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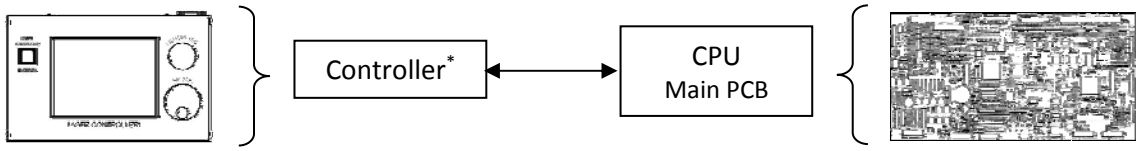
E00: Communication Line Error

Troubleshooting a *Communication Line* Error

An "E00 – Communication Line Error" indicates that there is no communication between the Laser CPU (hereinafter called ***CPU***) and the Laser Controller (hereinafter called ***Controller***). In its simplest form, the Controller/CPU communication circuit can be simplified as follows:



** The Laser Controller is also referred to as a Program Box or Control Panel and is used to control the Laser.*

In order for proper Laser operation, the **Controller** must be connected to the **CPU** at all times. An **E00** error means that either the **CPU** is sending signals to the **Controller** and it isn't responding, or the **Controller** is sending signals to the **CPU** and it isn't responding. In either case the Laser will not operate until communication between the **CPU** and **Controller** is restored.

An **E00: Communication** error can be caused by many things including:

1. Abnormal operation
2. RF/EMI Interference
3. Incorrect *Transmission Mode* setting
4. Low Battery Back-up on Main PCB
5. Incompatible Firmware / Hardware
6. CPU Initialization
7. Faulty Power Supply
8. Faulty Connection
9. Faulty Circuit PCB

1. Abnormal operation

Sometimes an abnormal transmission (i.e. corrupt data) can cause this error. Whenever an **E00** error is present, press the ***Trouble Reset*** button first to try and clear the error message, or recycle the power. If the problem persists, continue to troubleshoot as noted below.

2. RF / EMI Interference

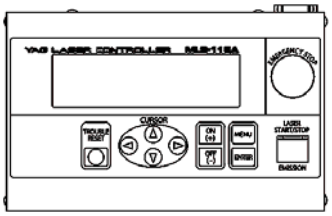
The **Controller** can be used one of two ways; (1) connected directly to the Laser, or (2) operated remotely with the use of an extension cable (AMYA # 205-263), that is shipped standard with all LW50A-400A Lasers. If the **Controller** is connected to an extension cable and an **E00** error exists, remove the extension cable and connect the **Controller** directly to the Laser. If the problem persists, isolate the Laser from all external noise sources (HV equipment & large machinery), or temporarily turn off all other equipment to try and isolate any potential noise source.

When testing for RF/EMI Interference, ask these questions; does the error repeat the same time every day? Was new equipment installed? Was the Laser moved to a different location? Has the A.C. Power Mains been changed in the building (common-mode noise)? If the answer is "yes" to any of these questions, try to identify and isolate the Laser from the offending noise source. If common-mode noise is occurring on the PE ground due to the operation of large equipment, try connecting the Laser to a different A.C. power circuit or install an isolation transformer between the Laser and A.C. Power. If the Laser is not being affected by a source of external noise, continue with the next troubleshooting step.

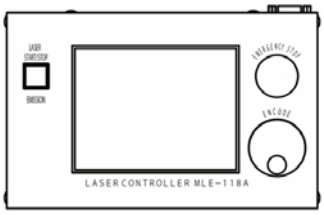
3. Incorrect *Transmission Mode* Setting

If the Laser has been untouched and was operating correctly prior to receiving the **E00** error, skip this step and continue with the next troubleshooting step. If the Laser has been recently repaired or if any of the Laser panels have been removed, check to make sure the *Transmission Mode* is properly set on the **CPU** (Main PCB). First identify which **Controller** is being used and then determine the required *Transmission Mode*.

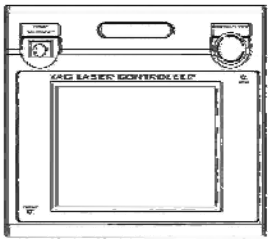
Laser Controller Identification:



MLE-115A
(half-duplex)



MLE-118A
(full-duplex)



MLE-116A
(full-duplex)

Then identify which **CPU** (Main PCB) is installed and follow the instructions below to properly set the *Transmission Mode*.

Laser Model	Transmission Mode of Controller			CPU (Main PCB)	CPU (Main PCB) Location
	MLE-115A	MLE-118A	MLE-116A		
LW2AG(E)	half-duplex[1]	N/A	N/A	ME-1925A/B/C	behind right side panel
LW5AG(E)	N/A	full-duplex	N/A	ME-1925C/ME-3023	behind right side panel
LW5A(M)/15A/25A	half-duplex[1]	N/A	N/A	ME-1925A/B	behind right side panel
LW5A(M)/15A/25A	half-duplex	full-duplex[2]	N/A	ME-1925C/ME-3023	behind right side panel
LW50A(C)/70A	half-duplex[1]	N/A	N/A	ME-1891	behind left side panel
LW50A(C)/70A(C)	half-duplex	full-duplex	N/A	ME-1958/ME-3024	behind left side panel
LW150A	half-duplex	full-duplex	N/A	ME-1958/ME-3024	behind left side panel
LW300A/400A	half-duplex[1]	N/A	N/A	ME-1891	behind right side panel
LW300A(H)/400A	half-duplex	full-duplex	N/A	ME-1958/ME-3024	behind right side panel
LW500A/600A	N/A	N/A	full-duplex	ME-1958/ME-3024	under top rear panel

Note 1: The ME-1925A/B and ME-1891 CPU (Main PCB) can only communicate in half-duplex mode.
Note 2: The MLE-118A option for the LW5A(M)/15A/25A Laser Welder was implemented in early 2015.

There are two modes of communication that can exist between the **Controller** and **CPU**; full-duplex or half-duplex. In full-duplex mode, there are separate pairs of Transmit and Receive wires. In half-duplex mode the Transmit/Receive signals share a common pair of wires (bi-directional communication).

ME-1925 /ME-3023 Main PCB

There are three revisions of the ME-1925 **CPU** (Main PCB). The ME-1925**A** and ME-1925**B** revisions do not have a *Transmission Mode* setting and are configured for half-duplex communication only. These Main PCB's can only be used with the MLE-115A **Controller**.

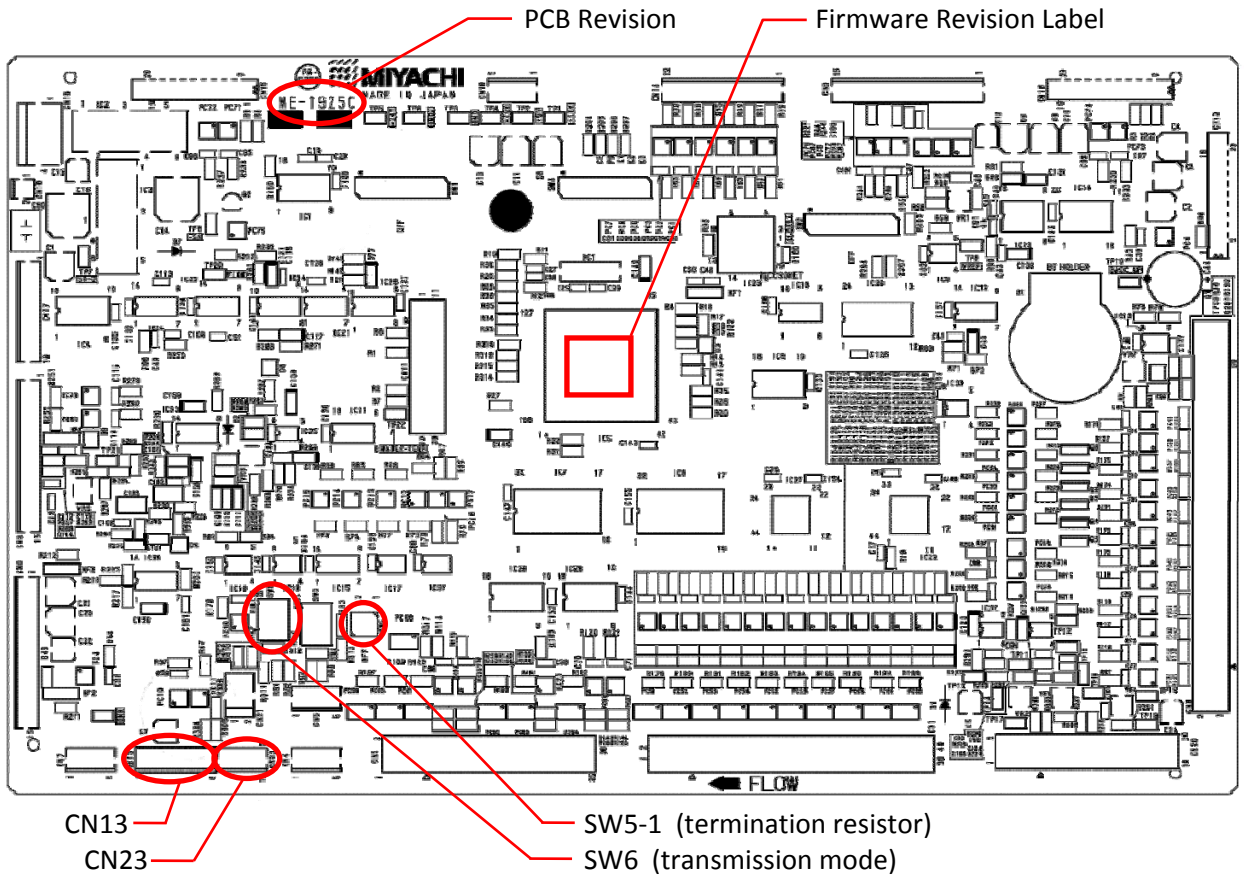
The ME-1925**C** and the ME-3023 (Main PCB) can be used with either the MLE-115A or MLE-118A **Controller**. Toggle switch SW6 is used to select the *Transmission Mode*. When SW6 is switched in the "down" position, the *Transmission Mode* is in half-duplex mode (for operation with the MLE-115A **Controller**). Likewise, when SW6 is switched in the "up" position, the *Transmission Mode* is in full-duplex mode (for operation with the MLE-118A **Controller**).

Dipswitch SW5-1 is used for switching a termination resistor in/out of circuit when communicating in full-duplex mode and dipswitch SW4-5 is used to select the type of Controller that is being used. Verify the settings as noted in the table below:

ME-1925C / ME-3023 Communication Settings

Controller	Transmission Mode	SW6 Mode	SW5-1 Termination Resistor	SW4-5 Controller
MLE-115A	Half-duplex	Down	OFF	ON
MLE-118A	Full-duplex	Up	ON	OFF

ME-1925C / ME-3023 – Component Layout



ME-1891 Main PCB

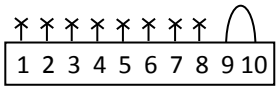
There is no *Transmission Mode* setting on the ME-1891 **CPU** (Main PCB). It is configured for half-duplex communication only. The ME-1891 **CPU** (Main PCB) can only be used with the MLE-115A **Controller**.

ME-1958 / ME-3024 Main PCB

There are three revisions of the ME-1958 CPU (Main PCB). All three ME-1958 PCB revisions and the ME-3024 can be used with any **Controller**. Toggle switch SW4 is used to select the *Transmission Mode*. When SW4 is switched in the "down" position, the *Transmission Mode* is in half-duplex mode (for operation with the MLE-115A **Controller**). Likewise, when SW4 is switched in the "up" position, the *Transmission Mode* is in full-duplex mode (for operation with the MLE-116A and MLE-118A **Controllers**).

Dipswitch SW3-2 is used for switching in/out a termination resistor when communicating in full-duplex mode. Turn SW3-2 "OFF" for half-duplex communications and SW3-2 "ON" for full-duplex communications.

ME-1958**A** PCB *only*: In addition to the setting of SW3 & SW4, loop-back connector CN27 must also be installed when using the ME-1958A **CPU** (Main PCB) with the MLE-115A **Controller**. Leave connector open for operation with the MLE-116A and MLE-118A Controllers.



Connector: AMYA # 250-945
Terminals: AMYA # 700-272
CN27 loop-back

An additional dipswitch SW5 is also present on the ME-1958**B**/**C** and ME-3024 (Main PCB) board. Dipswitch position SW5-4 is used to select the type of **Controller** and takes the place of the CN27 loop-back connector. When SW5-4 is switched "ON", the PCB is configured for operation with the MLE-115A **Controller**. Likewise, when SW5-4 is switched "OFF", the PCB is configured for operation with the MLE-116A and MLE-118A **Controllers**. Verify the settings as noted in the table below:

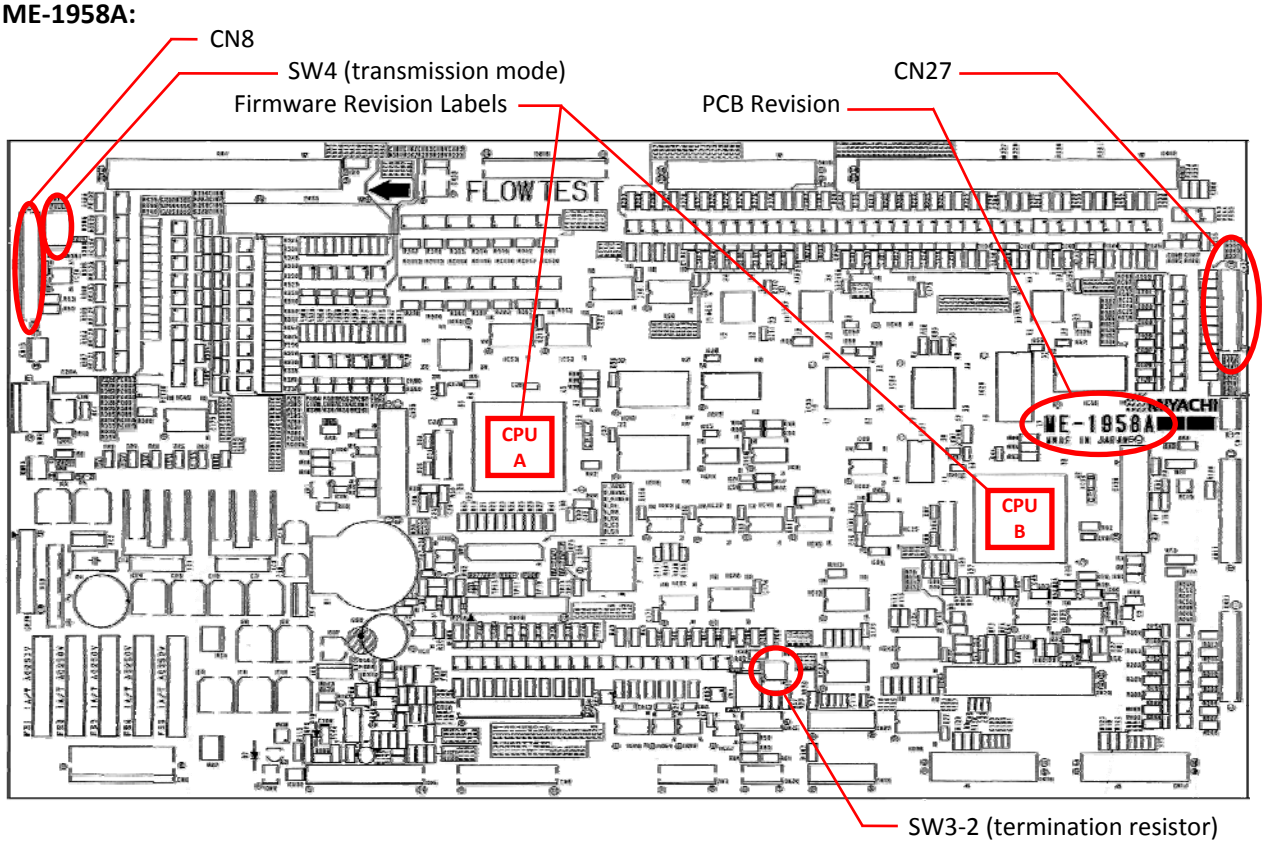
ME-1958 / ME-3024 Communication Settings:

CPU (Main PCB)	Controller	Transmission Mode	SW4 Mode	SW3-2 Termination Resistor	CN27 Loop-back	SW5-4[1] Controller
ME-1958A	MLE-115A	half-duplex	Down	OFF	Installed	N/A
	MLE-116A	full-duplex	Up	ON	Not installed	N/A
	MLE-118A	full-duplex	Up	ON	Not installed	N/A
ME-1958B	MLE-115A	half-duplex	Down	OFF	Not Installed	On
	MLE-116A	full-duplex	Up	ON	Not installed	Off
	MLE-118A	full-duplex	Up	ON	Not installed	Off
ME-1958C ME-3024	MLE-115A	half-duplex	Down	OFF	Not Installed	On
	MLE-116A	full-duplex	Up	ON	Not installed	Off
	MLE-118A	full-duplex	Up	ON	Not installed	Off

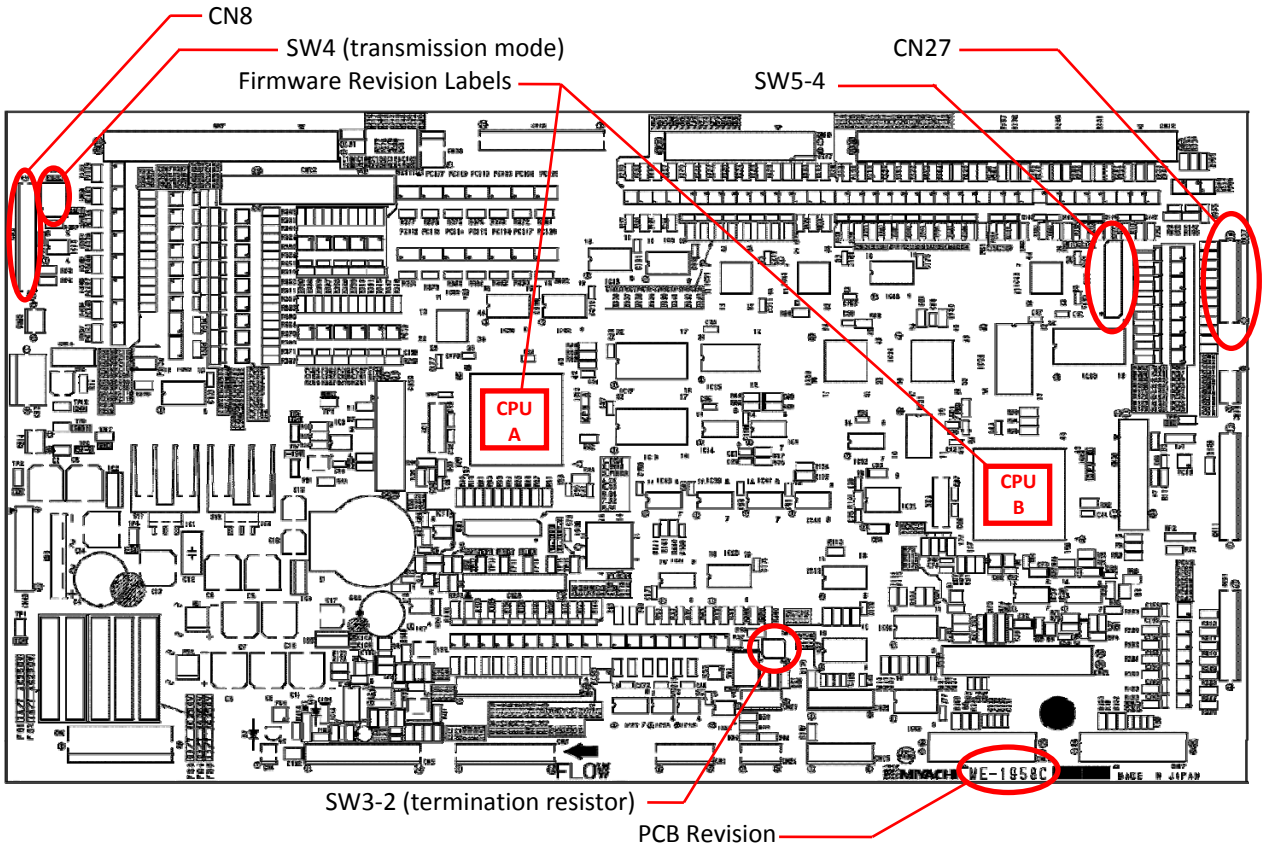
Note 1: If V50-xx Firmware code is used, additional switch settings on SW5 will be required to identify the Laser Model. Please refer to the "**Laser Model/Controller/Main PCB Compatibility**" reference document on the AMYA Support site (www.amyasupport.com/lsd) under "**Service**" for more information.

ME-1958 PCB Component locations:

ME-1958A:



ME-1958B/C and ME-3024:



4. Low Battery Back-up on Main PCB

If an **E00** error constantly appears during power-up and the "*Trouble Reset*" always clears this message and then all functions work for the remainder of operation, then the Battery Back-up may be low. The function of the battery back-up is to supply power to the SRAM memory, so that when power is turned on, the appropriate configuration data initializes the microprocessor. If the battery back-up is low, the reset IC will keep the microprocessor in a reset condition until the supply voltage reaches the designed threshold. This delay in microprocessor function can cause an **E00** error. Using a DMM, measure the battery back-up voltage and replace as necessary (with Laser power "OFF"). To prevent the programmed schedule information from being erased, exchange the battery quickly. A good practice is to record all schedule information prior to exchanging the battery.

Main PCB	DMM		Minimum Voltage	Battery	
	–	+		Type	AMYA #
ME-1925 / ME-3023	TP3	TP10	$V_{BAT} \geq 2.5V$	CR2450	145-014
ME-1958 / ME-3024	TP3	TP13			

5. Incompatible Firmware / Hardware

If the Laser has been untouched and was operating correctly prior to receiving the **E00** error, skip this step and continue with the next troubleshooting step. If the **CPU** (Main PCB) or **Controller** were recently changed, check to make sure the firmware revision is compatible. For the most recent list of compatible firmware, please refer to the "**Laser Model/Controller/Main PCB Compatibility**" reference document on the AMYA Support site (www.amyasupport.com/lsd) under "Service". Any combination not listed on the compatibility chart is invalid.

Under normal operating conditions, the Laser **Controller** can be used to display the currently installed firmware. However when an **E00** error is present, the **Controller** cannot be used to display this information. Instead a visual inspection will be required. Locate the **CPU** (Main PCB) as noted in the table under the *Transmission Mode* setting section (Page 2), and then read the firmware revision off of the label that is/are physically attached to the microprocessor(s) on the Main PCB. The firmware revision for the Controllers cannot be inspected visually.

6. CPU Initialization

Unless new hardware has been installed in the Laser, you can skip this step and continue with the next troubleshooting step. If new hardware has been installed, the Laser may need to be initialized. Initialization will be required when the firmware revision has changed in either the **CPU** (Main PCB) or **Controller**. The initialization method is **Controller** specific.

Important: *When a Laser is re-initialized, ALL programmed schedule information will be erased. Be sure to record or back-up all programmed Schedule Information prior to initialization.*

MLE-115A: With power and the keyswitch OFF, press and hold **MENU** while turning on power. Release **MENU** after self-check. Once the Initialization Screen appears, use the arrows to highlight the ***Initialize*** field, and then press *Enter*. Recycle power.

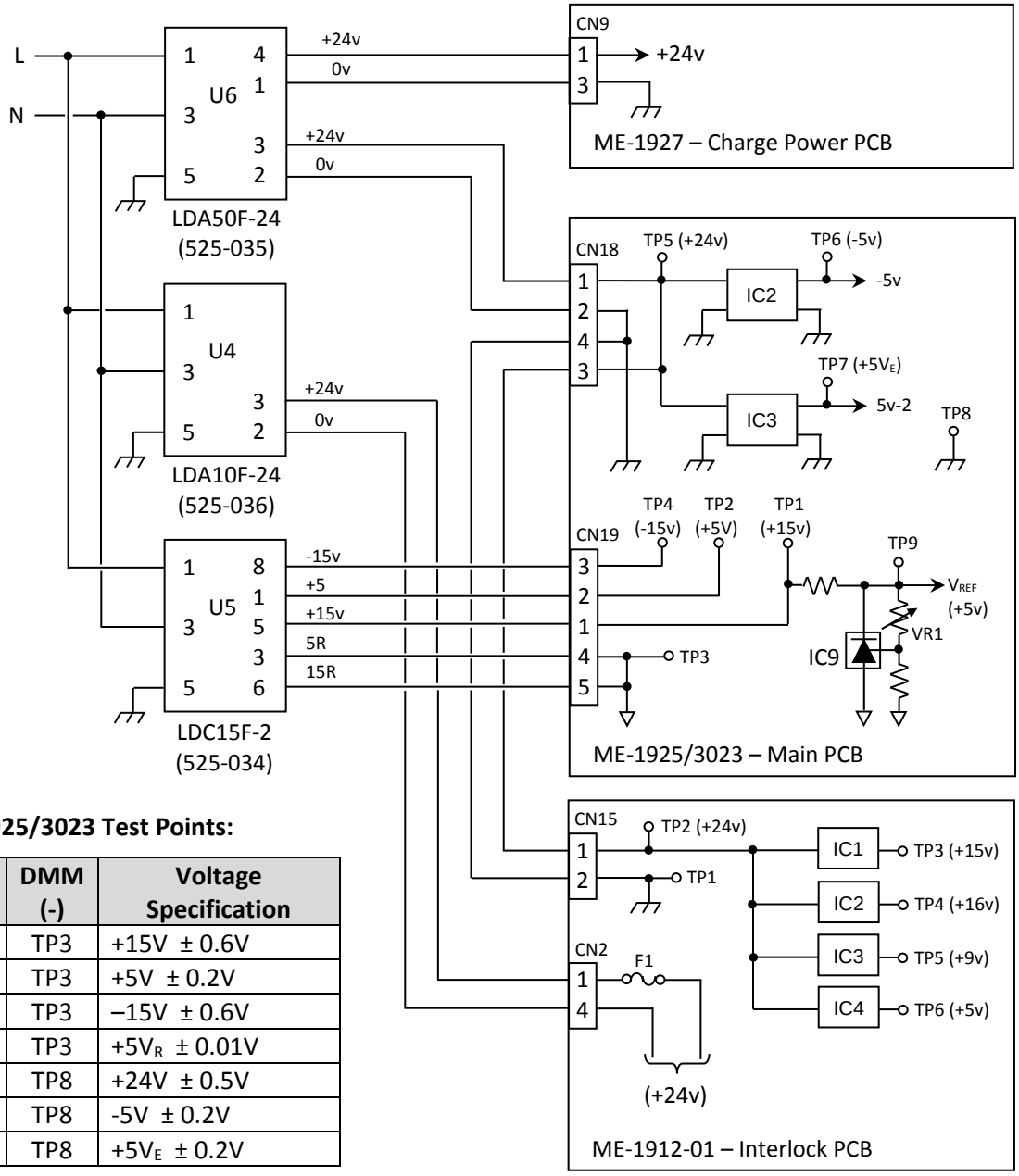
MLE-116A: With the keyswitch OFF, turn the Laser power ON, when the screen displays a picture of the Laser, press the 4th button down on the Left and 2nd button down on the Right simultaneously. Once the Initialization Screen appears, select the ***Initialize*** Field then recycle power.

MLE-118A: With the keyswitch OFF, push the **Encode** button down while powering ON the Laser. When the screen displays a picture of the Laser, turn the **Encode** CCW while continuously pressing **Encode** button down until the Initialization Screen appears. Rotate the **Encode** button to highlight the ***Initialize*** Field, then press the **Encode** button to select and then recycle power.

7. Faulty Power Supply

An **E00** error can also be caused by faulty Power Supply voltage. Typically a power supply fault will also yield other error messages as well. Using a DMM, measure the power supply voltages on the **CPU** (Main PCB) at the appropriate test points (see tables below for a list of test points and expected voltages). If all voltages test OK, continue with the next step. If there is a problem with one or more of the power supply voltages, isolate the failure based on the schematics below. Refer to the AMYA Support site (www.amyasupport.com/lsd) under "Service" for more information on component / test point locations.

LW5A(M)/15A/25A/2AG/5AG Laser Welders (8-xxx-01-xx)
with ME-1925/ME-3023 Main PCB – Power Distribution for Single E-Stop/Interlock Lasers



ME-1925/3023 Test Points:

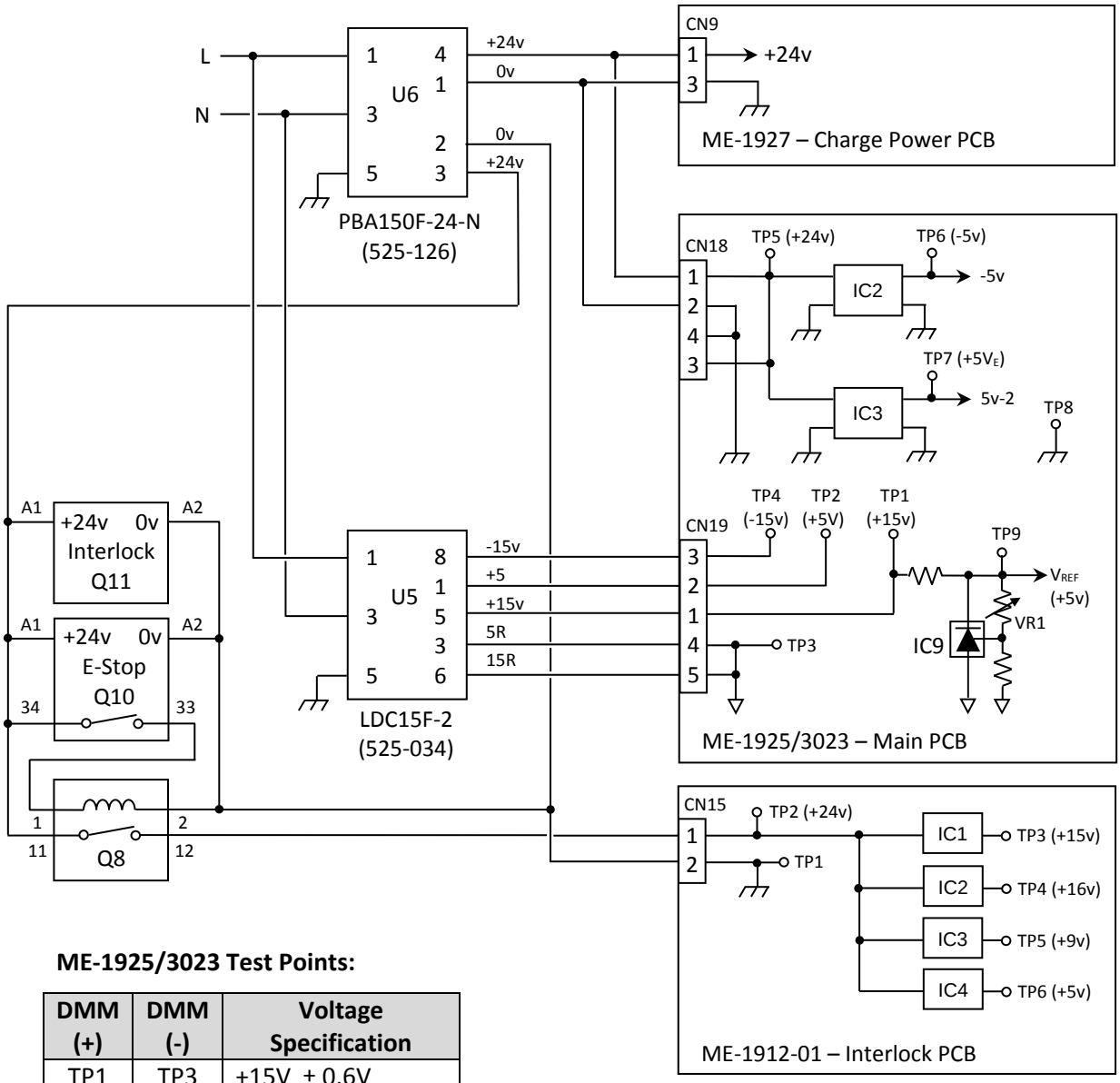
DMM (+)	DMM (-)	Voltage Specification
TP1	TP3	+15V ± 0.6V
TP2	TP3	+5V ± 0.2V
TP4	TP3	–15V ± 0.6V
TP9	TP3	+5V$_R$ ± 0.01V
TP5	TP8	+24V ± 0.5V
TP6	TP8	-5V ± 0.2V
TP7	TP8	+5V$_E$ ± 0.2V

Note: +5V$_R$ is adjusted by VR1 on Main PCB

Fuse F1: 218.002P (AMYA # 330-198)

U4, U5 and U6 are mounted to the inside chassis wall behind the Main PCB and Interlock PCB.

LW5A(M)/15A/25A/2AG/5AG Laser Welders (8-xxx-02-xx)
with ME-1925/ME-3023 Main PCB – Power Distribution for Dual E-Stop/Interlock Lasers



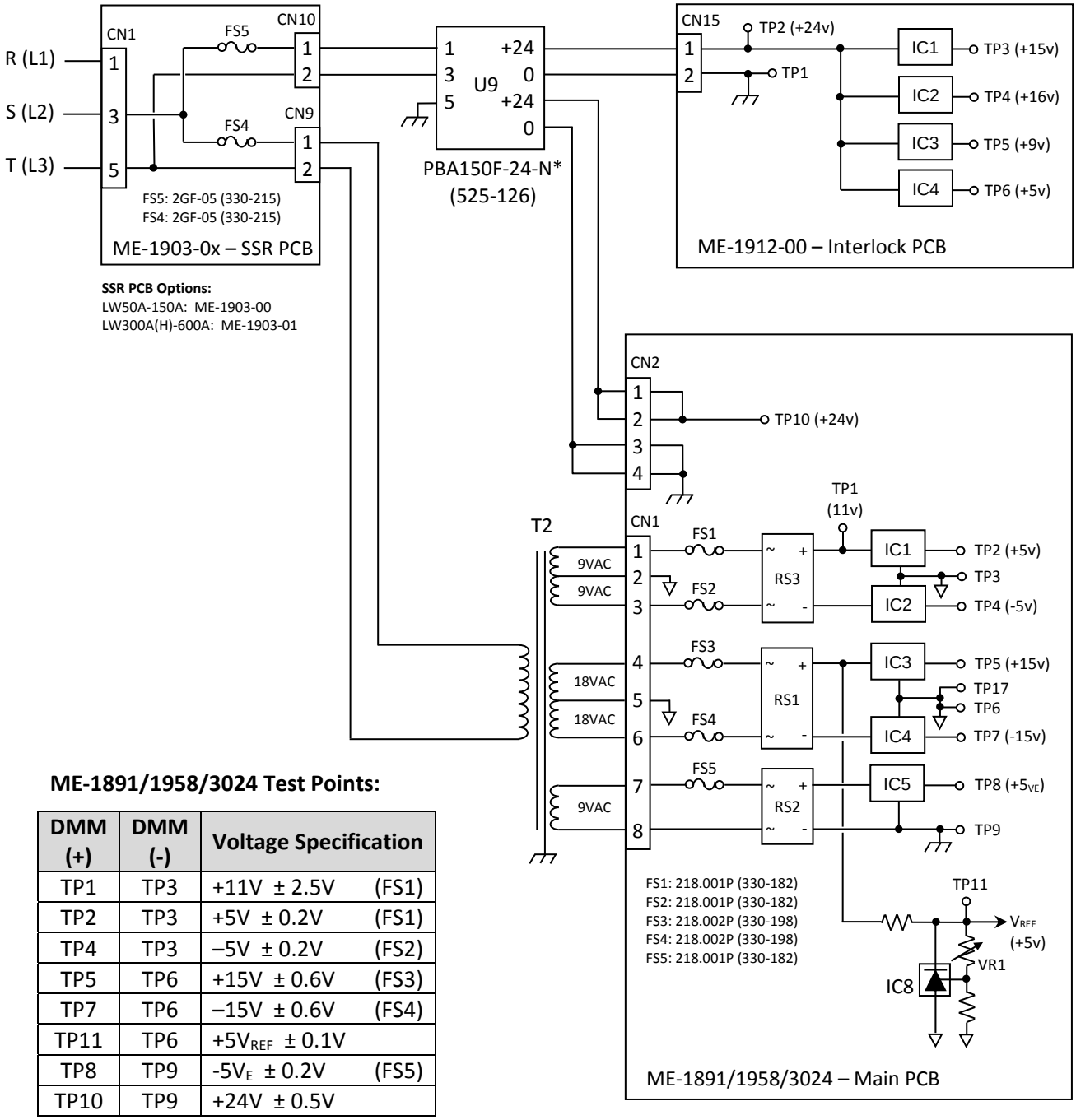
ME-1925/3023 Test Points:

DMM (+)	DMM (-)	Voltage Specification
TP1	TP3	+15V ± 0.6V
TP2	TP3	+5V ± 0.2V
TP4	TP3	–15V ± 0.6V
TP9	TP3	$+5V_R$ ± 0.01V
TP5	TP8	+24V ± 0.5V
TP6	TP8	-5V ± 0.2V
TP7	TP8	$+5V_E$ ± 0.2V

Note: $+5V_R$ is adjusted by VR1 on Main PCB

Power Supplies U5 & U6 are mounted to the inside chassis wall behind the Main PCB and Interlock PCB. Safety Relays Q10 / Q11 and relay Q8 are mounted on the chassis wall just below the Main PCB.

LW50A(C)/70A(C)/150A/300A(H)/400A/500A/600A Laser Welders (8-xxx-01-xx)
with ME-1891/ME-1958/ME-3024 Main PCB – Power Distribution for Single E-Stop/Interlock Lasers



ME-1891/1958/3024 Test Points:

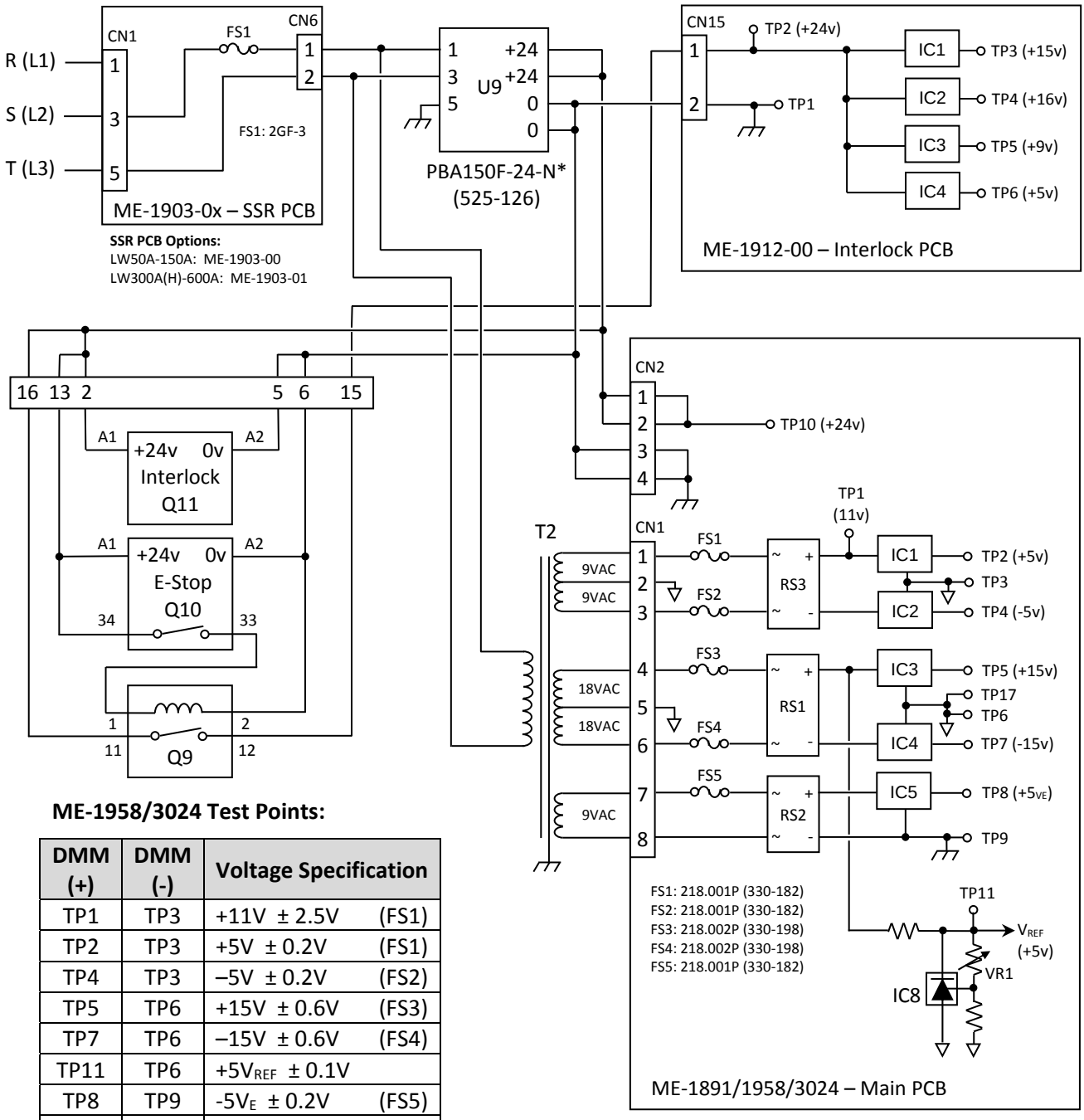
DMM (+)	DMM (-)	Voltage Specification	
TP1	TP3	+11V ± 2.5V	(FS1)
TP2	TP3	+5V ± 0.2V	(FS1)
TP4	TP3	–5V ± 0.2V	(FS2)
TP5	TP6	+15V ± 0.6V	(FS3)
TP7	TP6	–15V ± 0.6V	(FS4)
TP11	TP6	$+5V_{REF}$ ± 0.1V	
TP8	TP9	$-5V_E$ ± 0.2V	(FS5)
TP10	TP9	+24V ± 0.5V	

Note: $+5V_{REF}$ is adjusted by VR1 on Main PCB

The simplified schematic shown above highlights all important power supply connections and does not show all discrete components.

* At the time of this document's publish date, Power Supply U9 shown above is typical for 220VAC U.S. LW50A/70A/150A Laser Models. However, depending on the Laser Model, Date of Manufacture and destination country, Power Supply U9 may be different than shown. If a faulty power supply is found, read the model number of the power supply itself in order to determine the correct replacement.

LW50A(C)/70A(C)/150A/300A(H)/400A/500A/600A Laser Welders (8-xxx-02-xx)
with ME-1958/ME-3024 Main PCB – Power Distribution for Dual E-Stop/Interlock Lasers



ME-1958/3024 Test Points:

DMM (+)	DMM (-)	Voltage Specification	
TP1	TP3	+11V ± 2.5V	(FS1)
TP2	TP3	+5V ± 0.2V	(FS1)
TP4	TP3	–5V ± 0.2V	(FS2)
TP5	TP6	+15V ± 0.6V	(FS3)
TP7	TP6	–15V ± 0.6V	(FS4)
TP11	TP6	$+5V_{REF}$ ± 0.1V	
TP8	TP9	$-5V_E$ ± 0.2V	(FS5)
TP10	TP9	+24V ± 0.5V	

Note: $+5V_{REF}$ is adjusted by VR1 on Main PCB

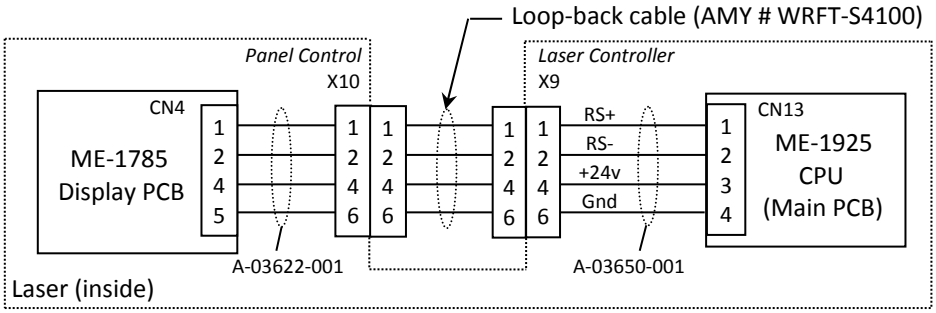
The simplified schematic shown above highlights all important power supply connections and does not show all discrete components.

* At the time of this document's publish date, Power Supply U9 shown above is typical for 220VAC U.S. LW50A/70A/150A Laser Models. However, depending on the Laser Model, Date of Manufacture and destination country, Power Supply U9 may be different than shown. If a faulty power supply is found, read the model number of the power supply itself in order to determine the correct replacement.

8. Faulty Connection

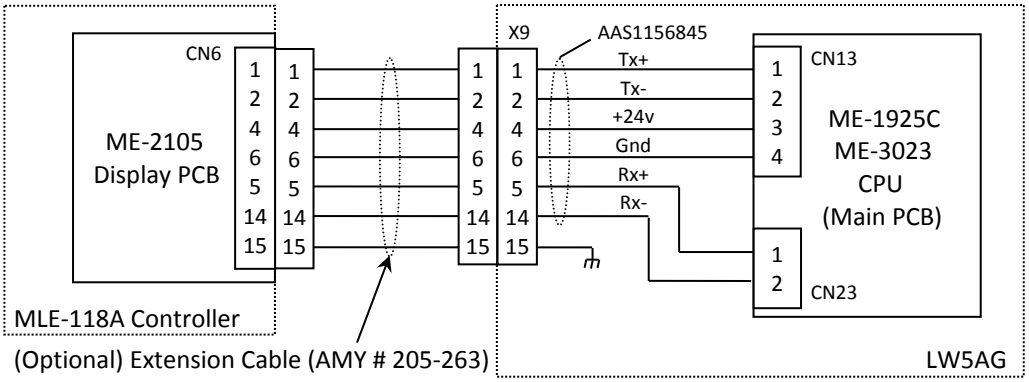
Although rare, a connection problem may exist in the communication wires. Using a DMM, check for continuity based on the schematics below (with Laser power off). Note that other connections will be present on these connectors, but these connections do not affect the **E00** error. Use proper static protection to avoid damaging the electronics. Be sure to also check all internal connections to make sure the wires haven't backed out of their respective connectors.

LW5A(M)/15A/25A/2AG + ME-115A Controller (with ME-1925A/B/C)

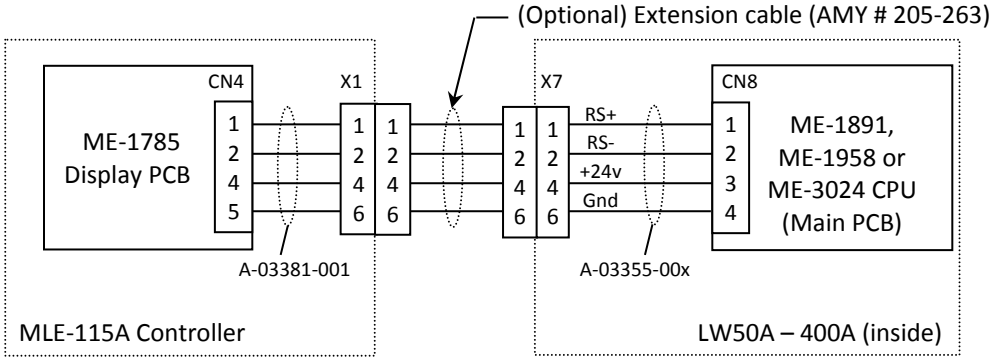


Note: The MLE-115A Controller is internally mounted inside the LW5A/15A/25A Laser. Both the "*Laser Controller*" (X9) connector and "*Panel Control*" (X10) connector are mounted on the middle panel behind the front door. Both the X9 + X10 connectors are connected together with a loop-back cable (AMYA # WRFT-S4100), wired 1-2, 2-2, etc. The X9 connector allows for remote operation.

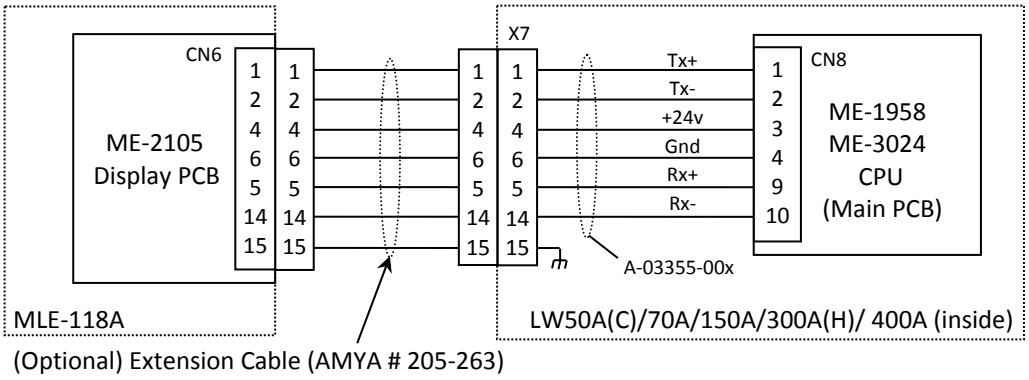
LW5AG + ME-118A Controller (with ME-1925C or ME-3023)



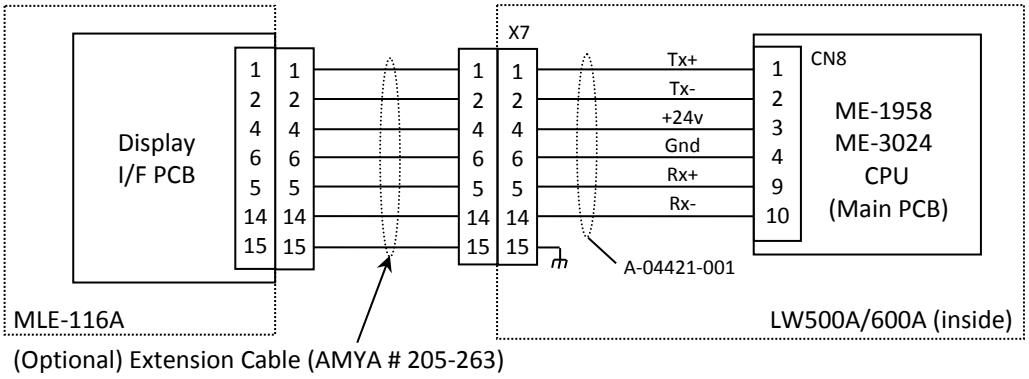
LW50A(C)/70A(C)/150A/300A(H)/400A + MLE-115A Controller (with ME-1891, ME-1958x or ME-3024)



LW50A(C)/70A(C)/150A/300A(H)/400A + MLE-118A Controller (with ME-1958x or ME-3024)



LW500A/600A + MLE-116A Controller (with ME-1958x or ME-3024)



9. Faulty Circuit PCB

When all likely causes have been eliminated, a faulty PCB should be suspected. Specifically a bad communications transceiver or reset IC is most likely the cause. A component failure is often due to mishandling of the equipment (static discharge through connecting/disconnecting the **Controller** or replacing the battery back-up with Laser Power on). If another **Controller** is available, try using it to isolate if the faulty PCB is the **Controller** or something on the **CPU** (Main PCB).

If a new **CPU** (Main PCB) or **Controller** is ordered, it is important to note which **CPU** (Main PCB) is installed, what firmware revision is currently installed on the Laser, and which **Controller** is being used.

PCB	Possible Faulty Components		
	Description	Ref Des	Mfg Pt #
ME-1925A/B	Transceiver	IC17	SN75176BPS
ME-1925C or ME-3023	Serial Receiver	IC17	SN75176BPSR
	Serial Transmitter	IC37	
ME-1925A/B/C	Battery B/U + Reset IC	IC16	PST531A
ME-1958A/B/C or ME-3024	Serial Receiver	IC18	SN75176BPSR
	Serial Transmitter	IC54	
	Battery B/U + Reset IC	IC7	PST531A

End of Procedure