or Y magnified view by pressing ***X/Y*** .

(3) Too many repetitions until "Test Finish" indicated in [Arc Calibration]
- The splicer needs to repeat the arc calibration after replacing the electrodes or when the environmental conditions change drastically.
  (Page 65). The number of arc calibrations can be set to a specific amount. When the splicer completes the set amount of calibrations, it indicates "Test Finish". However, this does not mean it is completely calibrated.

(4) "Test Finish" is never indicated after many repetitions in [Arc Calibration]
- Execute [Stabilizing Electrodes] function in [Maintenance Menu]. If the splicer still does not indicate "Test Finish", replace the electrodes. Refer to [Replace Electrode] section.

(5) No arc power change after [Arc Calibration]
- An internal factor is calibrated and adjusted for the specific arc power selected. The displayed arc power in each splice mode does not change.
- The calibration results affect all splice modes.

(6) Method to input different comments after each splice in splice results data
- Refer to [Splicing procedure] (Page 20).

(7) Method to input the same comments automatically in splice results data
- Refer to [Splicing procedure] (Page 20).

(8) Method to cancel storing splice results in internal memory
- Refer to [Splicing procedure] (Page 20).

(9) Method to download splice results from splicer to PC
- Contact your nearest sales agency.

1. Guarantee

1. Guarantee period and limits

If the splicer becomes out of order within one year from the date of delivery, we will repair it free of charge. However, note that repairs will be charged for the following cases regardless of the guarantee period:

(1) Trouble or damage due to natural disaster.
(2) Trouble or damage due to mishandling.
(3) Trouble or damage due to handling in disregard of the operating procedures or instructions described in the instruction manual.
(4) Consumable items (discharge electrodes etc.)
(5) Trouble or damage due to abnormal voltage supply.

In most cases, high voltage from AC power source breaks an AC adapter within the warranty period. The specification of AC input voltage is up to AC240V (340V-peak). For this reason, Fujikura Ltd. complies with a free replacement of AC adapter only one time. In a case that the second AC adapter is broken, Fujikura Ltd. cannot replace it to a third AC adapter at free of charge because the AC power source usually has a problem.

2. Before shipping the splicer

Please consult your nearest sales agency first.

3. Necessary information needed for repair

Include documentation with the splicer informing us of the details listed below.

(1) Your full name, section, division, company, address, phone number, fax number and e-mail address.
(2) Model name and serial number of the splicer.
(3) Problems encountered
- What problems did your splicer get into and when?
- What is its present operational state?
- The state of the monitor and the contents of the relevant error message.

etc.

4. Transporting the splicer

Since the splicer is a high-precision machine, always use the original carrying case for transportation and storage in order to protect it against humidity, vibration and shock. When requesting splicer repair, please send it, along with its accessories, in its original carrying case.

5. Note for Repair

Please note the memory contents, such as splicing results, splice mode, etc., may be lost depending on the kind of repair.

2. Contact Address

Inquiries concerning products should be made to the nearest sales agency or one of the following:

Fujikura Europe Ltd.
C51 Barwell Business Park
Leatherhead Road, Chessington, Surrey KT9 2NY
England
Tel. +44-20-8240-2000 (Service: +44-20-8240-2020)
Fax. +44-20-8240-2010 (Service: +44-20-8240-2029)
URL http://www.fujikura.co.uk

Alcoa Fujikura Ltd.
260 Parkway East
Duncan, SOUTH CAROLINA 29334
U.S.A.
Tel. +1-800-AFL-FIBER (Service: +1-800-866-3602)
Fax. +1-864-433-5560 (Service: +1-800-433-5452)
P.O.Box 3127 Spartanburg, SC 29304-3127
URL http://www.aflfiber.com

Fujikura Asia Ltd.
460 Alexandra Road #22-01 PSA Building
Singapore 119963
Tel. +65-6-2711312 Fax. +65-6-2780965
URL http://www.fujikura.com.sg

Fujikura Ltd.
Optical Fiber & Equipment Department
International Sales & Marketing
1-5-1 Kiba, Koto-ku, Tokyo 135-8512
Japan
Tel. +81-3-5606-1164 Fax. +81-3-5606-1534
URL http://www.fujikura.co.jp/front_e.htm

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