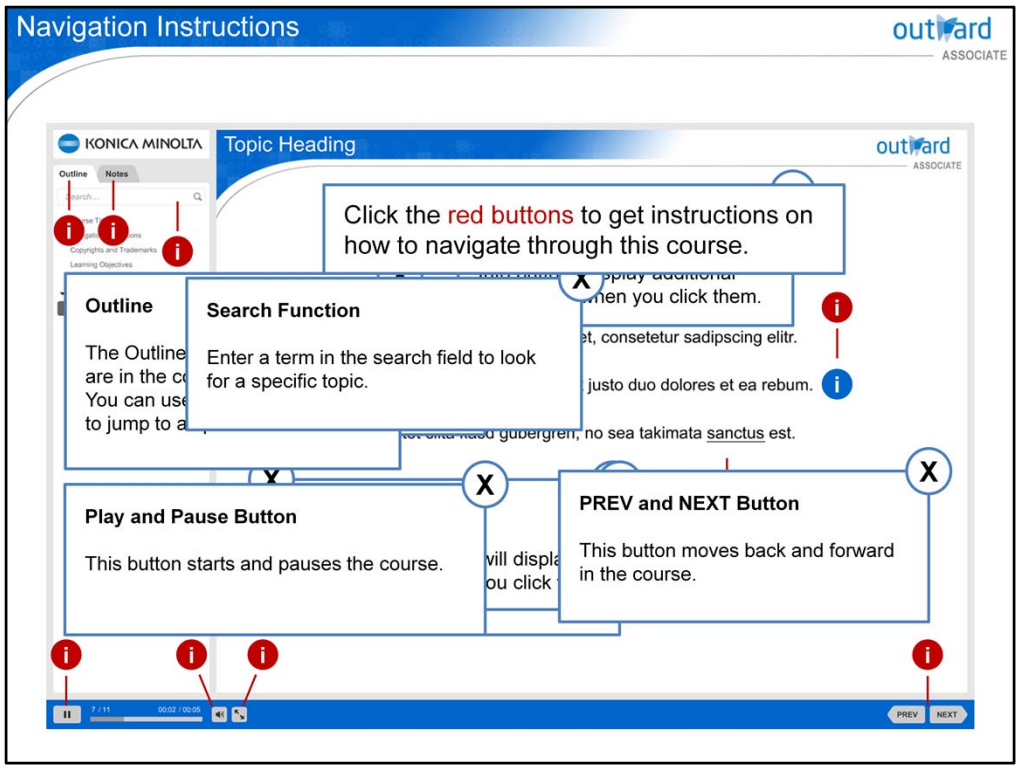
Welcome to the Konica Minolta OUTWARD Associate Electrical Systems 3 Course. The estimated run time of this course is 60 minutes.



Here you see how to navigate within the course.

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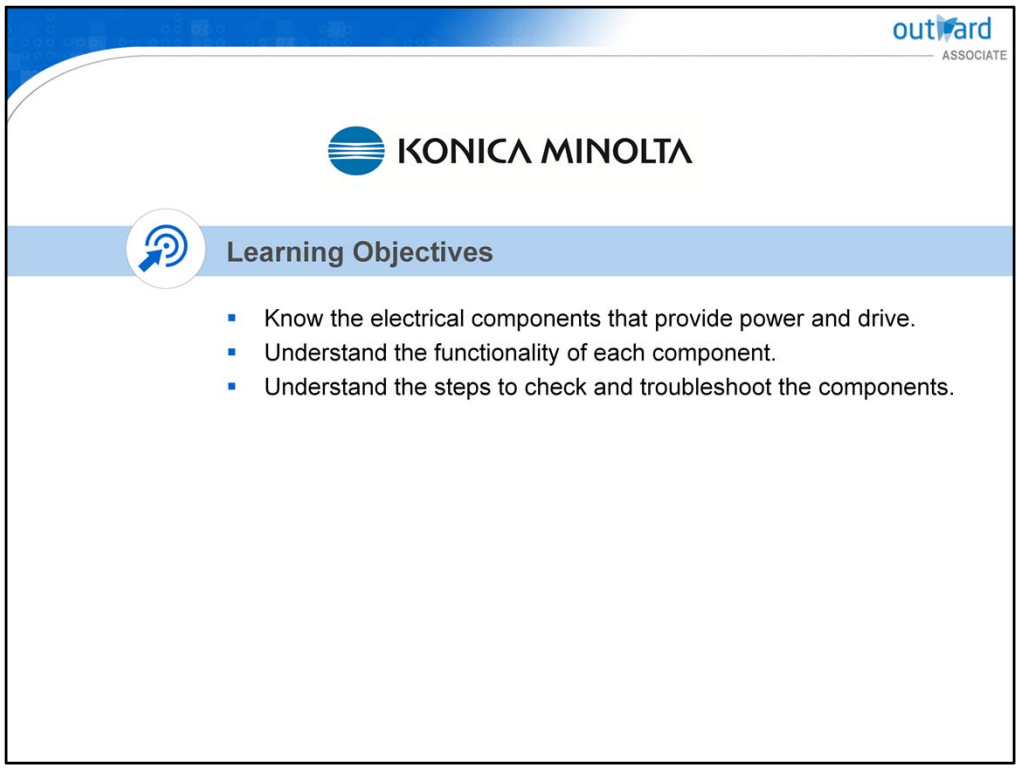
Welcome to the Konica Minolta OUTWARD Associate Electrical Systems 3 Course. At this point, you should have completed the Electrical Systems 1 and 2 courses.

In the Electrical Systems 1 course, you were provided with the basic electrical concepts regarding voltage, current, and resistance. You were then exposed to the basic elements of an electrical circuit, followed by basic DC and AC circuit theory. Another topic covered was the methods of troubleshooting these circuits. Furthermore, you got to know the various switching methods that control circuit components, and the different types of meters used for troubleshooting. Also covered was the explanation on how to use wiring diagrams to assist with this process, and the basic concepts of AC power sources.

In the Electrical Systems 2 course, you first learned about the various circuit protection devices that are used to protect the machine. Lamps were then discussed, with a focus on lamps used in the fusing and exposure sections of the machine. These topics were followed up by the most commonly used switching devices in Konica Minolta products, and lastly, the purpose that solenoids serve in machines.

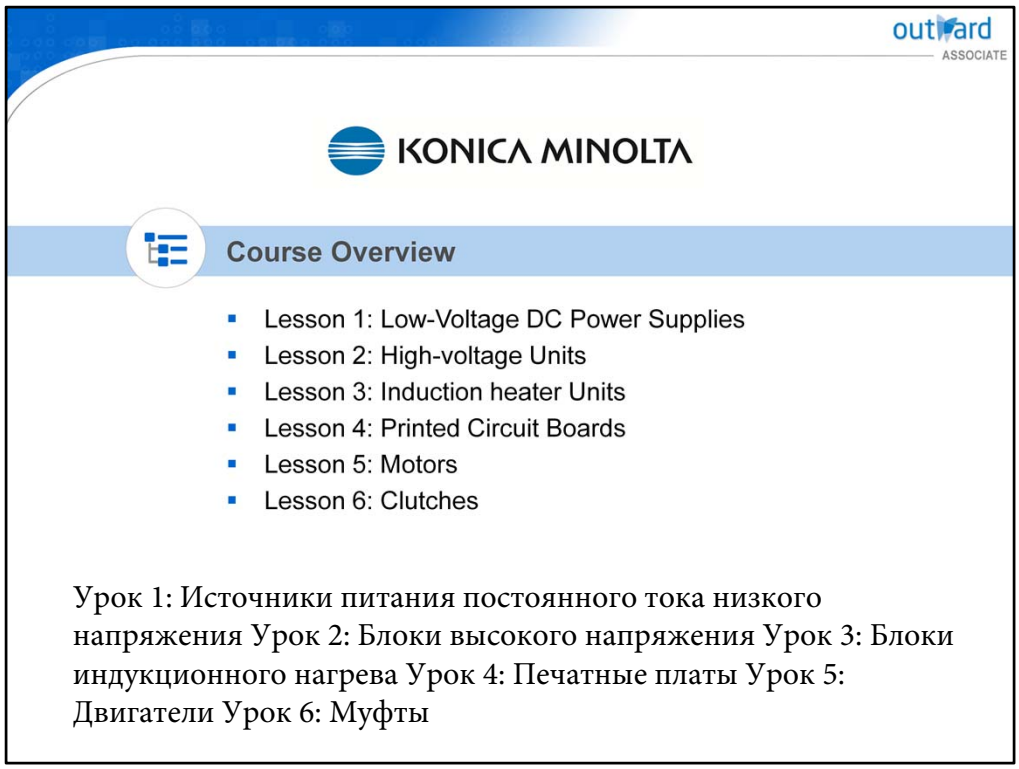
In this course, you will learn about the role that DC Power Supplies, High-voltage Units, Inductance heaters, Printed Wiring Boards, Motors, and Clutches play in Konica Minolta products. Furthermore, you will learn about the associated voltages, logic signals, troubleshooting techniques, and codes regarding these components.

Добро пожаловать на курс Konica Minolta OUTWARD Associate Electrical Systems 3. На этом этапе вы должны были пройти курсы «Электрические системы 1 и 2». На курсе «Электрические системы 1» вам были представлены основные электрические концепции, касающиеся напряжения, тока и сопротивления. Затем вы познакомились с основными элементами электрической цепи, а затем с базовой теорией цепей постоянного и переменного тока. Еще одна тема была посвящена методам устранения неисправностей в этих цепях. Кроме того, вы познакомились с различными методами коммутации, которые управляют компонентами схемы, и различными типами счетчиков, используемых для устранения неполадок. Также было рассмотрено объяснение того, как использовать схемы электрических соединений, чтобы помочь с этим процессом, и основные понятия источников питания переменного тока. На курсе «Электрические системы 2» вы впервые узнали о различных защитных устройствах, которые используются для защиты машины. Затем обсуждались лампы с акцентом на лампы, используемые в секциях термозакрепления и экспонирования машины. За этими темами следили наиболее часто используемые коммутационные устройства в продуктах Konica Minolta и, наконец, назначение, которое соленоиды служат в машинах. В этом курсе вы узнаете о роли, которую источники питания постоянного тока, высоковольтные блоки, индуктивные нагреватели, печатные платы, двигатели и муфты играют в продуктах Konica Minolta. Кроме того, вы узнаете о связанных напряжениях, логических сигналах, методах устранения неполадок и кодах, касающихся этих компонентов.



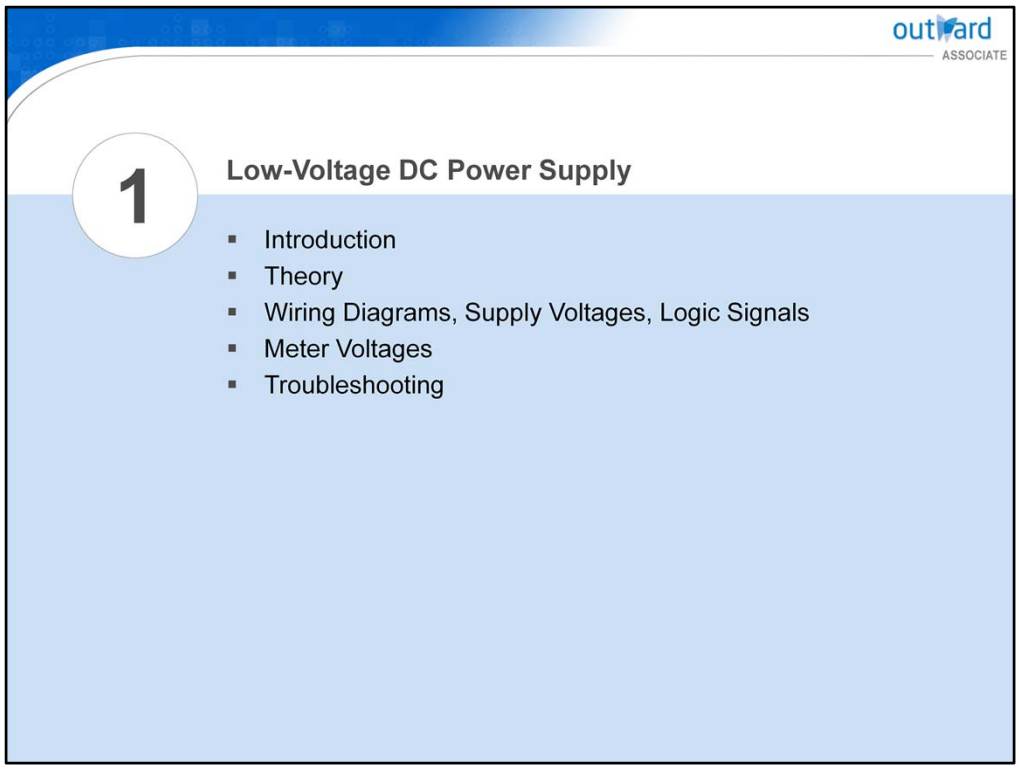
After completing this course, you will know the electrical components that provide power and drive to Konica Minolta MFPs. You will also have an understanding of how each component functions, and how to check and troubleshoot these components.

После прохождения этого курса вы будете знакомы с электрическими компонентами, которые обеспечивают питание и привод к МФУ Konica Minolta. У вас также будет понимание того, как функционирует каждый компонент, и как проверять и устранять неполадки этих компонентов.



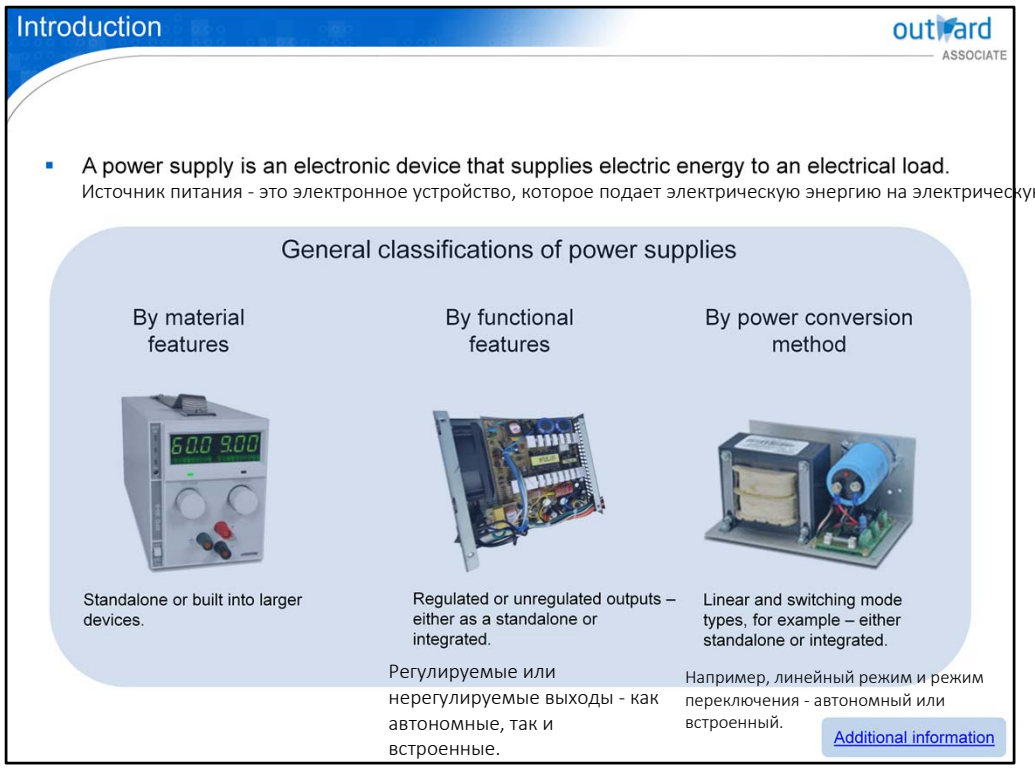
This course is comprised of five lessons that are arranged in a logical troubleshooting sequence to enhance learner understanding. These lessons include: DC Power Supplies, High-voltage Units, Induction heater Units, printed circuit boards, Motors, and Clutches. Each lesson introduces the common types of these components that are found in Konica Minolta MFPs.

Этот курс состоит из пяти уроков, которые расположены в логической последовательности для устранения неполадок, чтобы улучшить понимание учащихся. Эти уроки включают: источники питания постоянного тока, высоковольтные блоки, блоки индукционного нагрева, печатные платы, двигатели и муфты. Каждый урок знакомит с общими типами этих компонентов, которые можно найти в МФУ Konica Minolta.



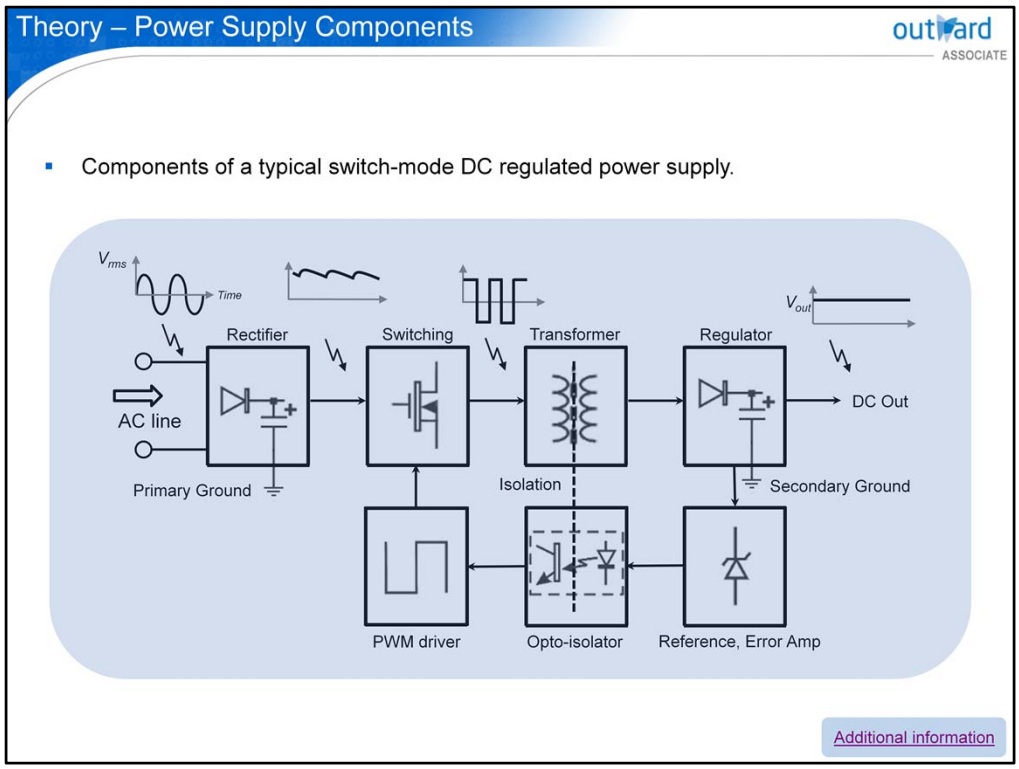
Welcome to Lesson 1, Low-voltage DC Power Supply. Within this lesson, you will first become familiar with the common types of these components and their basic functionality. This familiarization will help you to grasp their purpose within the electrical system of MFPs. This lesson will then provide typical wiring diagrams of these power supplies to identify the on-board components. These components include fuses, and voltage and signal checkpoints that you should be aware of for troubleshooting purposes. Lastly, you will be shown how to check the input and output voltage levels of the DC power supply board using a meter. Then you will be provided with a procedure for troubleshooting this board.

Добро пожаловать в Урок 1, Низковольтный источник постоянного тока. В рамках этого урока вы сначала познакомитесь с общими типами этих компонентов и их основными функциями. Это ознакомление поможет вам понять их назначение в электрической системе МФУ. На этом уроке будут представлены типовые схемы подключения этих источников питания для определения встроенных компонентов. Эти компоненты включают предохранители и контрольные точки напряжения и сигнала, о которых вам следует знать в целях устранения неполадок. Наконец, вам будет показано, как проверить уровни входного и выходного напряжения платы источника постоянного тока с помощью измерителя. Затем вам будет предоставлена процедура устранения неполадок этой платы.



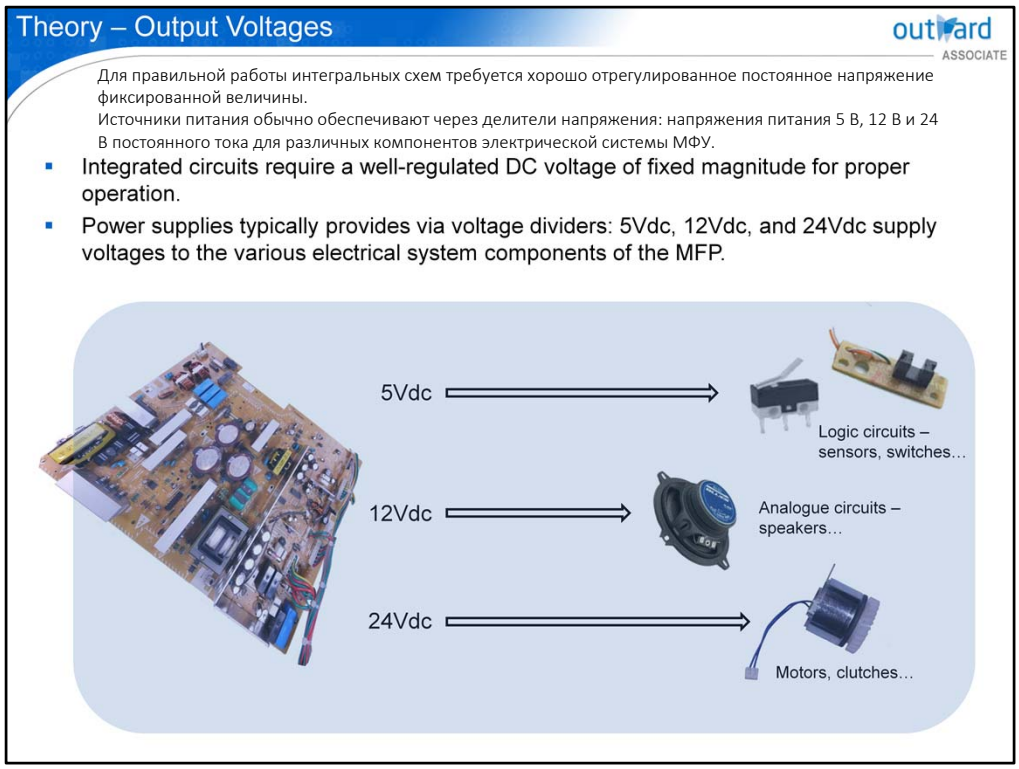
A power supply is an electronic device that supplies electric energy to an electrical load. The primary function of a power supply is to convert one form of electrical energy to another. As a result, they are sometimes referred to as electric power converters. Select the link for additional information.

Источник питания - это электронное устройство, которое подает электрическую энергию на электрическую нагрузку. Основной функцией источника питания является преобразование одной формы электрической энергии в другую. В результате их иногда называют преобразователями электроэнергии. Выберите ссылку для получения дополнительной информации.



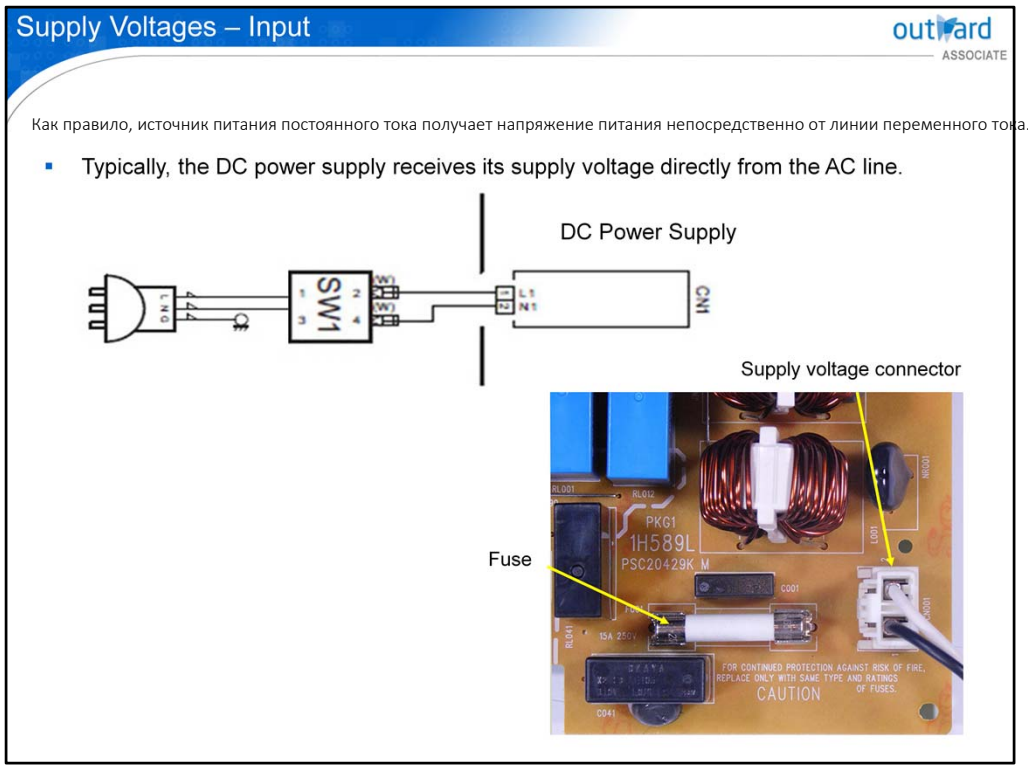
Shown here are the basic components of a switch-mode regulated DC power supply. As mentioned previously, power supplies of this type are typically used in Konica Minolta MFPs. Compared to linear units, these types of units can typically operate with the use of a smaller transformer and smaller regulating semiconductor components. As a result, these types of power supplies are normally lighter and cooler to operate, and thus more efficient and suitable for MFP use. Select the link for additional information.

Здесь показаны основные компоненты импульсного источника постоянного тока. Как упоминалось ранее, источники питания этого типа обычно используются в МФУ Konica Minolta. По сравнению с линейными блоками эти типы блоков обычно могут работать с использованием меньшего трансформатора и меньших регулирующих полупроводниковых компонентов. В результате эти типы блоков питания обычно легче и холоднее в эксплуатации, и, следовательно, более эффективны и пригодны для использования МФУ. Выберите ссылку для получения дополнительной информации.



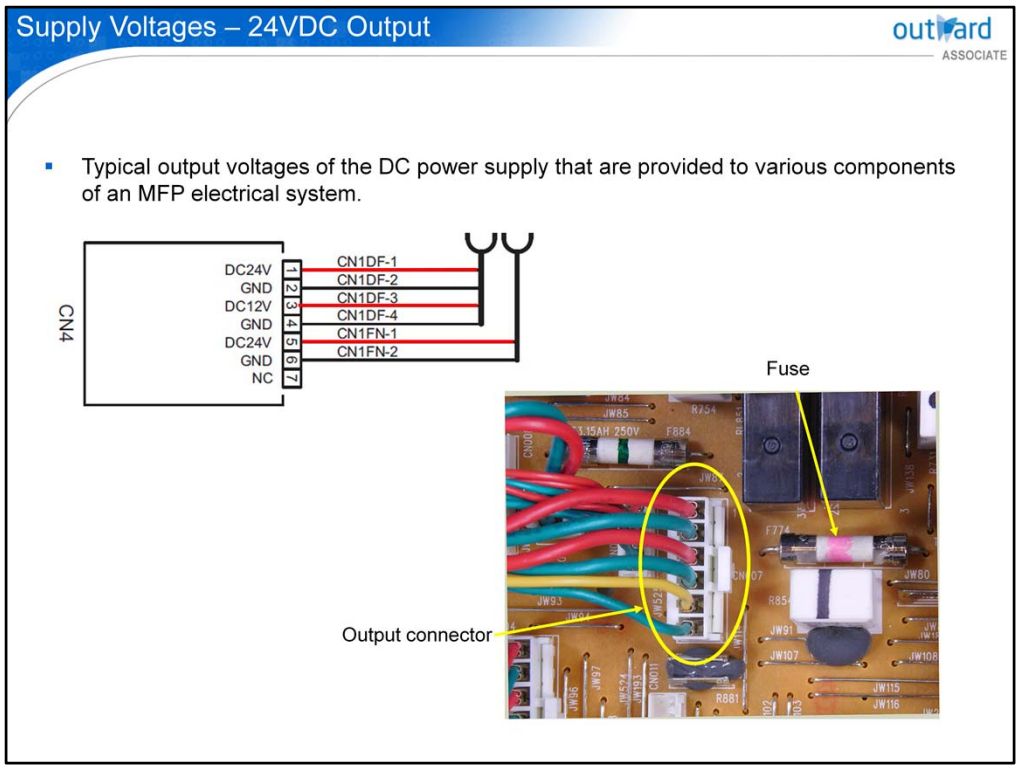
The integrated circuits, or ICs, within MFPs require DC power supplies to provide a well-regulated DC voltage of fixed magnitude for their proper operation. These MFPs typically require converted output voltages of 5Vdc, 12Vdc, and 24Vdc to provide power to their various electrical components. Regarding these output voltages, 5Vdc is typically provided for logic circuits, sensors, and switches; 12Vdc for analogue circuits; and 24Vdc for motors, solenoids, clutches, or similar components.

Интегральные схемы, или интегральные схемы, в МФУ требуют источников питания постоянного тока, чтобы обеспечить хорошо регулируемое напряжение постоянного тока фиксированной величины для их правильной работы. Эти МФУ обычно требуют преобразованных выходных напряжений 5 В, 12 В и 24 В постоянного тока для подачи питания на их различные электрические компоненты. Что касается этих выходных напряжений, 5 В пост. Тока обычно предоставляется для логических схем, датчиков и переключателей; 12 В постоянного тока для аналоговых цепей; и 24 В постоянного тока для двигателей, соленоидов, сцеплений или аналогичных компонентов.



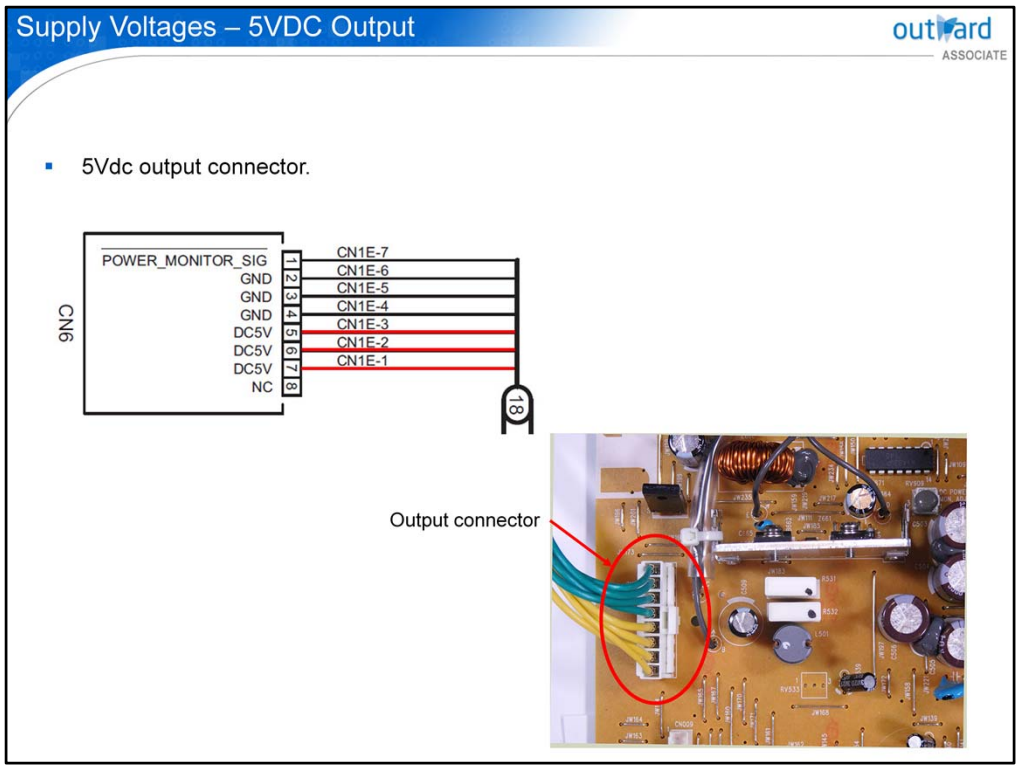
Several components convert the AC line input into the DC voltage that the MFP requires. Pictured are the supply voltage connector, safety fuse, and some of the components that perform this task.

Несколько компонентов преобразуют линейный вход переменного тока в постоянное напряжение, необходимое для МФП. На рисунке изображены разъем питания, предохранитель и некоторые компоненты, которые выполняют эту задачу.

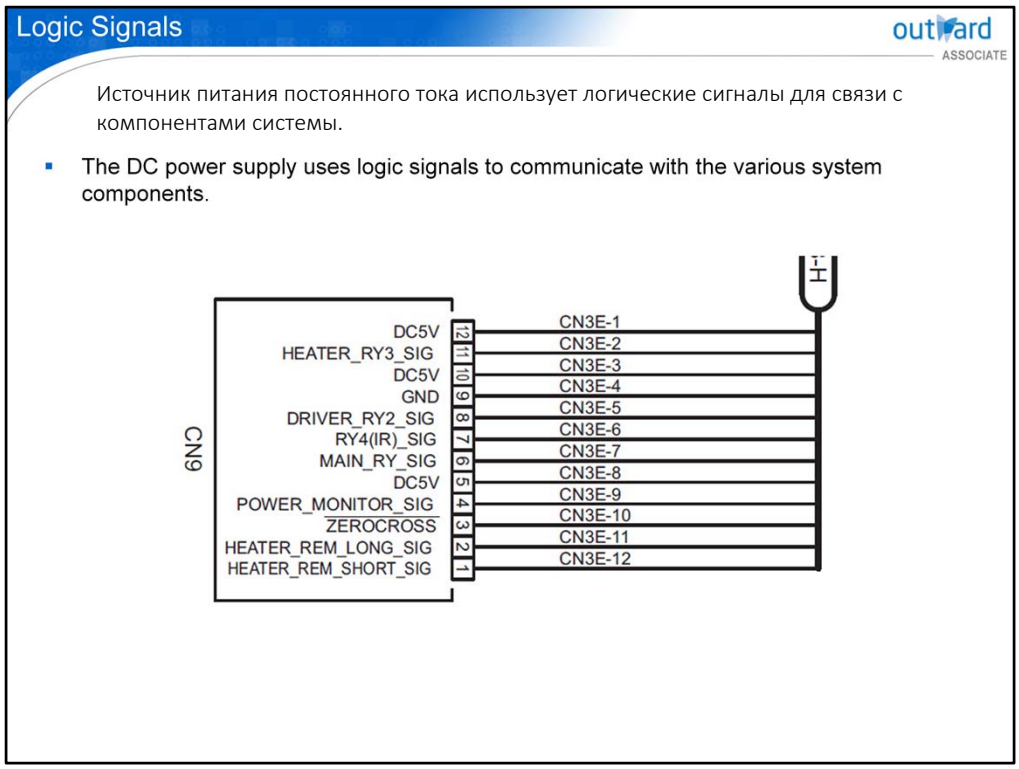


As mentioned previously, the purpose for DC power supplies is to provide a constant DC voltage to its load. In particular regarding MFP systems, this load would include integrated circuit boards consisting of many components, such as IC chips. These IC chips are used extensively in a logic circuitry. Pictured here is a typical 24Vdc, 12Vdc output connector and circuit protection fuses. Typically, the larger wires represent the 24Vdc lines; the smaller wires represent the 12Vdc lines. The wire colors can vary from MFP to MFP.

Как упоминалось ранее, целью источников питания постоянного тока является обеспечение постоянного напряжения постоянного тока для его нагрузки. В частности, что касается систем MFP, эта нагрузка будет включать в себя интегральные платы, состоящие из множества компонентов, таких как микросхемы. Эти микросхемы широко используются в логических схемах. Здесь изображен типовой выходной разъем 24 В постоянного тока, 12 В постоянного тока и предохранители цепи защиты. Как правило, более крупные провода представляют линии 24 В пост. меньшие провода представляют линии 12 В пост. Цвет провода может варьироваться от МФУ к МФУ.

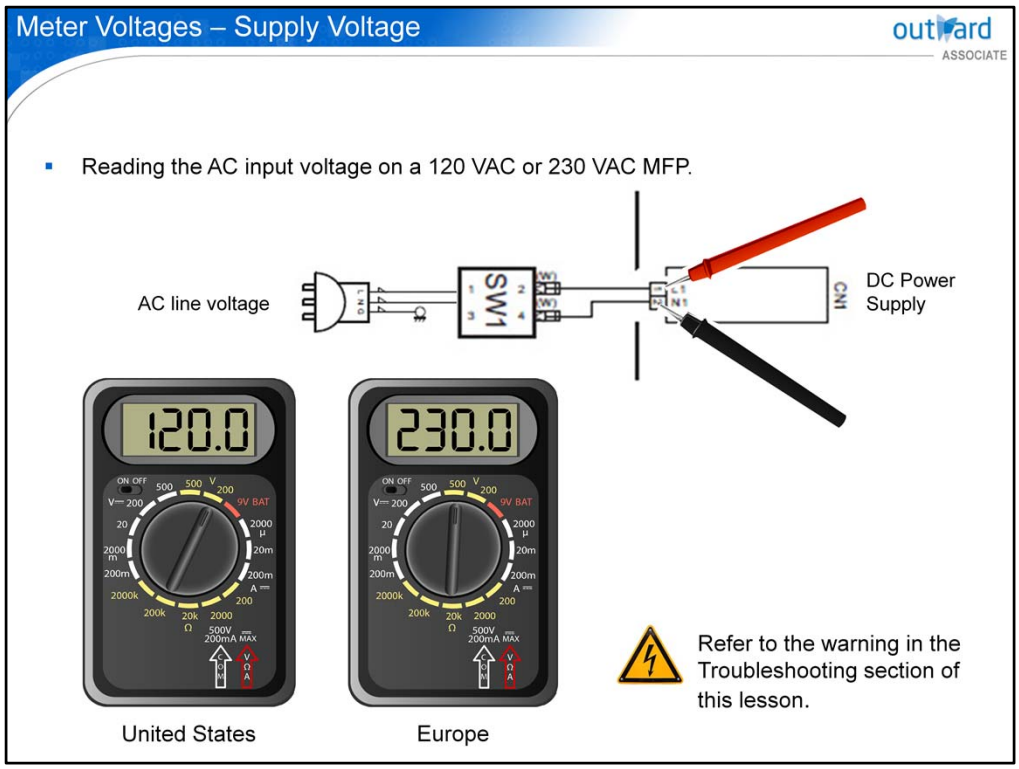


Pictured here is a typical 5Vdc output connector.



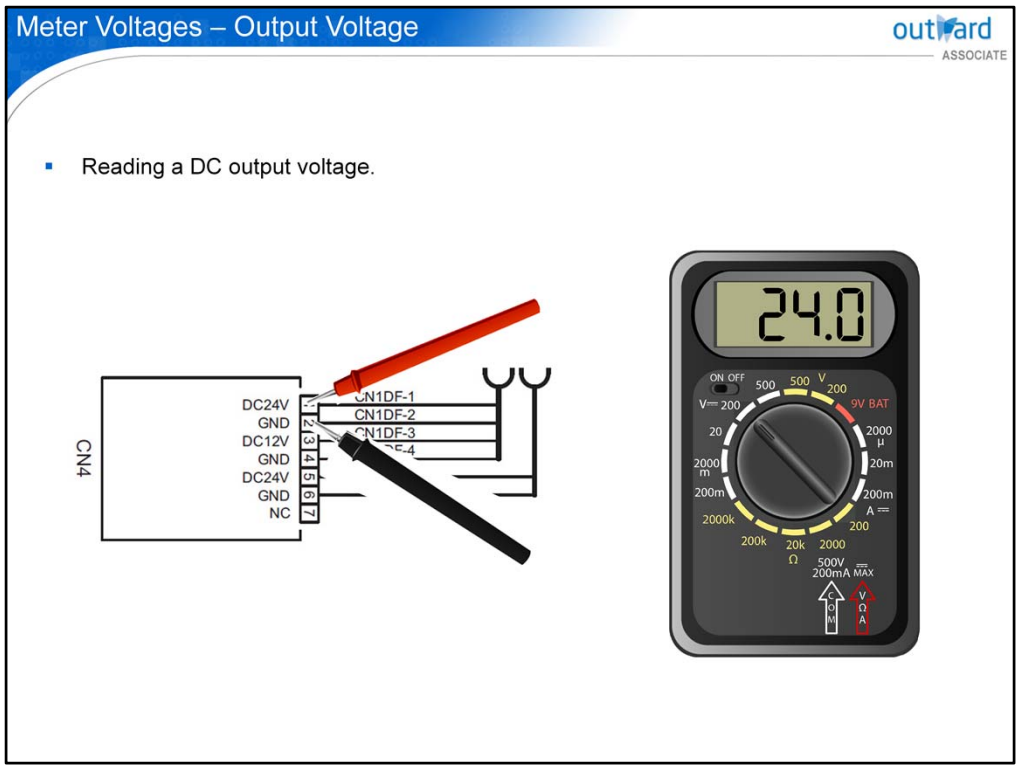
The DC power supply uses logic signals to communicate with the various system components, and to receive control signals from the MFP control board.
Provided here is an example of the logic signals of CN9 on a typical DC power supply board. In this example, these logic signals are exchanged between the MFP board, DC power supply, and fusing unit. By this process, it is possible to turn ON and OFF, and to monitor statuses of the fusing unit.

Источник питания постоянного тока использует логические сигналы для связи с различными компонентами системы и для получения сигналов управления от платы управления MFP.
Здесь представлен пример логических сигналов CN9 на типовой плате источника постоянного тока. В этом примере эти логические сигналы передаются между платой MFP, источником питания постоянного тока и блоком термозакрепления.
Благодаря этому процессу можно включать и выключать, а также контролировать состояние блока термозакрепления.



To check the AC voltage on 120 VAC MFPs, first turn the meter dial to 200 VAC as identified in this scenario. Then insert the red meter lead into the L1 pin and the black meter lead into the N1 pin of the input connector. You should get a reading of 120 VAC. If a 0 VAC reading is obtained, the issue is located before the DC power supply. For checking the AC voltage on 230 VAC MFPs, first select 500 VAC on the meter as identified in this scenario, then follow the same procedure.
Note: Meters vary from model to model, thus the value range selections that other meters provide, may differ from what is shown here in this example. When taking readings of a circuit, select the next higher value on the dial than the value of the circuit that you are measuring. This note also applies to the remaining meter reading topics provided within this course.

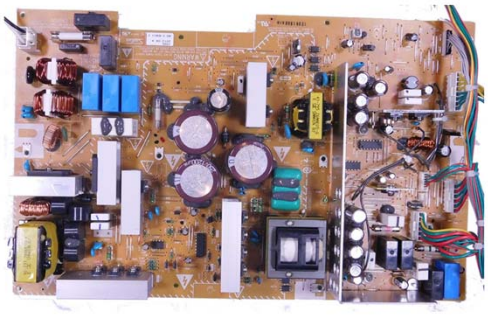
Чтобы проверить напряжение переменного тока на МФУ 120 В переменного тока, сначала поверните шкалу счетчика на 200 В переменного тока, как указано в этом сценарии. Затем вставьте красный измерительный провод в контакт L1, а черный измерительный провод - в контакт N1 входного разъема. Вы должны получить показание 120 В переменного тока. Если получено значение 0 В переменного тока, проблема находится перед источником питания постоянного тока. Для проверки напряжения переменного тока на 230 MAC MFP сначала выберите 500 VAC на счетчике, как указано в этом сценарии, а затем выполните ту же процедуру.
Примечание. Метры варьируются от модели к модели, поэтому выбор диапазона значений, предоставляемый другими счетчиками, может отличаться от показанного здесь в этом примере. При съемке показаний цепи выберите на шкале следующее более высокое значение, чем значение измеряемой цепи. Это примечание также относится к остальным темам чтения счетчиков, приведенным в этом курсе.



Provided here is an example on how to check the output from a DC power supply board. We will check the 24Vdc pin in this scenario. First, using the dial on the meter, select the 200Vdc range as identified in this scenario. Then insert the black negative meter lead into the Ground, or GND, pin, and then the red positive lead into the DC24V pin. The meter should read 24Vdc.

Здесь приведен пример проверки выхода платы питания постоянного тока. В этом сценарии мы проверим вывод 24 В пост. Сначала с помощью шкалы на измерителе выберите диапазон 200 В постоянного тока, как указано в этом сценарии. Затем вставьте черный отрицательный провод измерителя в контакт заземления или GND, а затем красный положительный провод в вывод DC24V. Счетчик должен показывать 24 В пост.

- The way to troubleshoot a DC power supply is to:
  1) Disconnect the machine line cord from the wall outlet.
  2) Unplug all connectors from the DC power supply, except the AC supply input.
  3) Turn the machine ON after plugging the line cord in.

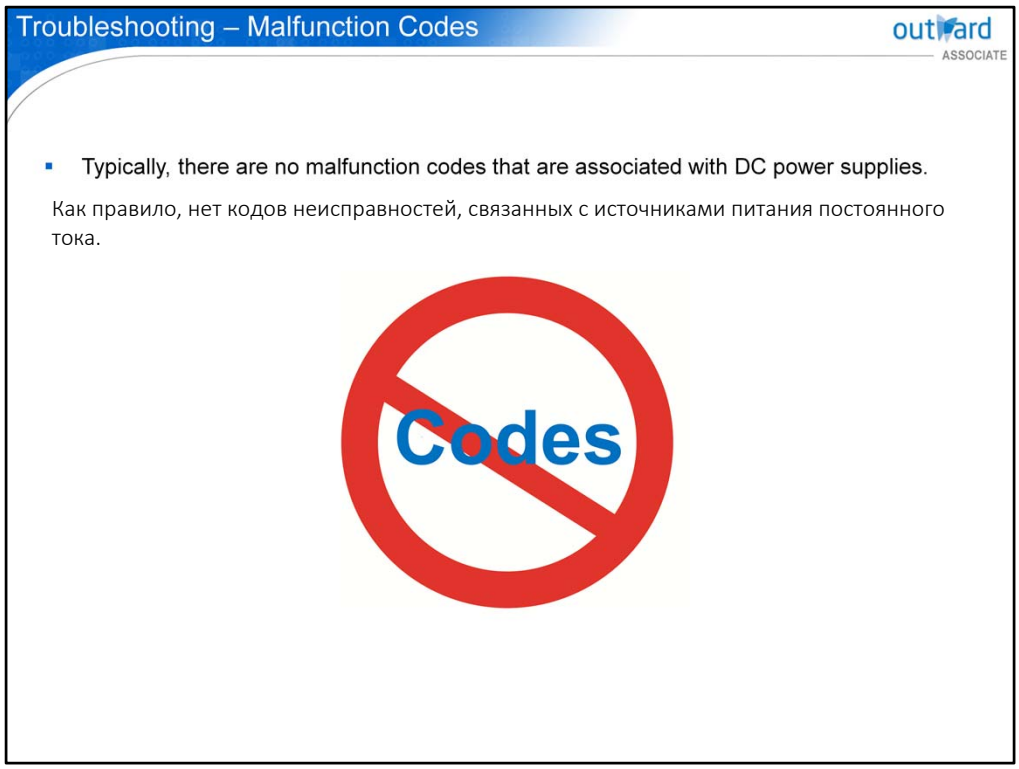


  4) Place the negative meter lead on one of the ground pins of the DC power supply. Place the positive meter lead on any of the DC supply voltage pins that are in question. Is the suspect voltage present?
  5) If the suspect voltage is present, then plug in one connector at a time until the power is no longer present. This connector may have a possible shorted component or wiring affecting the DC power supply.

Способ устранения неполадок постоянного тока
Поставка для:
1) Отсоедините сетевой шнур от стенной розетки.
2) Отсоедините все разъемы от источника постоянного тока, кроме входа переменного тока.
3) Включите аппарат после подключения сетевого шнура.
4) Поместите отрицательный провод измерителя на один из выводов заземления источника питания постоянного тока. Поместите положительный провод измерителя на любой из рассматриваемых контактов напряжения питания постоянного тока. Подозрительное напряжение присутствует?
5) Если подозрительное напряжение присутствует, подключайте один разъем за раз, пока не исчезнет питание. Этот разъем может иметь возможный закороченный компонент или проводку, влияющую на источник питания постоянного тока.

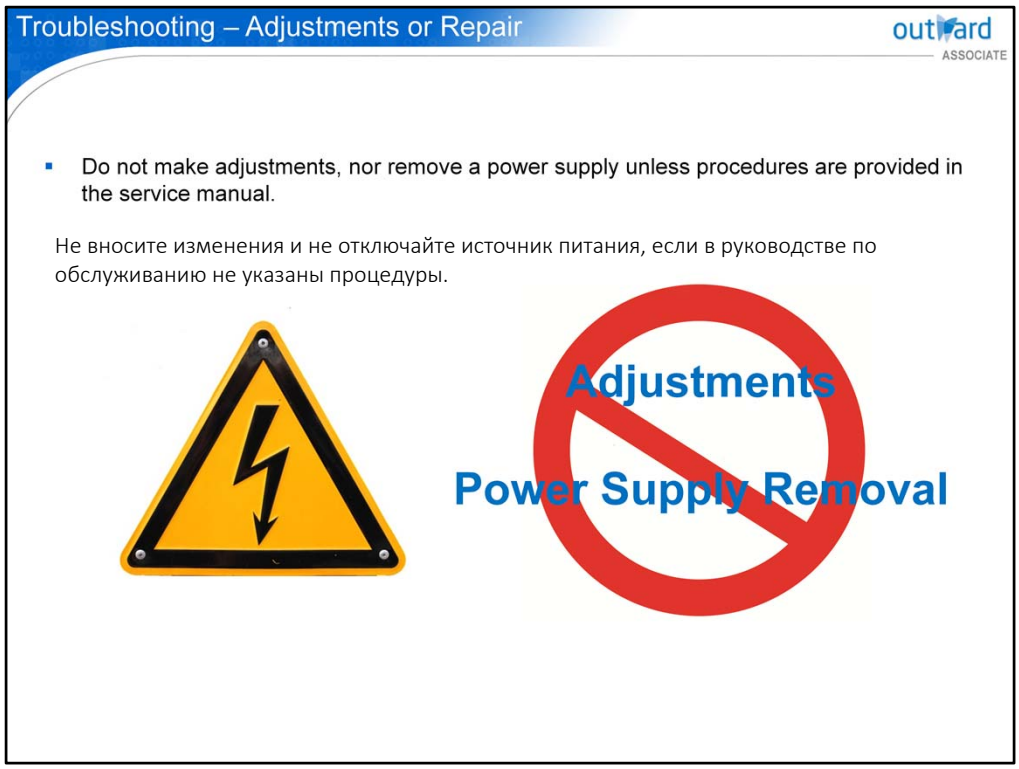
While troubleshooting a DC power supply, exercise caution. Do not short two adjoining pins together when taking readings at the connector pins, while the connectors are removed. Shorting two pins together will most likely damage the power supply and possibly the meter as well. You should reference the wiring diagram for the circuit that you are troubleshooting.
For details, look at the provided procedure.

При поиске неисправностей источника питания постоянного тока соблюдайте осторожность. Не закорачивайте два смежных штырька вместе, снимая показания на штырьках разъема, пока разъемы удалены. Замыкание двух контактов вместе, скорее всего, повредит источник питания и, возможно, счетчик. Вы должны обратиться к электрической схеме для цепи, которую вы устраняете.
Для получения подробной информации, посмотрите на предоставленную процедуру.

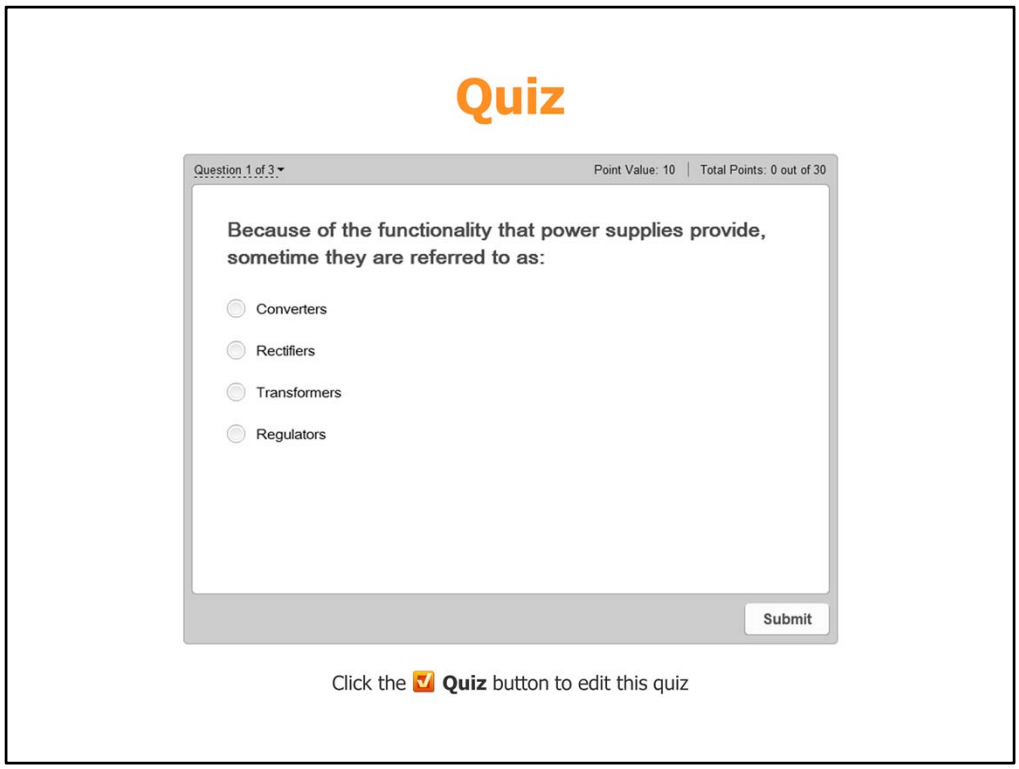


In most machines, there are no specific malfunction codes that inform a technician that a problem with the low-voltage DC power supply exists. However, any problems with this unit can cause a wide range of issues with the MFP. For example, loss of power to the MFPB would affect the ability of the control board to power and monitor system components, such as motors, sensors, and clutches. The operation of peripherals, such as a document feeder, could be affected as well if the problem area on the power supply unit involves these components.

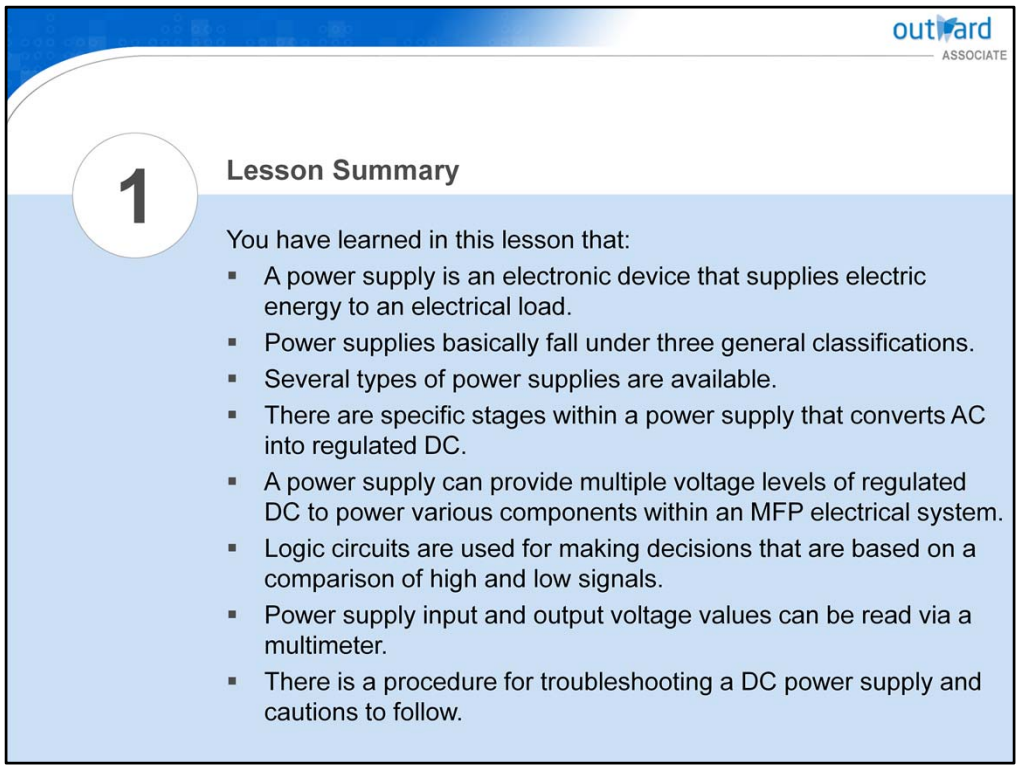
В большинстве машин отсутствуют специальные коды неисправностей, которые информируют специалиста о наличии проблемы с источником питания постоянного тока низкого напряжения. Однако любые проблемы с этим устройством могут вызвать широкий спектр проблем с МФП. Например, потеря питания на MFPB будет влиять на способность платы управления питать и контролировать компоненты системы, такие как двигатели, датчики и сцепления. На работу периферийных устройств, таких как устройство подачи документов, также может повлиять, если проблемная область на блоке питания включает эти компоненты.



If there are any potentiometers, or variable resistors, on the board, they should not be adjusted unless these adjustments are documented in the service manual. All adjustments are performed at the factory and therefore further adjustments are not necessary. Any change from the factory adjustments may cause erratic machine performance.
WARNING: Because of the high-voltages present, technicians should not attempt to make on-sight repairs to power supplies at the component level. The only exception is to replace a line fuse that protects a circuit, unless explicit directions are provided within the applicable service manual. Even when the MFP is unplugged, power supplies can retain dangerous voltages, such as from capacitors for example. Such repairs are normally beyond the scope of field service. Also, any attempt to repair the board could void any warranty as well as damage the circuitry beyond repair.
Если на плате есть какие-либо потенциометры или переменные резисторы, их не следует регулировать, если эти настройки не задокументированы в руководстве по обслуживанию. Все регулировки выполняются на заводе, поэтому дальнейшие настройки не требуются. Любое изменение заводских настроек может привести к нестабильной работе машины.
ПРЕДУПРЕЖДЕНИЕ. Из-за высокого напряжения технические специалисты не должны пытаться проводить ремонт источников питания на уровне компонентов на месте. Единственным исключением является замена сетевого предохранителя, защищающего цепь, если в соответствующем руководстве по обслуживанию не указаны явные указания. Даже когда МФП отключен, источники питания могут сохранять опасные напряжения, например, от конденсаторов. Такой ремонт обычно выходит за рамки полевого обслуживания. Кроме того, любая попытка отремонтировать плату может привести к аннулированию гарантии, а также к повреждению схемы без возможности ремонта.



To verify your understanding of the lesson, take this quiz.



Provided here is a summary of the topics that you learned about in this lesson.

На этом уроке вы узнали, что:

■ Источник питания - это электронное устройство, которое подает электрическую энергию на электрическую нагрузку.

* Источники питания в основном подпадают под три основные классификации.

■ Доступны несколько типов источников питания.

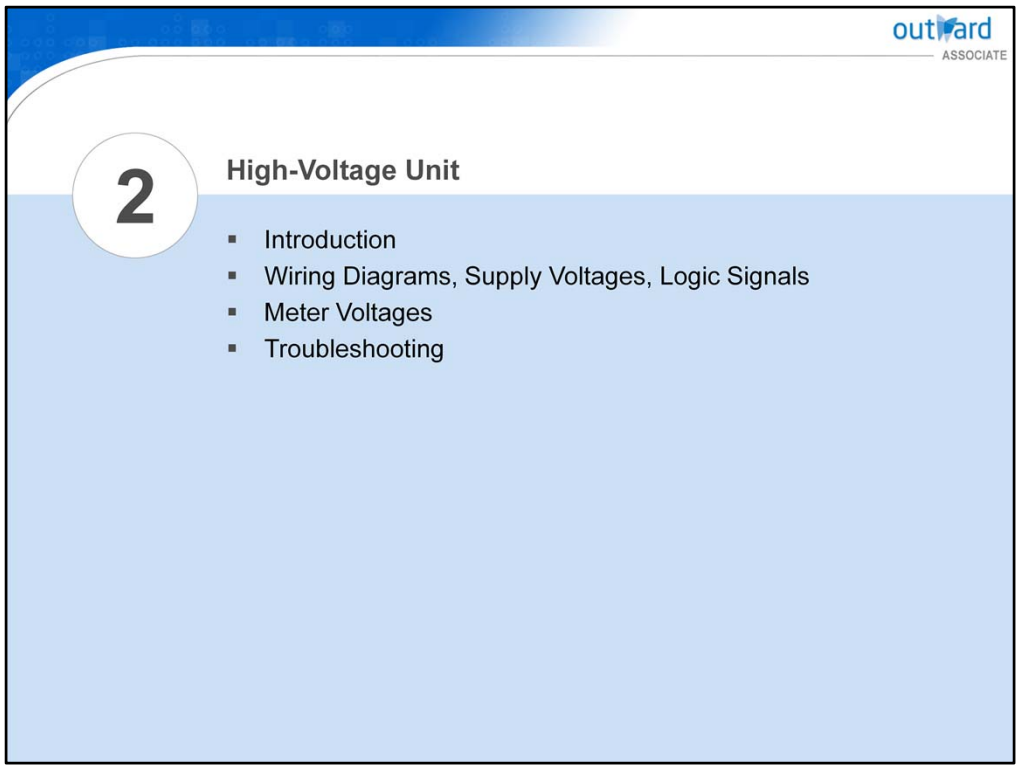
■ В источнике питания есть определенные ступени, которые преобразуют переменный ток в регулируемый постоянный ток.

■ Источник питания может обеспечивать несколько уровней напряжения постоянного тока для питания различных компонентов в электрической системе МФП.

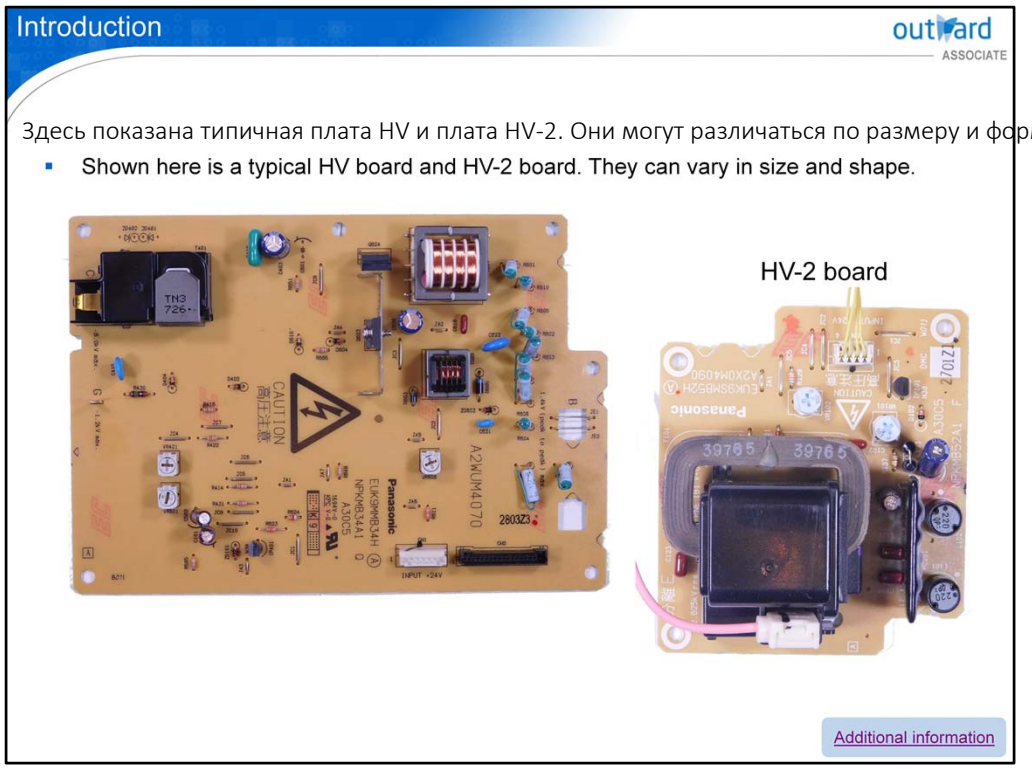
■ Логические схемы используются для принятия решений, основанных на сравнении высоких и низких сигналов.

■ Значения входного и выходного напряжения источника питания можно прочитать с помощью мультиметра.

■ Существует процедура устранения неполадок источника питания постоянного тока и предостережения, которым необходимо следовать.

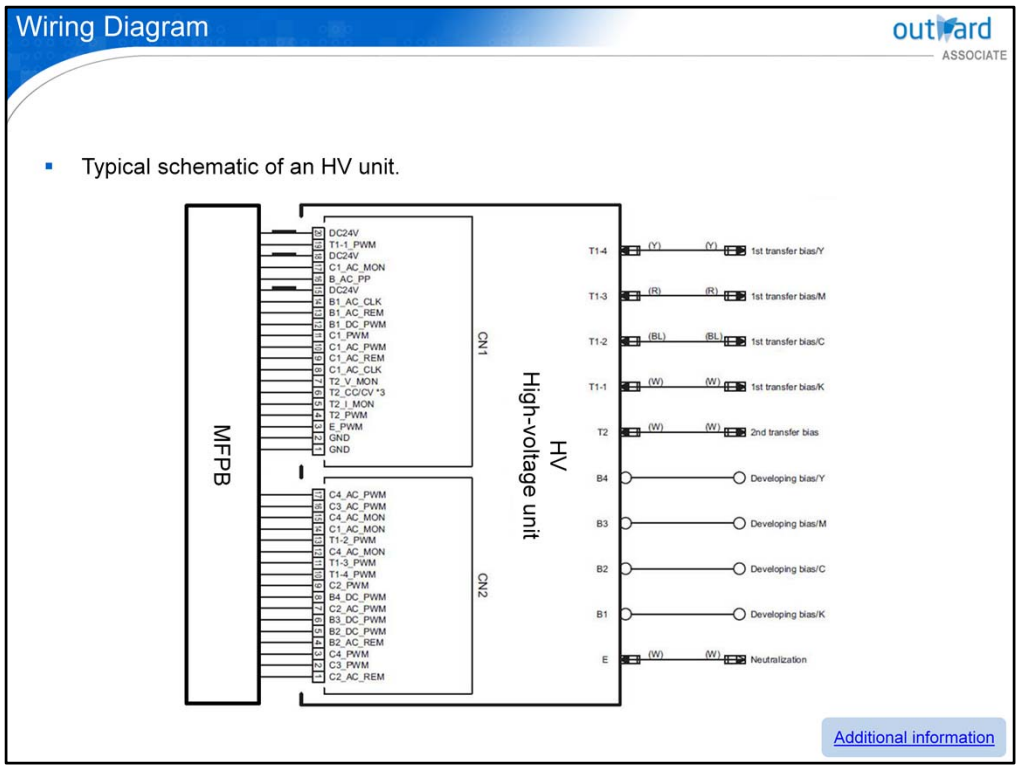


Welcome to Lesson 2, High-voltage Unit. Within this lesson, you will first be provided with an overview regarding the purpose of high-voltage, or HV, units within the Konica Minolta MFPs. This overview will be followed up by an explanation of the basic functionality of these units. A typical wiring diagram of the high-voltage unit will then be provided to identify the on-board connector pin-outs and the outputs that this unit provides. You will then be shown the supply voltage and the typical logic signals that are associated with the HV units. You will then see how to check the input and output voltage levels of the high-voltage unit board using a meter. And lastly, you will be provided with information regarding troubleshooting safety, disassembly and reassembly, adjustments, codes, and troubleshooting tips.
Добро пожаловать на Урок 2, Высоковольтное устройство. В рамках этого урока вам сначала будет предоставлен обзор относительно назначения высоковольтных или высоковольтных устройств в МФУ Konica Minolta. Этот обзор будет сопровождаться объяснением основных функций этих устройств. Затем будет предоставлена типовая схема подключения высоковольтного устройства для идентификации выводов встроенного разъема и выходов, которые обеспечивает этот модуль. Затем вам будет показано напряжение питания и типичные логические сигналы, которые связаны с высоковольтными блоками. Затем вы увидите, как проверить уровни входного и выходного напряжения на плате высоковольтного блока с помощью счетчика. И, наконец, вам будет предоставлена информация, касающаяся безопасности при устранении неполадок, разборки и повторной сборки, настроек, кодов и советов по устранению неполадок.



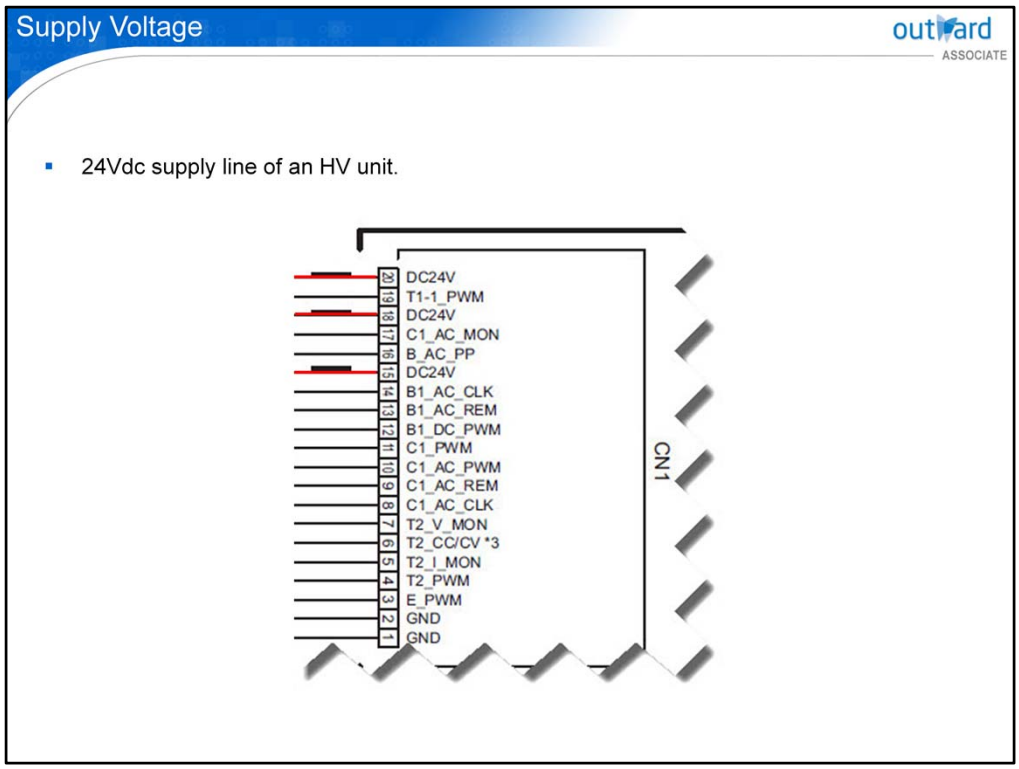
The HV unit within many MFPs today typically supplies voltage for the first transfer belt bias, second transfer belt bias, and developing bias circuits. The high-voltage unit may also provide a signal to neutralize the bias voltages that are applied to these components in preparation for the next copy cycle. This unit also provides power to the photoconductor section, and inverters for the scanner lamp and LCD backlight of the operation panel. Also, some classes of MFPs may require more than one HV unit, which is based on the demand of the system. Select the link for additional information.

Блок ВН во многих МФУ сегодня обычно требует напряжения для передачи первого ремня, для передачи второго ремня и для разрабатываемых цепей. Высоковольтный блок также может обеспечить сигнал для нейтрализации напряжений Это устройство также обеспечивает питание фотобарабанов и инверторов для ламп сканера и подсветки. Кроме того, МФУ может требовать более одного блока HV, который основан на системе требований. Выберите ссылку для получения дополнительной информации.



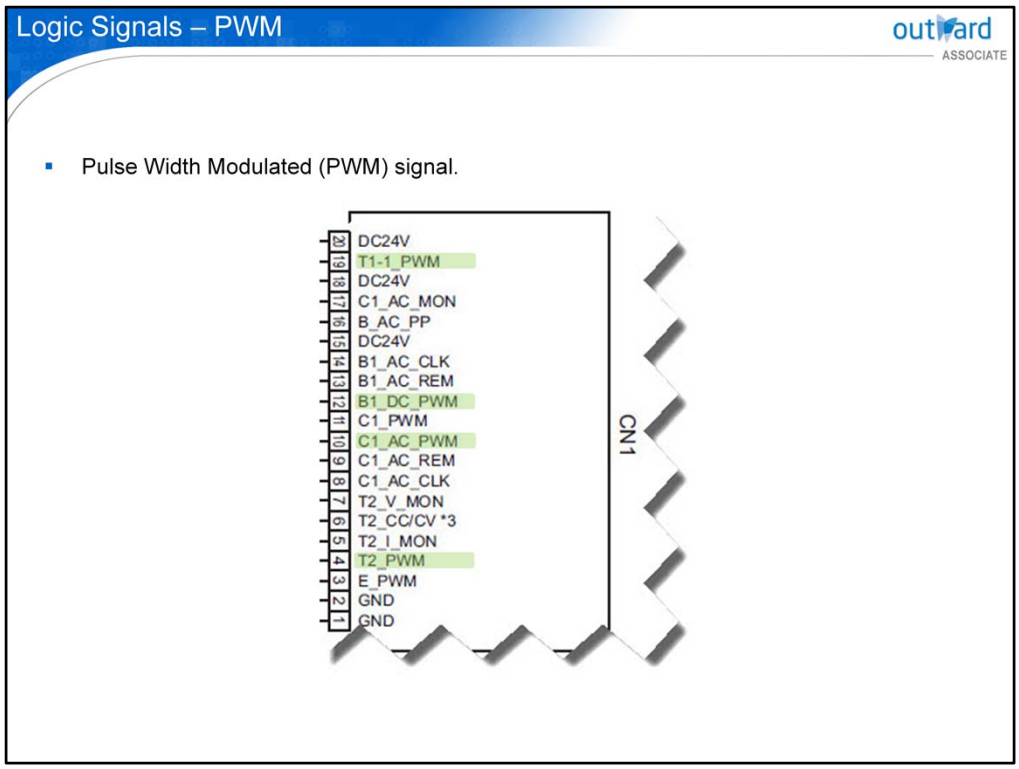
Provided here is a typical schematic of the HV unit. The MFP board provides the supply voltage and control to the HV unit. In turn, the HV unit converts these voltage levels into the levels needed by the various components that it supports. These converted voltage levels include the transfer and developing bias voltages. Select the link for additional information.

Здесь представлена типичная схема высоковольтного блока. Плата MFP обеспечивает напряжение питания и управление для высоковольтного блока. В свою очередь, высоковольтный блок преобразует эти уровни напряжения в уровни, необходимые различным компонентам, которые он поддерживает. Эти преобразованные уровни напряжения включают в себя напряжение передачи и развивающееся напряжение смещения. Выберите ссылку для получения дополнительной информации.



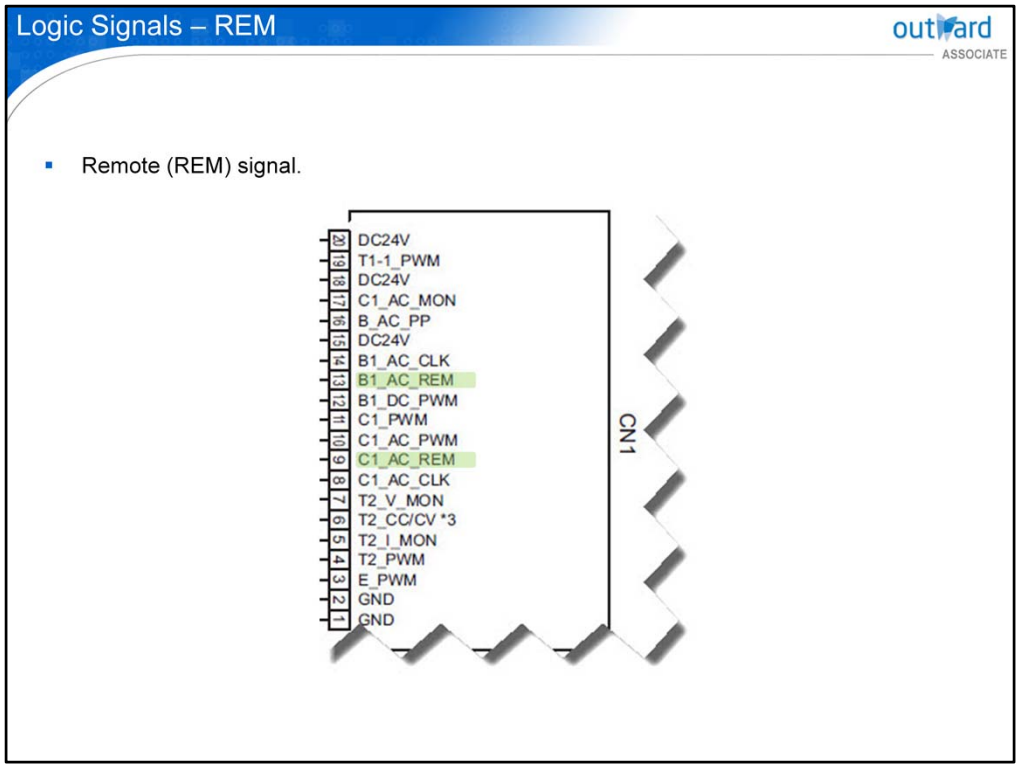
Shown here at connector 1 of the HV unit are the 24Vdc supply lines that power and enable the HV unit to perform its functions.

Здесь в разъеме 1 высоковольтного блока показаны линии питания 24 В постоянного тока, которые питают и позволяют высоковольтному блоку выполнять свои функции.



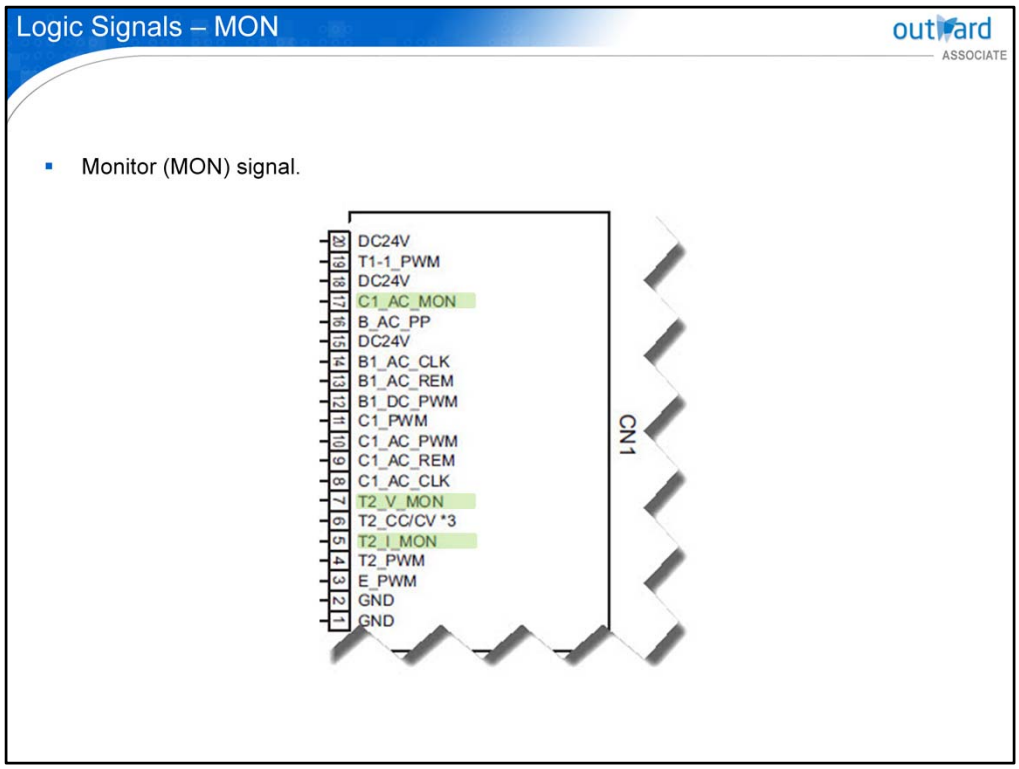
Shown here are examples of Pulse Width Modulated, or PWM, signals. The HV unit uses these signals to adjust the voltage and current levels of the various components that it supports. Via monitoring signals that are exchanged between the supported components and the MFPB, the PWM signals are adjusted to meet the voltage demands of the operation.
These PWM signals regulate both AC and DC values which are processed by the HV unit. This regulation process ensures that enough toner is transferred during the printing process via developing and transfer bias levels.
Depending on the manufacturer of the HV unit, these details may differ.

Здесь показаны примеры сигналов с широтно-импульсной модуляцией или ШИМ. Блок HV использует эти сигналы для регулировки уровней напряжения и тока различных компонентов, которые он поддерживает. Посредством сигналов контроля, которыми обмениваются поддерживаемые компоненты и MFPB, сигналы ШИМ настраиваются в соответствии с требованиями напряжения работы. Эти ШИМ-сигналы регулируют значения как переменного, так и постоянного тока, которые обрабатываются устройством HV. Этот процесс регулирования обеспечивает передачу достаточного количества тонера в процессе печати через уровни смещения и передачи. В зависимости от производителя блока HV эти данные могут отличаться.



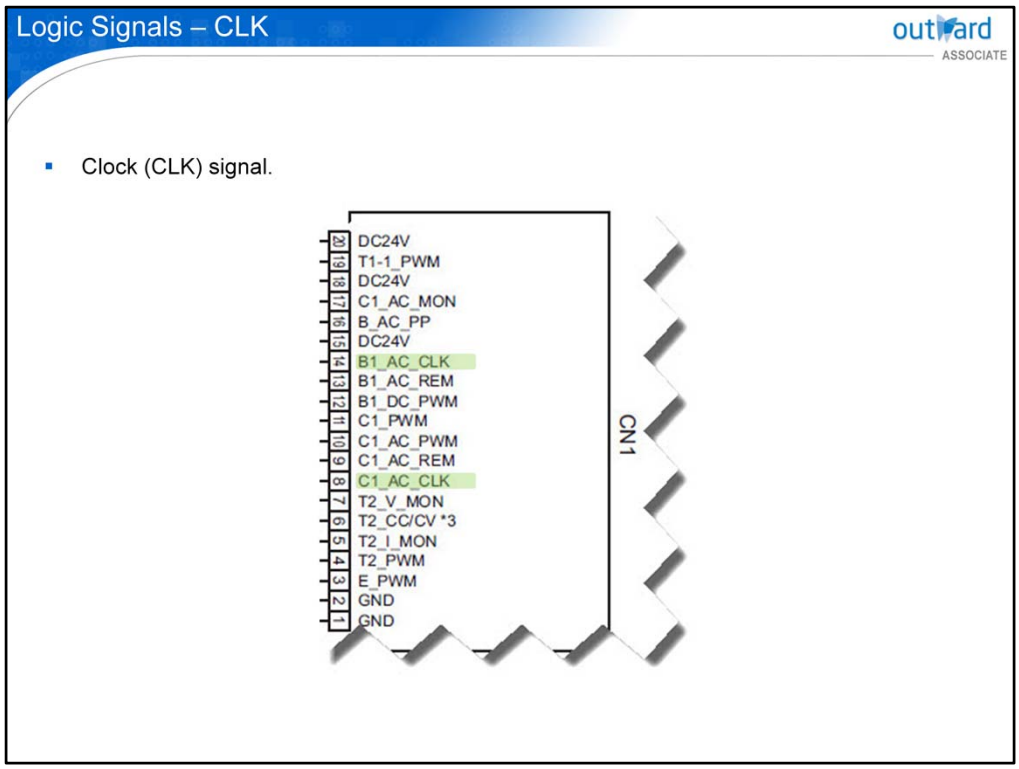
The Remote, or REM, signal is used to turn ON or OFF specific areas or functionality of the HV unit. In this case, this signal is used to turn ON or OFF the AC input, which is based on the needs of the component.
Again, these details may differ depending on the manufacturer of this unit

Сигнал Remote, или REM, используется для включения или выключения определенных областей или функций высоковольтного блока. В этом случае этот сигнал используется для включения или выключения входа переменного тока, который основан на потребностях компонента. Опять же, эти детали могут отличаться в зависимости от производителя данного устройства



The MFPB uses the monitor, or MON, signal to detect the conditions of the HV unit and the components that it is servicing. Based on these signals, components, AC and DC levels, and other values are either adjusted or turned ON or OFF in support of operating conditions.
Again, these details may differ depending on the manufacturer of this unit.

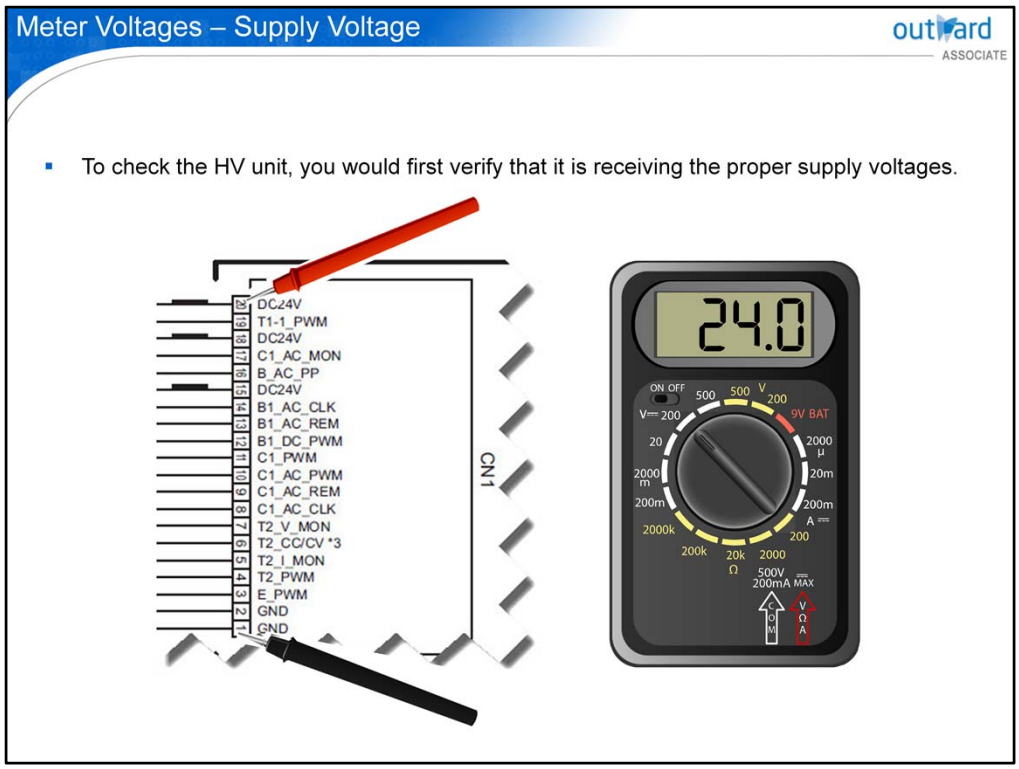
MFPB использует сигнал монитора или MON для определения состояния высоковольтного блока и компонентов, которые он обслуживает. На основе этих сигналов компоненты, уровни переменного и постоянного тока и другие значения либо настраиваются, либо включаются или выключаются в соответствии с условиями эксплуатации.
Опять же, эти детали могут отличаться в зависимости от производителя данного устройства.



The control processor of the MFPB provides a pulse-generated input for the Clock, or CLK, signal. This signal is used for timing or synchronizing purposes in digital circuits. Thus, the sequence and timing of the logic signals discussed in this lesson are controlled by this signal. In this case, the CLK signal controls the ON and OFF timing of the REM signal.

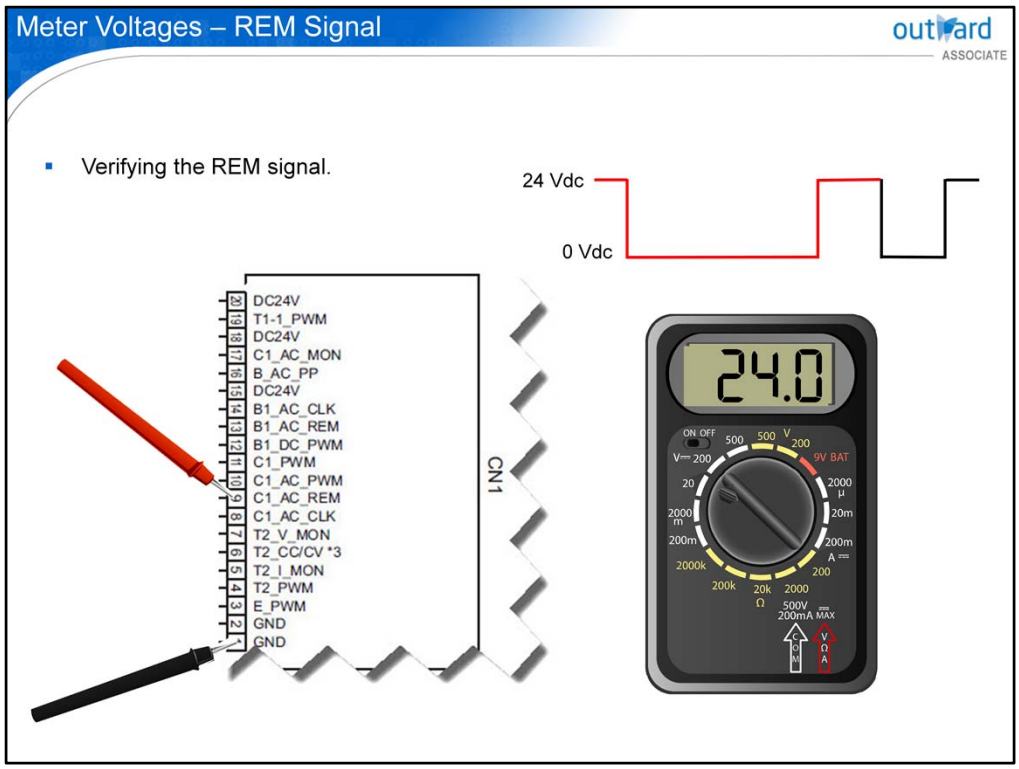
Again, these details may differ depending on the manufacturer of this unit.

Управляющий процессор MFPB обеспечивает генерируемый импульсом вход для сигнала синхронизации или CLK. Этот сигнал используется для синхронизации или синхронизации в цифровых цепях. Таким образом, последовательность и синхронизация логических сигналов, обсуждаемых в этом уроке, управляются этим сигналом. В этом случае сигнал CLK контролирует время включения и выключения сигнала REM.



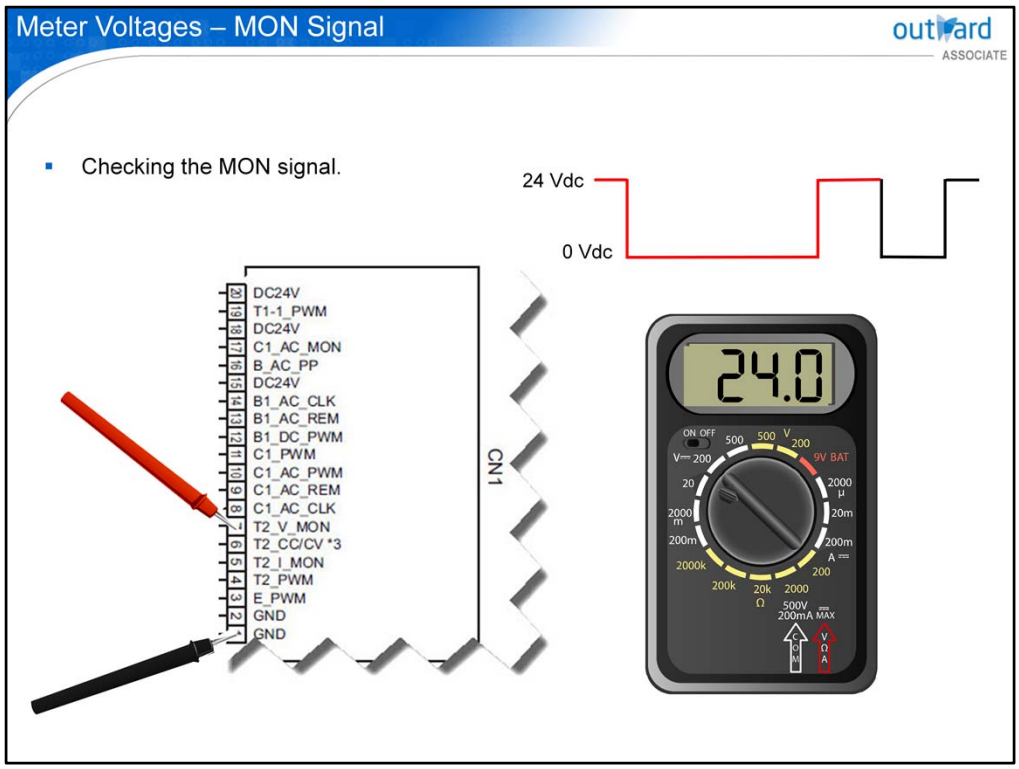
To check the HV unit, first verify that it is receiving the proper supply voltages. To verify the voltages, measure across the 24Vdc and the ground being supplied to the unit, in this case pins 1 and 20. With the machine turned ON, all machine covers closed, and there are no paper jams or malfunctions, the meter should read 24Vdc between these pins. The same checks would be made at any other 24Vdc pins as well, in this case, pins 18 and 15.

Чтобы проверить высоковольтный блок, сначала убедитесь, что он получает правильное напряжение питания. Чтобы проверить напряжение, измерьте напряжение 24 В пост. Тока и заземление, подаваемое на устройство, в этом случае контакты 1 и 20. Когда машина включена, все крышки машины закрыты, и нет застревания бумаги или неисправностей, счетчик должен прочитать 24 В постоянного тока между этими контактами. Те же проверки будут выполняться и на любых других контактах 24 В пост. Тока, в данном случае на контактах 18 и 15.



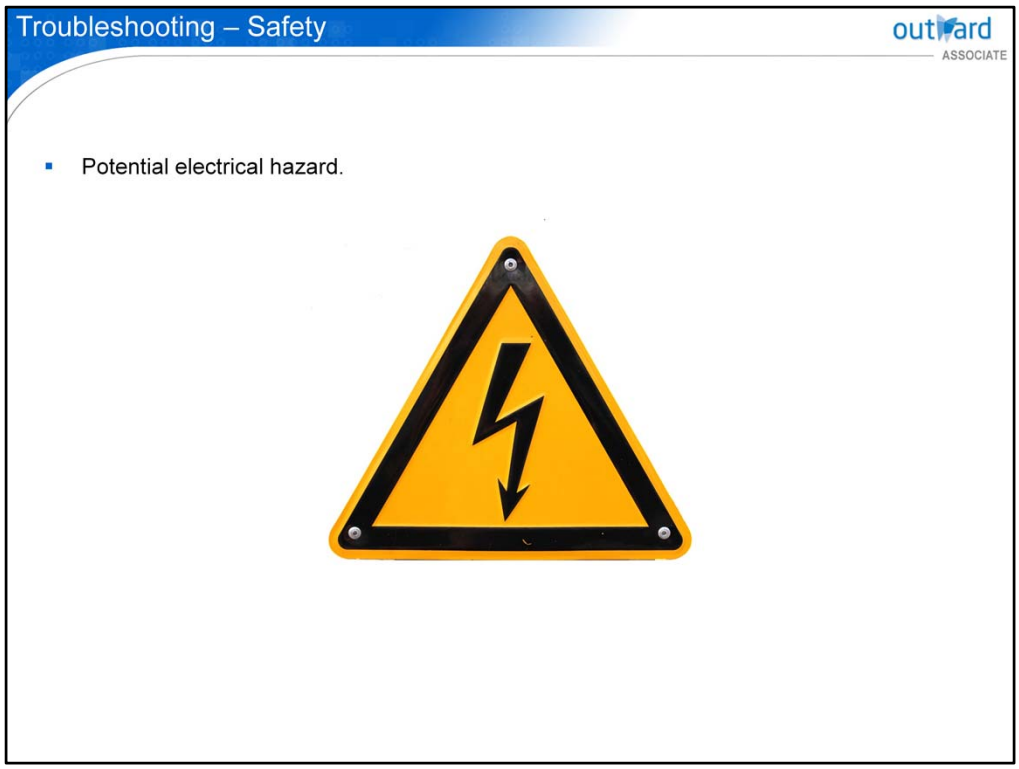
Next, verify the REM signal. Place the negative meter lead at GND and the positive meter lead at C1_AC_REM. The initial rest state is a high of approximately 24Vdc, then switching to a low at near zero.

Затем проверьте сигнал REM. Поместите отрицательный вывод измерителя в GND, а положительный вывод измерителя в C1_AC_REM. Начальное состояние покоя составляет максимум около 24 В пост. Тока, затем переключается на низкий уровень около нуля.



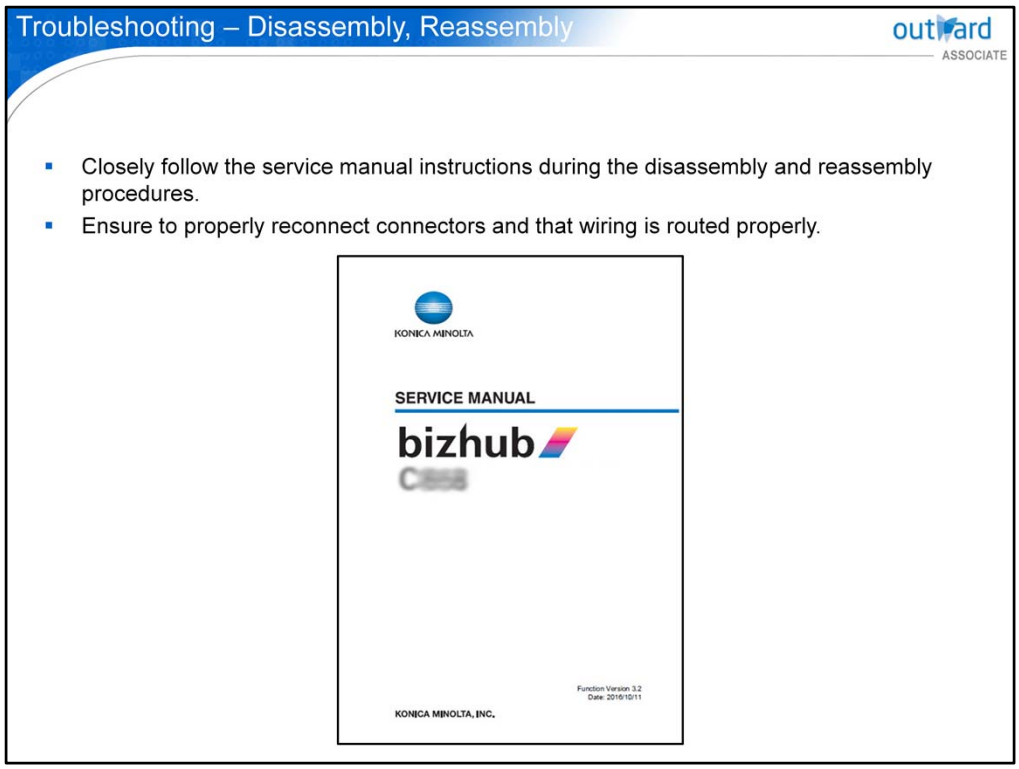
Next, check the MON signal by placing the positive meter lead on the T2_V_MON pin, in this case, and the negative meter lead on GND. Values will vary depending on the component being monitored; however, this signal provides the MFPB with the status of the component.

Затем проверьте сигнал MON, поместив положительный вывод измерителя на вывод T2_V_MON, в данном случае, и отрицательный вывод измерителя на GND. Значения будут варьироваться в зависимости от отслеживаемого компонента; однако этот сигнал предоставляет MFPB статус компонента.



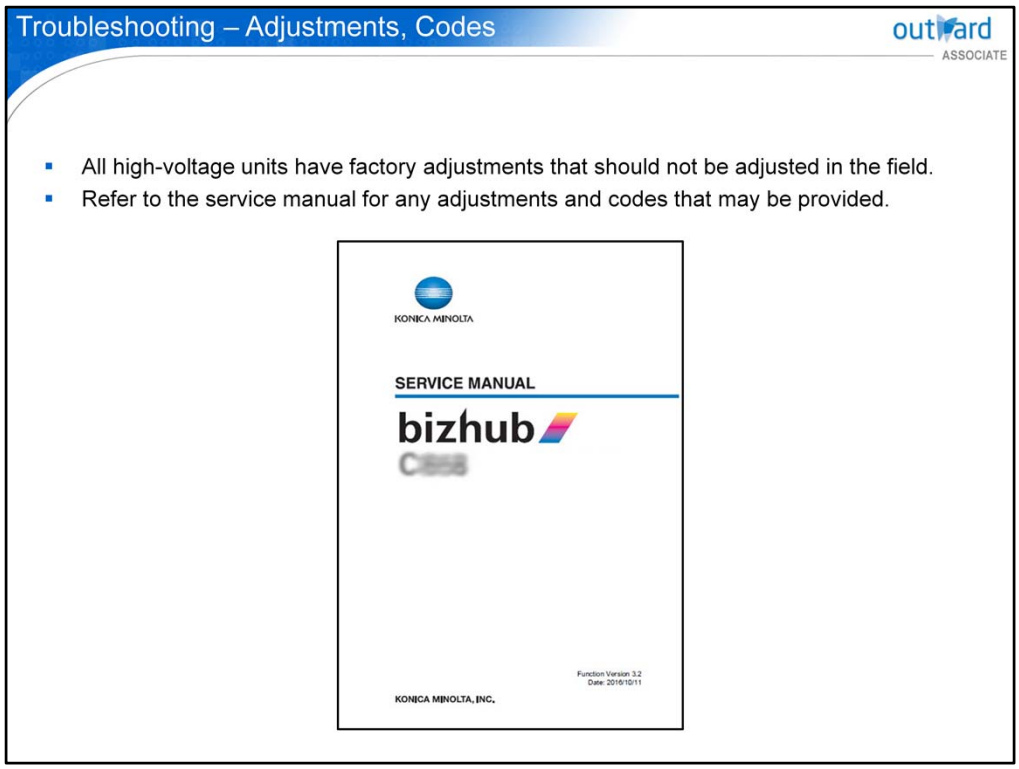
WARNING: As in dealing with any electrical component, be careful not to touch or get too close to the high-voltage leads with fingers or metal objects. Never attempt to measure the output voltage directly from the power supply unless you have a high-voltage probe for your meter. The output voltage of these units can vary from 6,000 volts to 10,000 volts. These high voltages could damage your meter and injure yourself if you were touching or holding the meter leads.

ПРЕДУПРЕЖДЕНИЕ. Как и в случае с любым электрическим компонентом, будьте осторожны, чтобы не прикасаться пальцами или металлическими предметами к контактам высокого напряжения и не приближаться к ним слишком близко. Никогда не пытайтесь измерять выходное напряжение непосредственно от источника питания, если у вас нет высоковольтного датчика для вашего счетчика. Выходное напряжение этих устройств может варьироваться от 6000 вольт до 10000 вольт. Эти высокие напряжения могут повредить ваш счетчик и нанести ему травму, если вы касаетесь или держите провода счетчика.



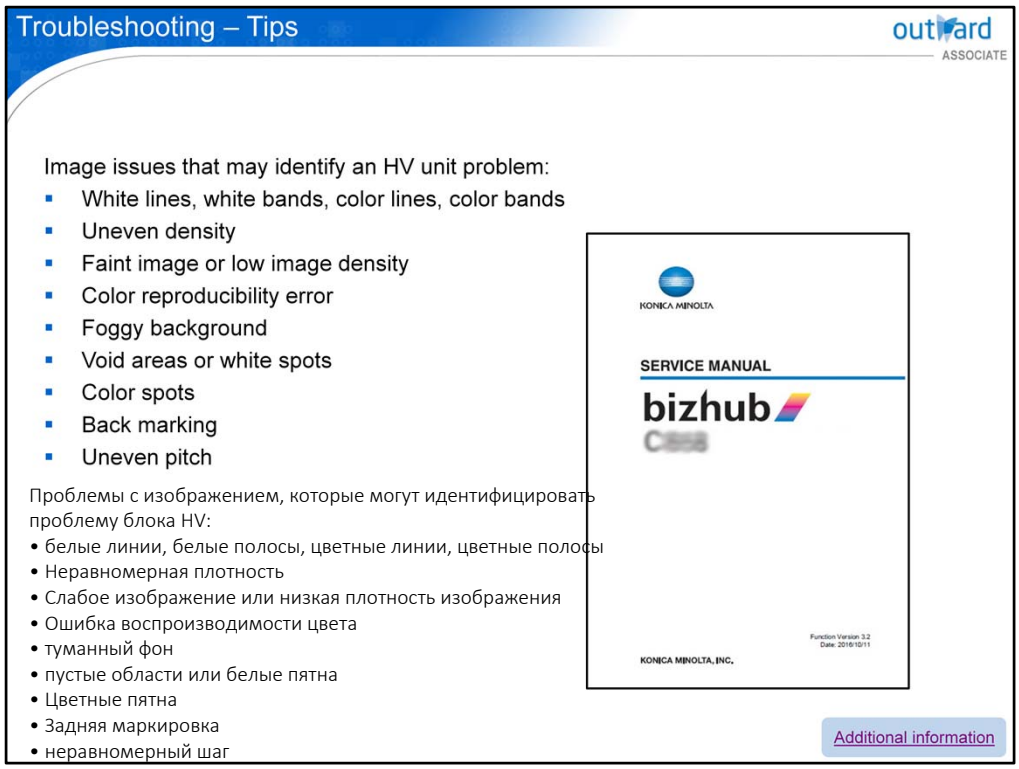
If having to replace the high-voltage board, closely follow the disassembly and reassembly instructions that are provided in the applicable service manual. Ensure that all contact points on the board are securely reconnected. Also ensure that the wiring is routed in the same way as it came from the factory. If the wires are not routed properly, the wires could be cut, damaged, or be more prone to electrical arcing.

При необходимости замены высоковольтной платы внимательно следуйте инструкциям по разборке и сборке, приведенным в соответствующем руководстве по обслуживанию. Убедитесь, что все контактные точки на плате надежно подключены. Также убедитесь, что проводка проложена так же, как и на заводе. Если провода не проложены должным образом, провода могут быть обрезаны, повреждены или стать более подверженными электрическому искрению.



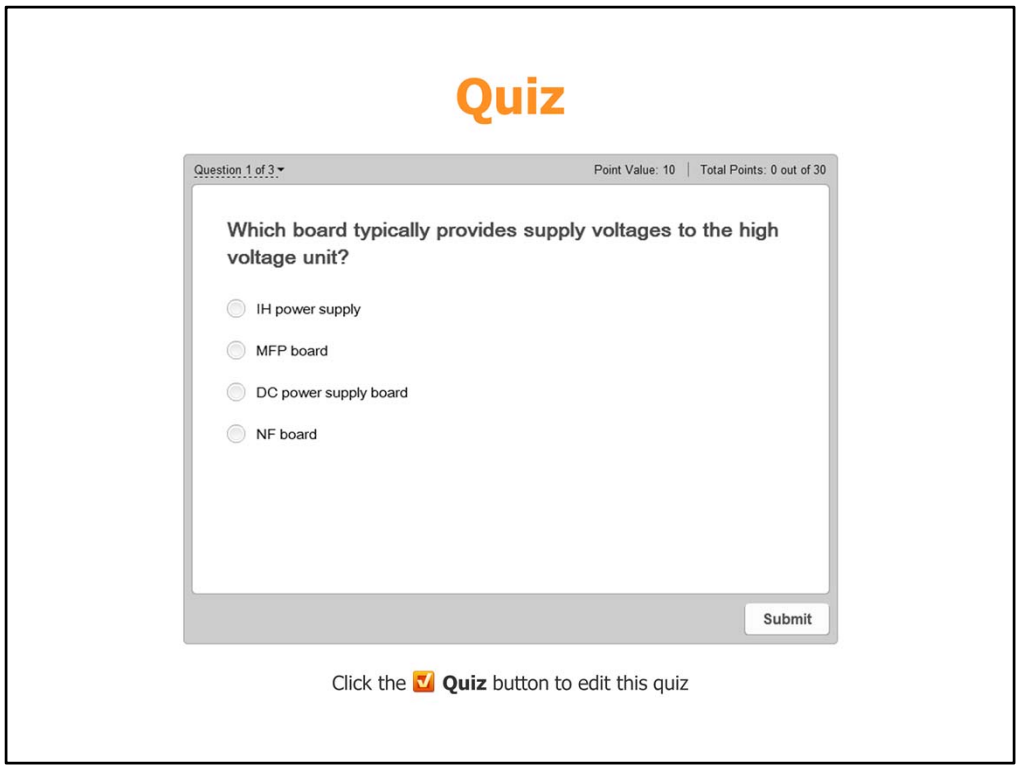
High-voltage units have factory adjustments that should not be adjusted in the field. However, on some models, you may have either dipswitches or adjustments from the service adjust modes that could increase or decrease the output.
High-voltage units in most MFPs have some sort of malfunction codes that help to identify what corona or bias circuit may be faulty. However, the high-voltage units in low speed engines may not have this diagnostic feature.
Refer to the applicable service manual for any adjustments or malfunction codes that may be provided.

Высоковольтные устройства имеют заводские настройки, которые не должны регулироваться в полевых условиях. Однако на некоторых моделях у вас могут быть либо двухпозиционные переключатели, либо настройки из режимов сервисной настройки, которые могут увеличивать или уменьшать выходной сигнал. Высоковольтные блоки в большинстве МФУ имеют своего рода коды неисправностей, которые помогают определить, какая корона или цепь смещения могут быть неисправны. Однако высоковольтные блоки в тихоходных двигателях могут не иметь этой диагностической функции. Обратитесь к соответствующему руководству по техническому обслуживанию для любых корректировок или кодов неисправностей, которые могут быть предоставлены.

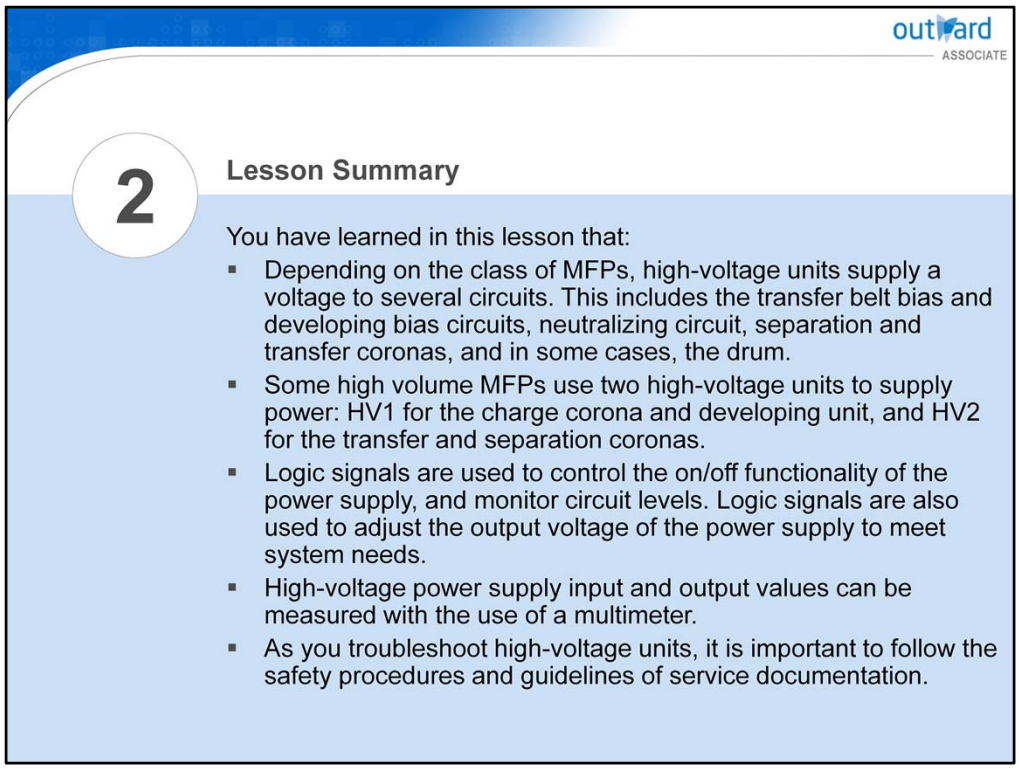


The HV unit can be the cause of the image issues shown here. To determine whether-or-not the HV unit is the source of the problem, refer to the troubleshooting steps that are provided in the service manual. Select the link for additional information.

Блок HV может быть причиной проблем изображения, показанных здесь. Чтобы определить, является ли блок HV источником проблемы, обратитесь к инструкциям по устранению неполадок, приведенным в руководстве по обслуживанию. Выберите ссылку для получения дополнительной информации.



To verify your understanding of the lesson, take this quiz.



Provided here is a summary of the topics that you learned about in this lesson.

На этом уроке вы узнали, что:

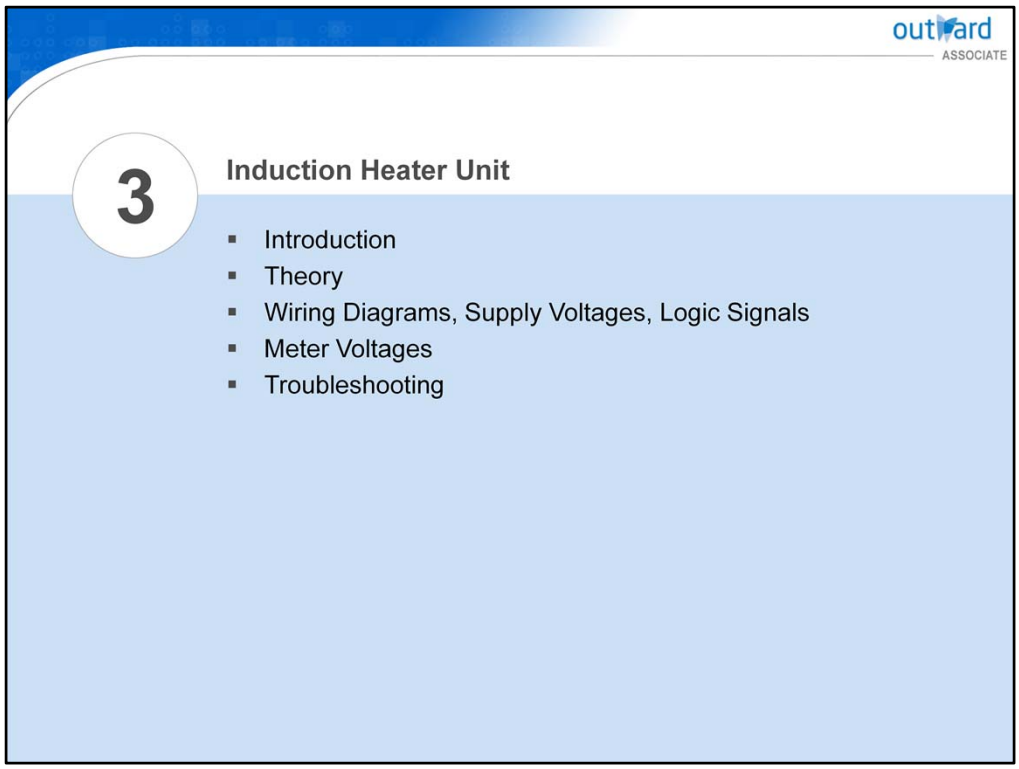
■ В зависимости от класса МФУ, высоковольтные устройства подают напряжение на несколько цепей. Это включает в себя смещение ремня переноса и схемы смещения проявки, контур нейтрализации, корону разделения и переноса, а в некоторых случаях и барабан.

■ Некоторые МФУ большого объема используют два высоковольтных блока для подачи питания: HV1 для короны заряда и проявочного блока и HV2 для передающих и разделительных корон.

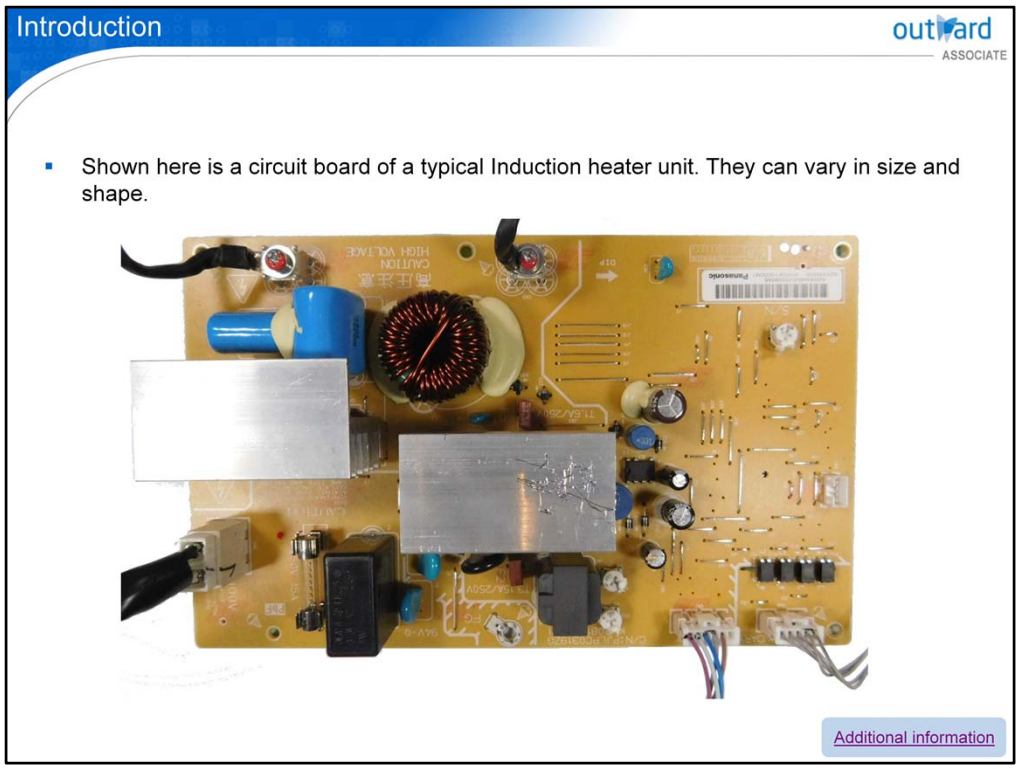
■ Логические сигналы используются для управления функциями включения / выключения источника питания и контроля уровня цепи. Логические сигналы также используются для регулировки выходного напряжения источника питания в соответствии с потребностями системы.

■ Значения входа и выхода высоковольтного источника питания можно измерять с помощью мультиметра.

■ При устранении неполадок в высоковольтных устройствах важно соблюдать процедуры безопасности и руководящие указания к сервисной документации.

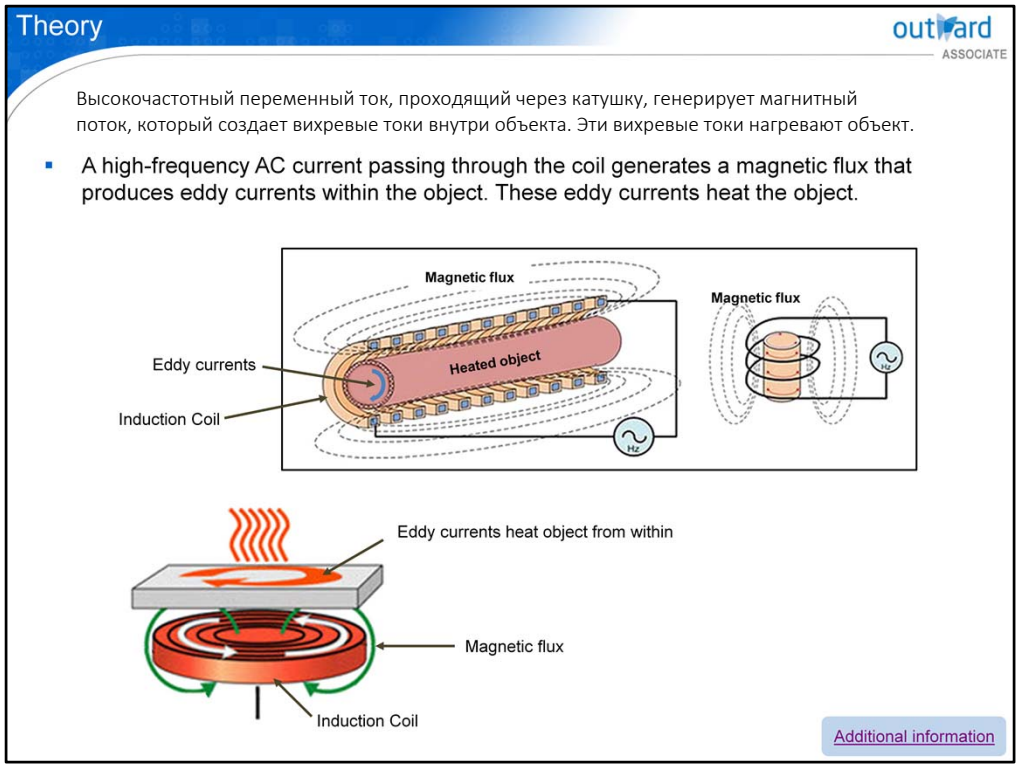


Welcome to Lesson 3, Induction Heater Unit. Within this lesson, you will first be provided with an overview regarding the purpose of the induction heater unit within the Konica Minolta MFPs. This overview will be followed up by an explanation of the basic functionality of these units. Typical wiring diagrams of the induction heater unit will then be provided to identify the on-board components. These components include fuses, and voltage and signal checkpoints that you should be aware of for troubleshooting purposes. You will then be shown how to check the input and output voltage levels of this unit using a meter, followed up by troubleshooting tips.



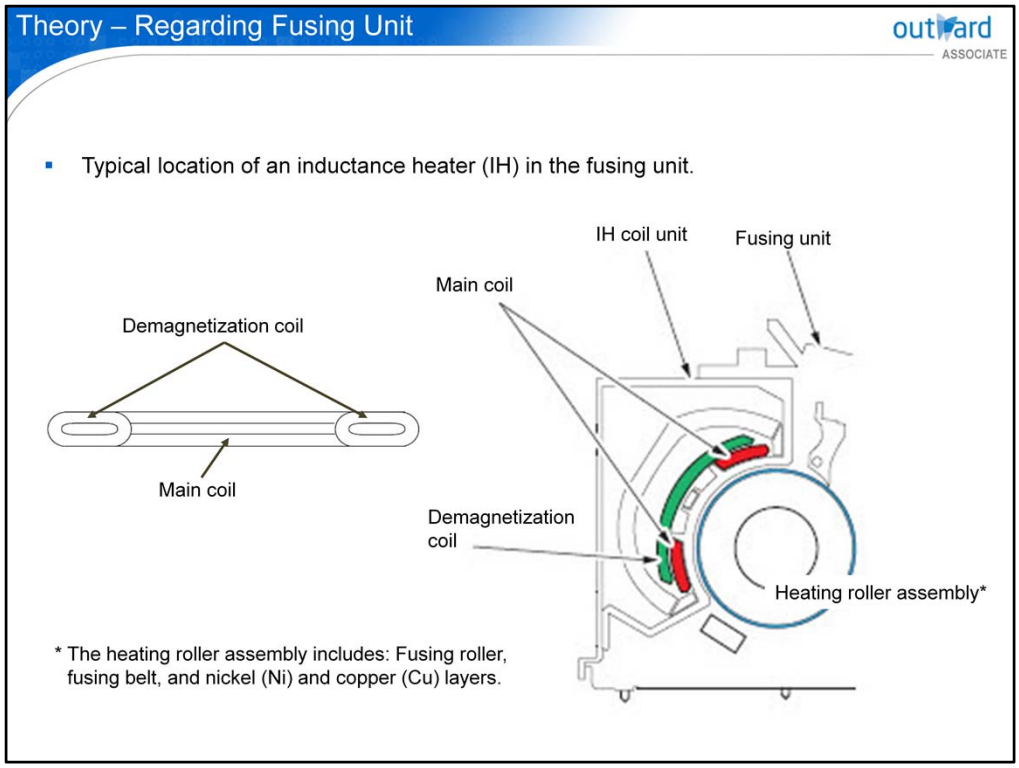
As the name implies, the Induction heater Unit, or IH unit, employs an induction heating process that can rapidly heat surfaces. Because of this property, the unit is used to heat fusing rollers in higher volume MFPs that require rapidly heated surface areas. This rapid heat-up time is required to compensate for faster paper feed operations. Whereas, the heat-up time of the traditional fuser heater lamp, is not rapid enough to ensure proper fusing operation. Select the link for additional information.

Как видно из названия, в блоке индукционного нагревателя, или в блоке IH, используется процесс индукционного нагрева, который может быстро нагревать поверхности. Из-за этого свойства устройство используется для нагрева валиков плавления в МФУ с большим объемом, которые требуют быстро нагреваемых поверхностей. Это быстрое время разогрева требуется для компенсации более быстрых операций подачи бумаги. Принимая во внимание, что время нагрева традиционной лампы нагревателя фьюзера недостаточно быстрое, чтобы обеспечить правильную работу термозакрепления. Выберите ссылку для получения дополнительной информации.

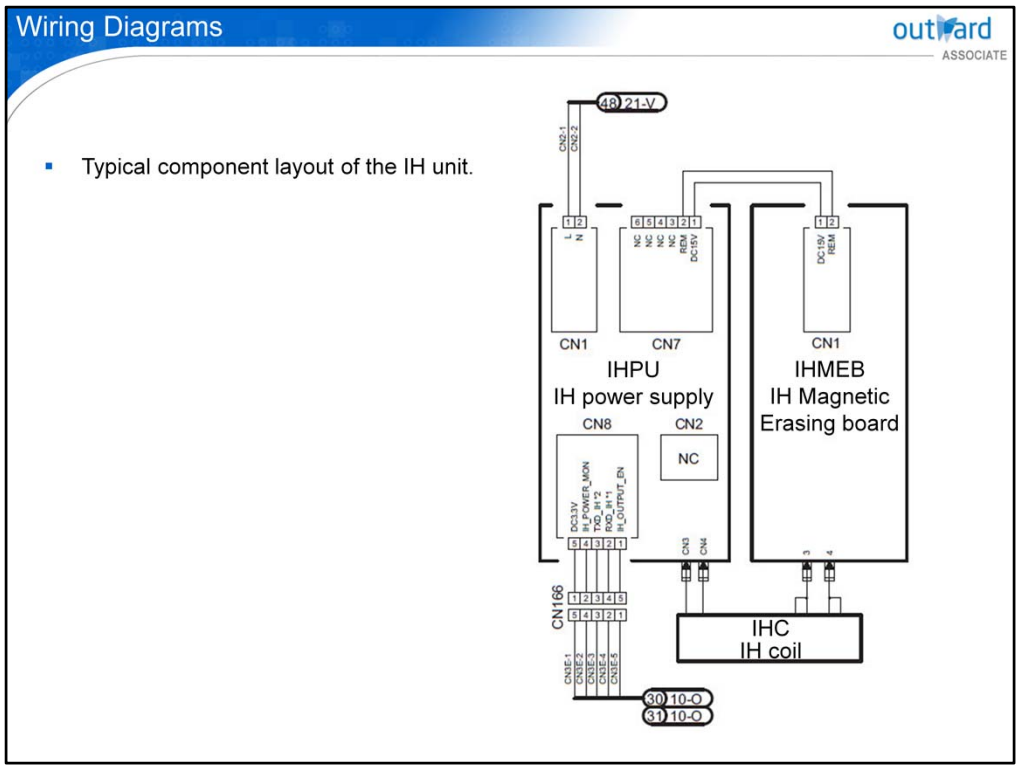


Induction heating is the process of heating an electrically conducting object, usually a metal, by electromagnetic induction which produces eddy currents. The eddy currents flowing through the resistance of the material generates heat from inside the object itself. Thus, external sources, such as a fusing heating lamp, are not required. Because of this internal heat-up process, objects heat up much more rapidly. Select the link for additional information.

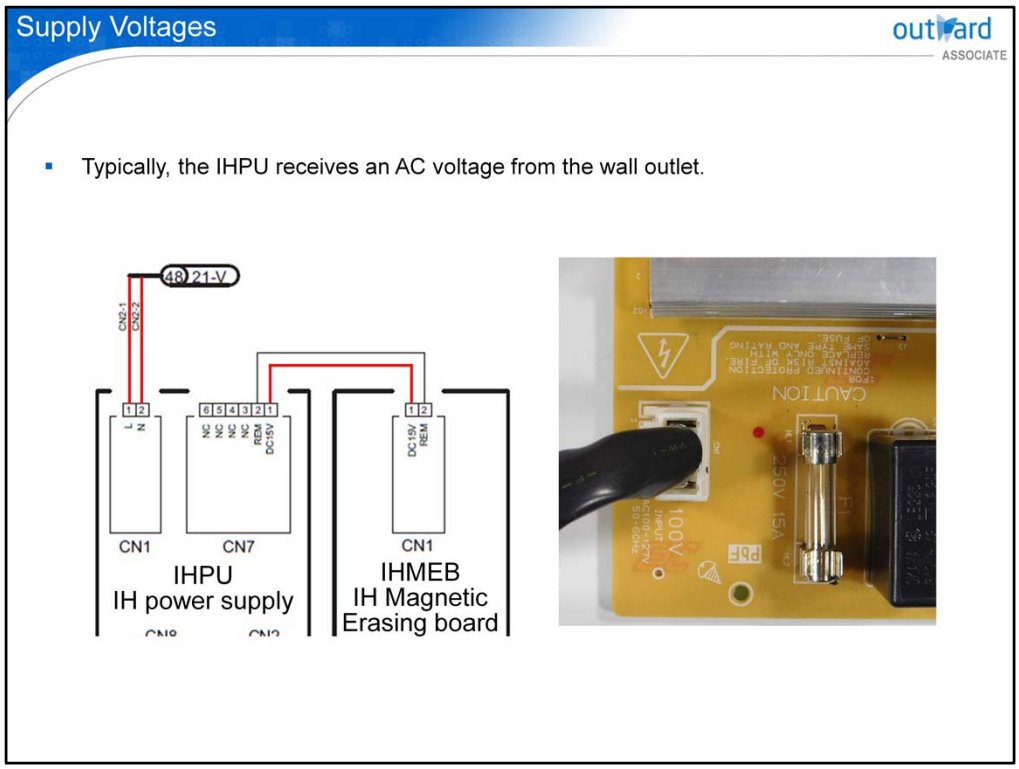
Индукционный нагрев - это процесс нагрева электропроводящего объекта, обычно металла, электромагнитной индукцией, которая создает вихревые токи. Вихревые токи, протекающие через сопротивление материала, генерируют тепло внутри самого объекта. Таким образом, внешние источники, такие как нагревательная лампа, не требуются. Из-за этого внутреннего процесса нагрева объекты нагреваются намного быстрее. Выберите ссылку для получения дополнительной информации.



The IH coil unit that is located beside the heating roller assembly, radiates magnetic flux to the fusing belt when it is energized. The IH coil unit consists of two types of coils: the main coil and the demagnetization coil. The main coil heats the fusing belt by induced magnetic flux. The demagnetization coil controls the heating zone of the fusing belt by canceling the magnetic flux that is generated by the main coil. The nickel and copper layers of the fusing belt, which are a part of the heating roller assembly, makeup the conducting layer. Within this conducting layer, an eddy current is generated by magnetic flux. The eddy current that is generated in the conducting layer produces Joule heat to heat the heating roller.

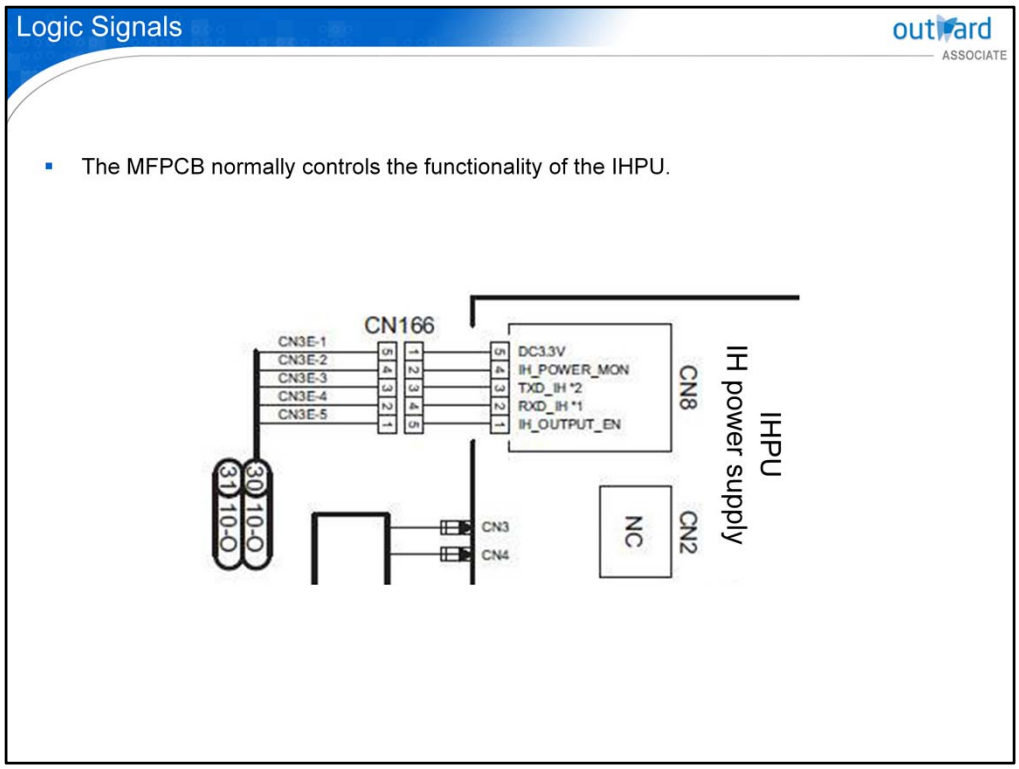


Provided here is a typical component layout of the IH Unit. The IH power supply board supplies the main coil of the fusing unit fusing belt. The IH magnetic erasing board supplies the demagnetization coil that controls the heating zone of the fusing belt.

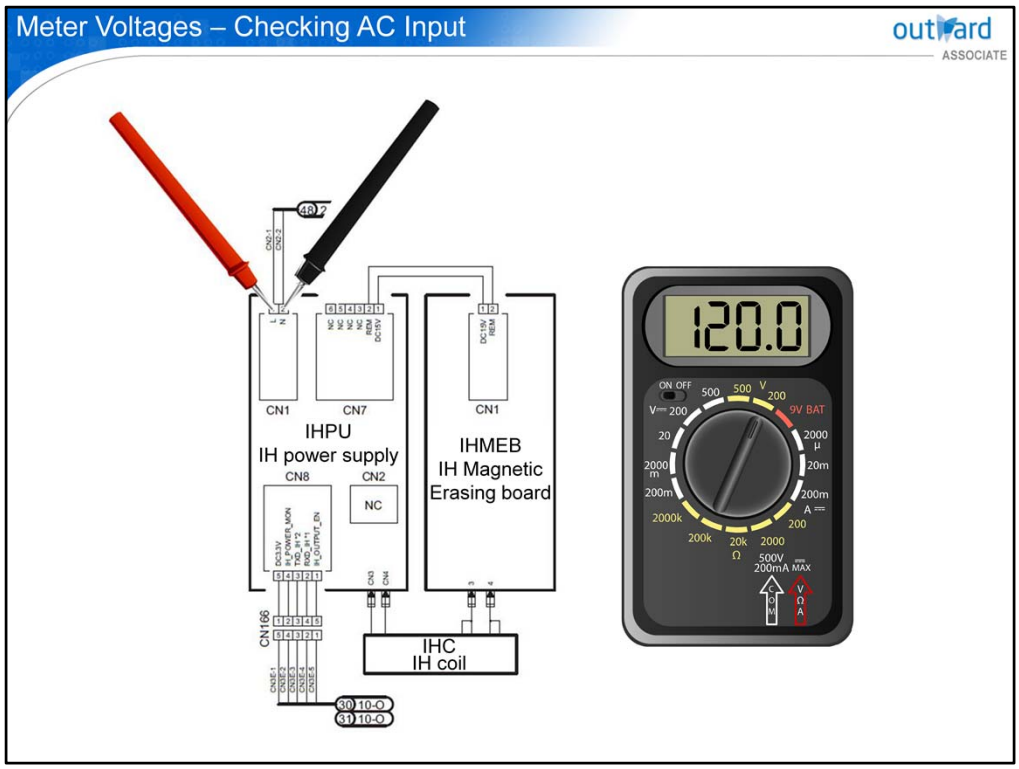


The IH Power Supply, or IHPU, receives an AC voltage from the wall outlet to provide oscillating current to the IH main coil. This oscillating current produces the eddy currents necessary to generate heat. In turn, voltage is also provided to the IH magnetic erasing board, or IHMEB, to reduce the generated heat via the demagnetization coil.

This picture depicts the connector of the AC voltage source, and temperature fuse. This fuse prevents IH power supply issues due to an increased unit internal temperature.

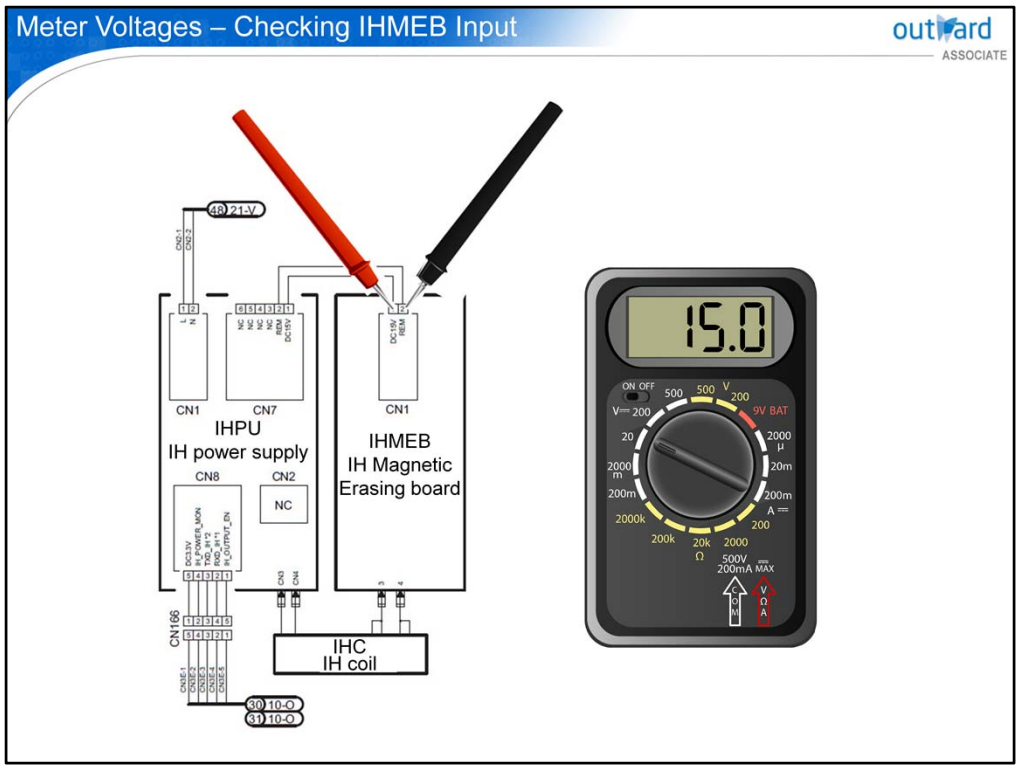


Normally, the MFP Control Board, or MFPCB, controls the functionality of the IHPU via the logic signals shown here. The control of the voltage that is provided to the load at pin IH_OUTPUT_EN, is based on monitoring signal IH_POWER_MON and certain data. This date is received and transmitted via the RXD_IH and TXD_IH signals.



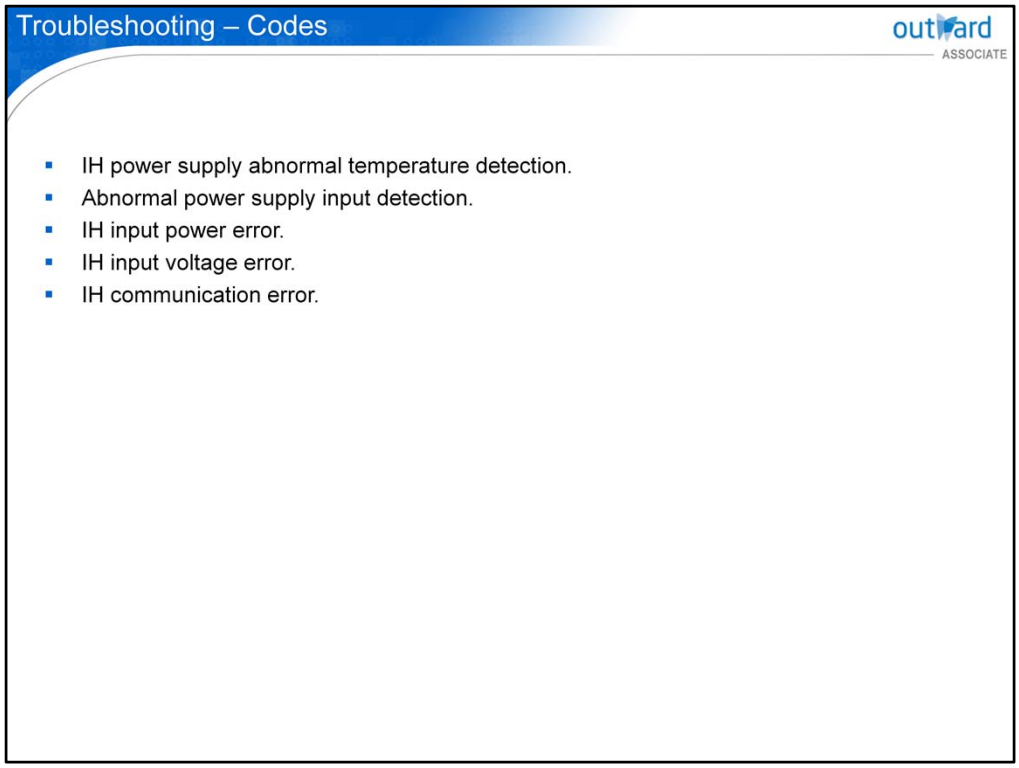
The AC source being supplied to the IHPU board: 100 VAC, 120 VAC, or 230 VAC, is dependent on the MFP model and the location where the MFP is installed. In the example that is provided, the MFP is connected to a 120 VAC service.

For example, to check the AC voltage that is supplied to the IHPU board, turn the meter dial to 200 VAC as identified in this scenario. Then insert the red meter lead into the L1 pin and the black meter lead into the N1 pin of the input connector. You should get a reading of 120 VAC. For checking the AC voltage on 230 VAC MFPs, first select 500 VAC on the meter, then follow the same procedure.

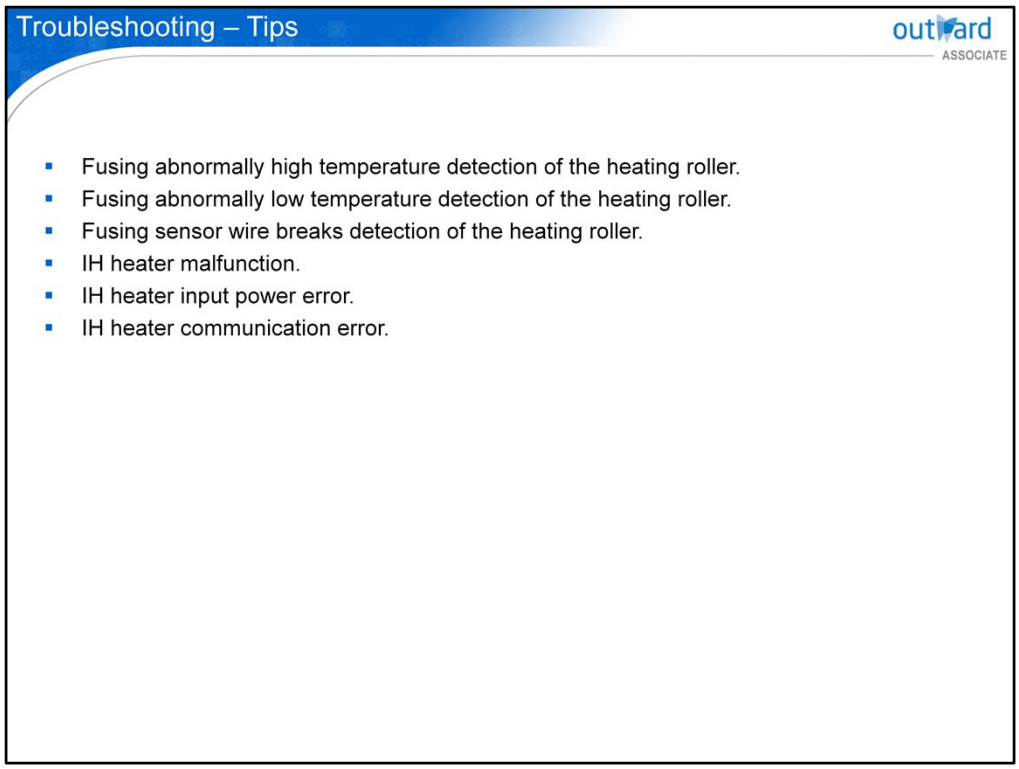


As mentioned earlier, the IHMEB provides voltage to the demagnetization coil to control the heating zone of the fusing belt. Normally, a reading of 15Vdc across the DC 15V and REM pins, indicates that the demagnetization process at the fusing unit is not taking place at that time. However, a value of typically 0 – 3Vdc across these pins indicates a closed circuit, and that the fusing belt is in the process of being demagnetized.

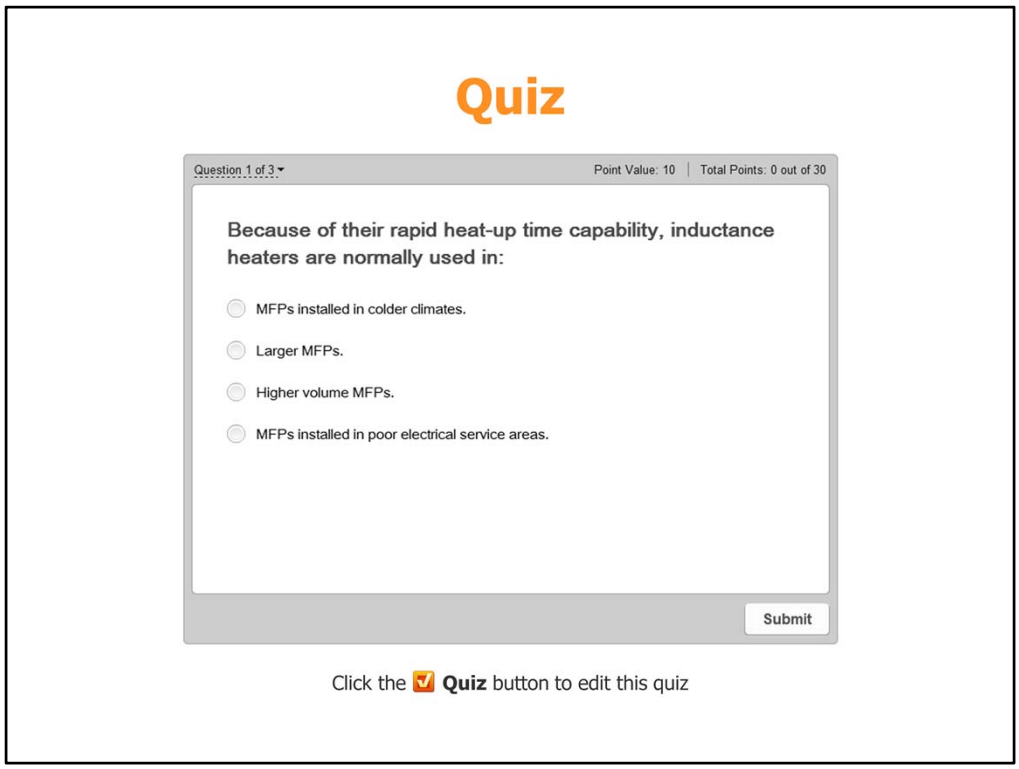
To take a reading across these two pins, first select the 20Vdc range with the dial on the multimeter. Then, insert the red meter lead into the DC 15V pin and the black meter lead into the REM pin of the connector.



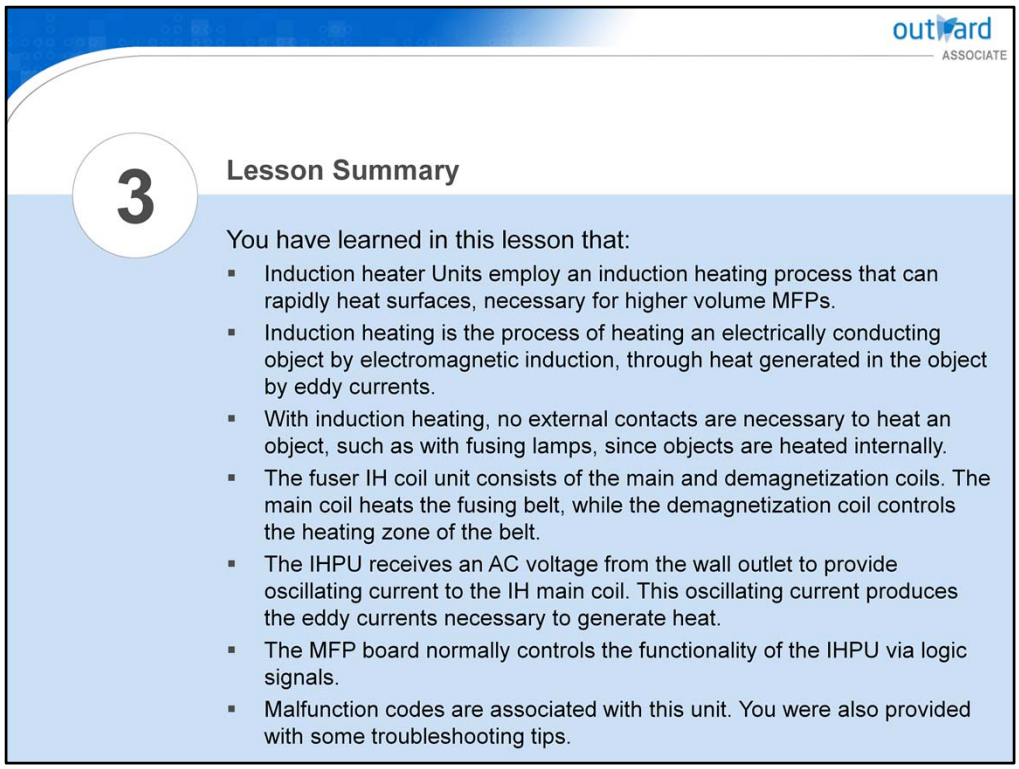
Though they may vary from MFP-to-MFP, there are several malfunctions codes that are associated with the induction heater unit. If an abnormality is detected by sensing devices, these codes will appear. The service manual of the MFP provides a solution for each of these codes. Examples of some of these codes are provided here.



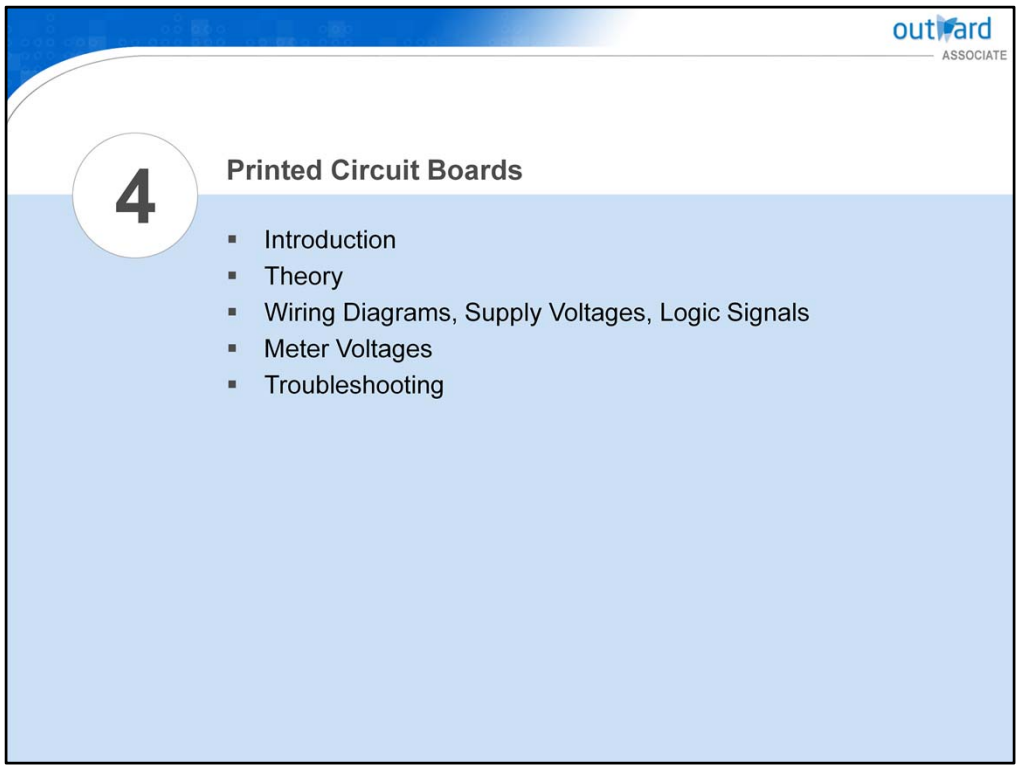
Various problems can cause these identified issues, including an issue with the IHPU board. To determine whether-or-not the IHPU is the source of the problem, follow the troubleshooting steps that are provided in the service manual.



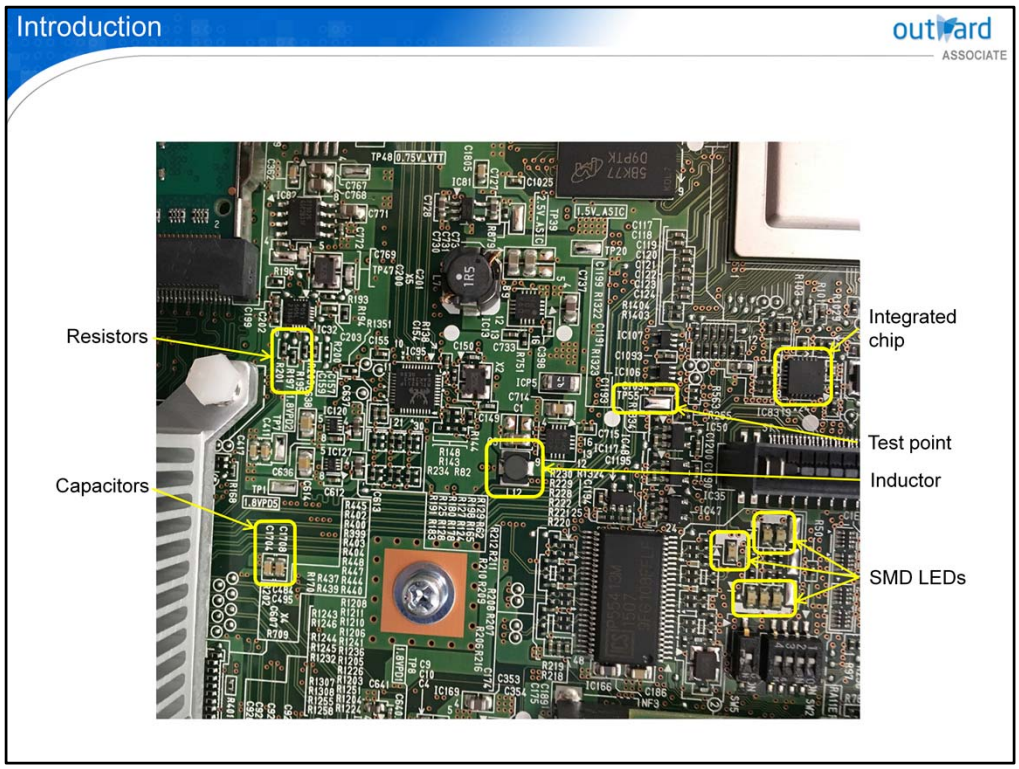
To verify your understanding of the lesson, take this quiz.



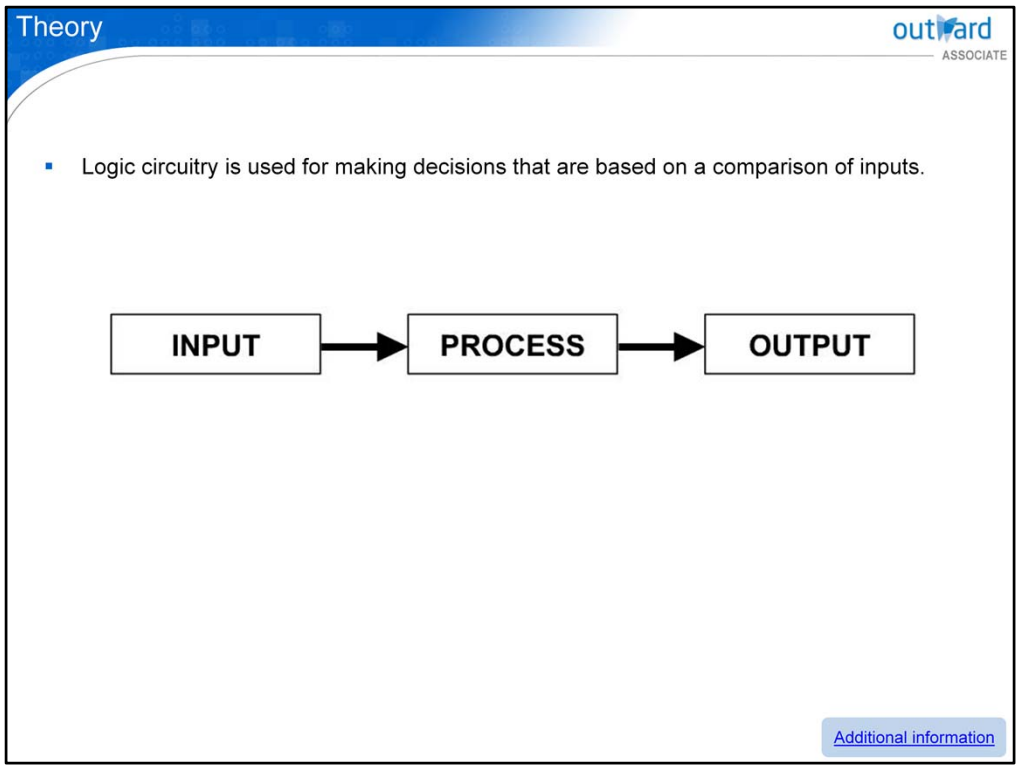
Provided here is a summary of the topics that you learned about in this lesson.



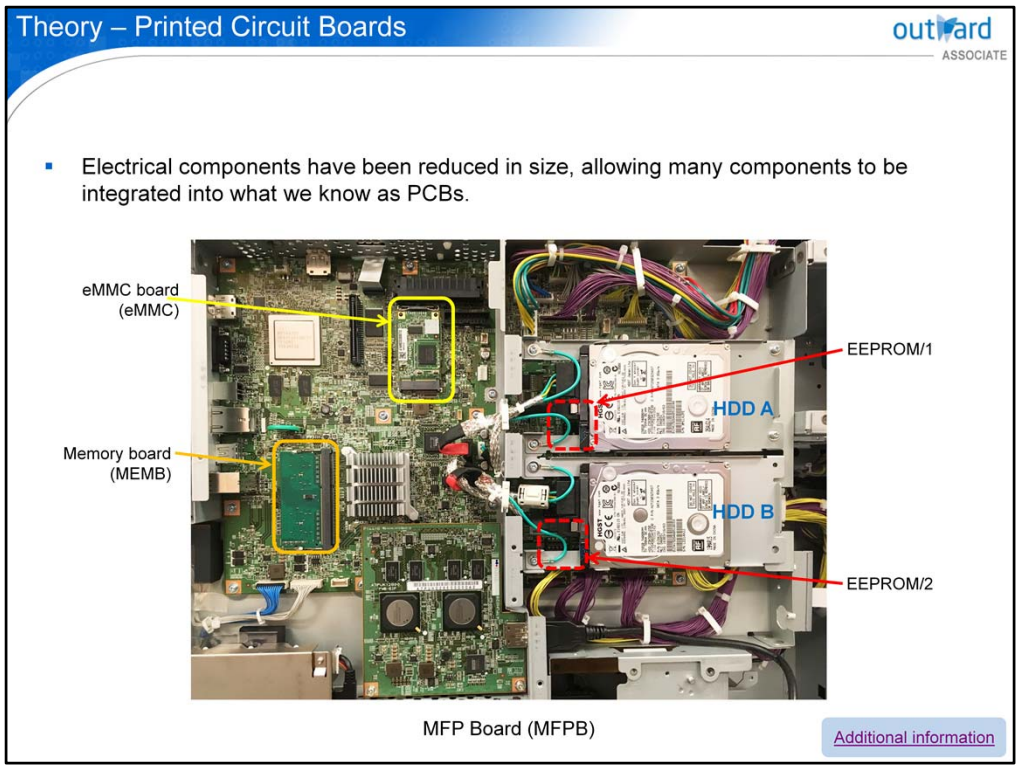
Welcome to Lesson 4, Printed Circuit Boards. Within this lesson you will first be provided with an overview of printed circuit boards, or PCBs, and the basic common components integrated on these boards. You will then be presented with basic wiring diagrams, depicting logic signal pinouts and PCB supply voltages. Lastly, you will be presented with basic troubleshooting tips. These tips will include checking signals with a multimeter, and safety points that are important to consider.



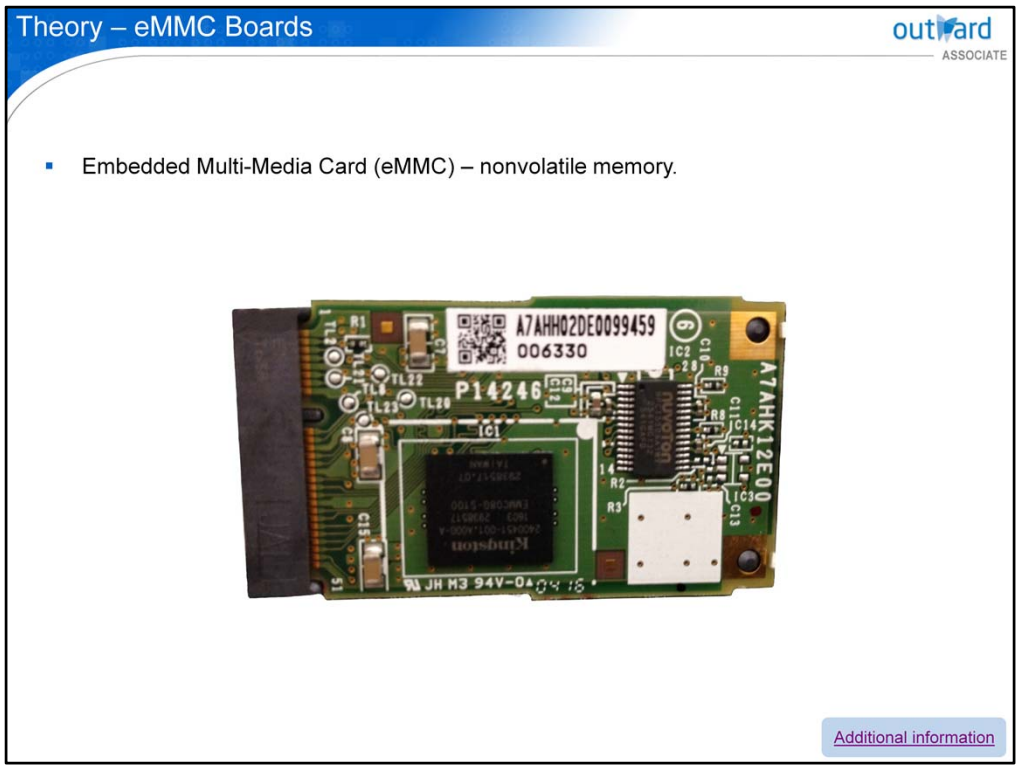
A Printed Circuit Board, or PCB, mechanically supports and electrically connects electronic components. This connection is accomplished using conductive tracks, pads, and other features etched from copper sheets laminated onto a non-conductive substrate. Capacitors, resistors, integrated chips, inductors, test points, and LEDs, for example, are generally soldered on the PCB. Advanced PCBs may contain components that are embedded in the substrate. PCBs can be single-sided, one copper layer, double-sided, two copper layers, or multi-layer, having outer and inner layers. Multi-layer PCBs allow for much higher component density.



Circuit boards include Integrated Chips, or ICs, that are used extensively in a logic circuit. Logic circuitry is used for making decisions that are based on a comparison of inputs. In logic circuits, there are only two kinds of logic input: logic high, represented by the letter "H", and logic low represented by the letter "L". The voltage level determines what is a high input and what is a low input. The system that the logic component supports determines the point at which a level is considered high. The same determining factor applies regarding the threshold level at when a signal is considered low. Select the link for additional information.



Due to the advances in electronics, electrical components have been reduced in size, allowing many components to be integrated into what we know as PCBs. These components include integrated circuits, ICs, or chips, which can be comprised of hundreds of electrical components that are networked together into tiny packages. The reduction in the size of electrical components and wiring, reduces the MFPs power consumption and provides savings in bulk weight and cost. Select the link for additional information.

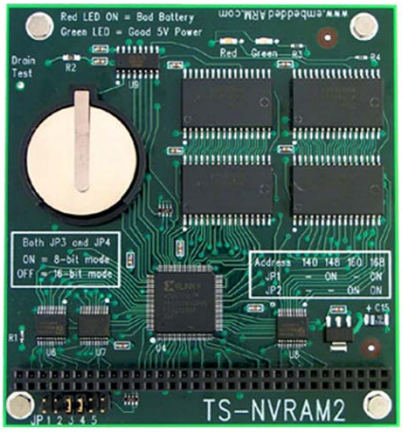


The Embedded Multi-Media Card, or eMMC, is steadily replacing the NVRAM board in most office models. The eMMC is an integrated circuit board that is used in many MFPs today to store data that is critical for the proper functionality of the machine. This critical data includes information, such as the configuration of the MFP, user choices, tech. rep. mode settings, and counter settings, for example. The eMMC does not require a battery to retain data. Select the link for additional information.

Theory – NVRAM Boards

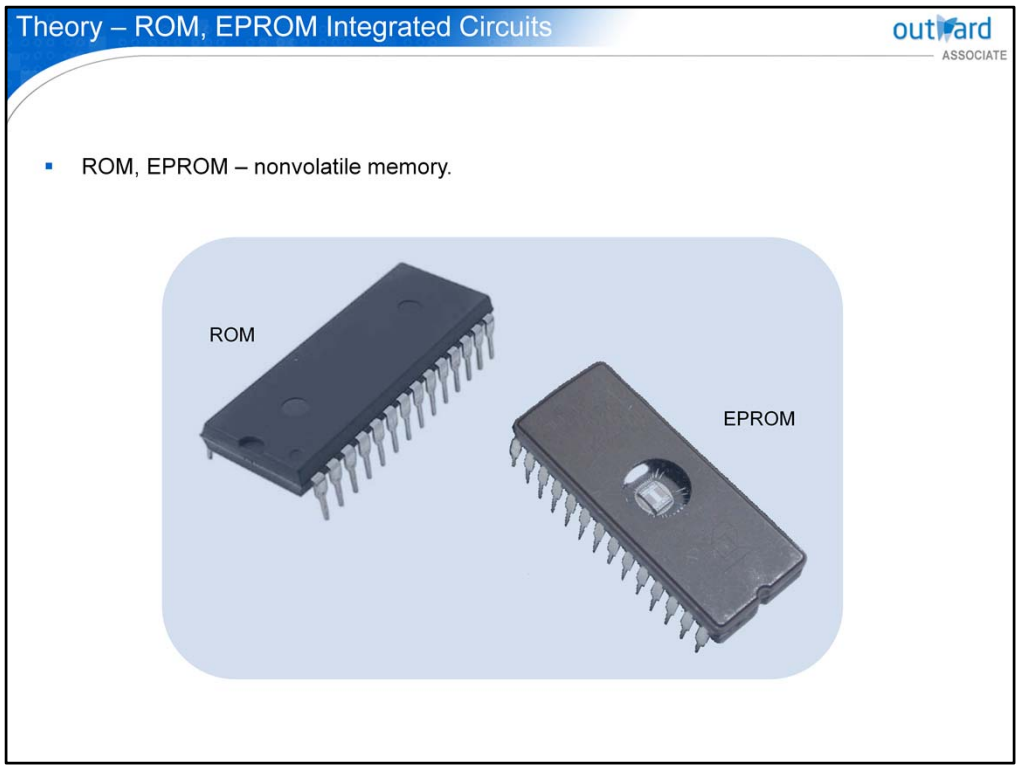
outward ASSOCIATE

- Non-volatile Random Access Memory.



Additional information

The NVRAM board is considered to be an older technology that is steadily being replaced by more advanced data storage devices. Select the link for additional information.



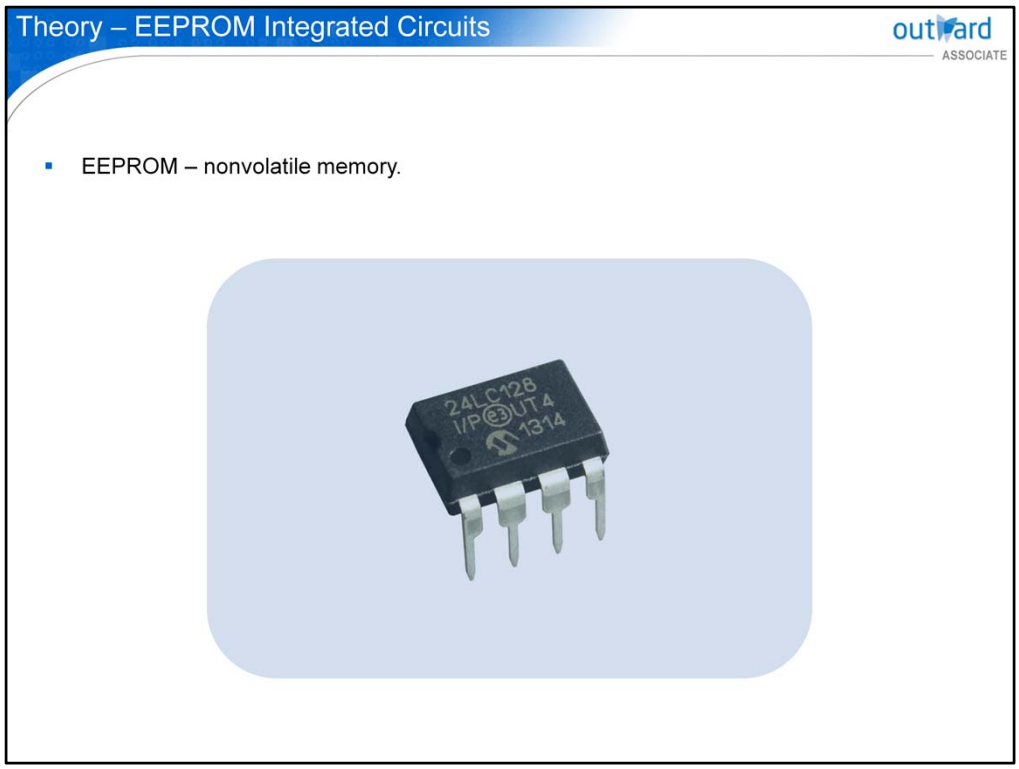
You may see three types of memory when working on the equipment: ROM, EPROM, and PLCC.

Read-only Memory, or ROM, is a type of nonvolatile memory that is used in integrated circuits. ROMs have programs in the form of electronic data that are permanently stored within the IC. CPUs use this data, or information, to perform its operations.

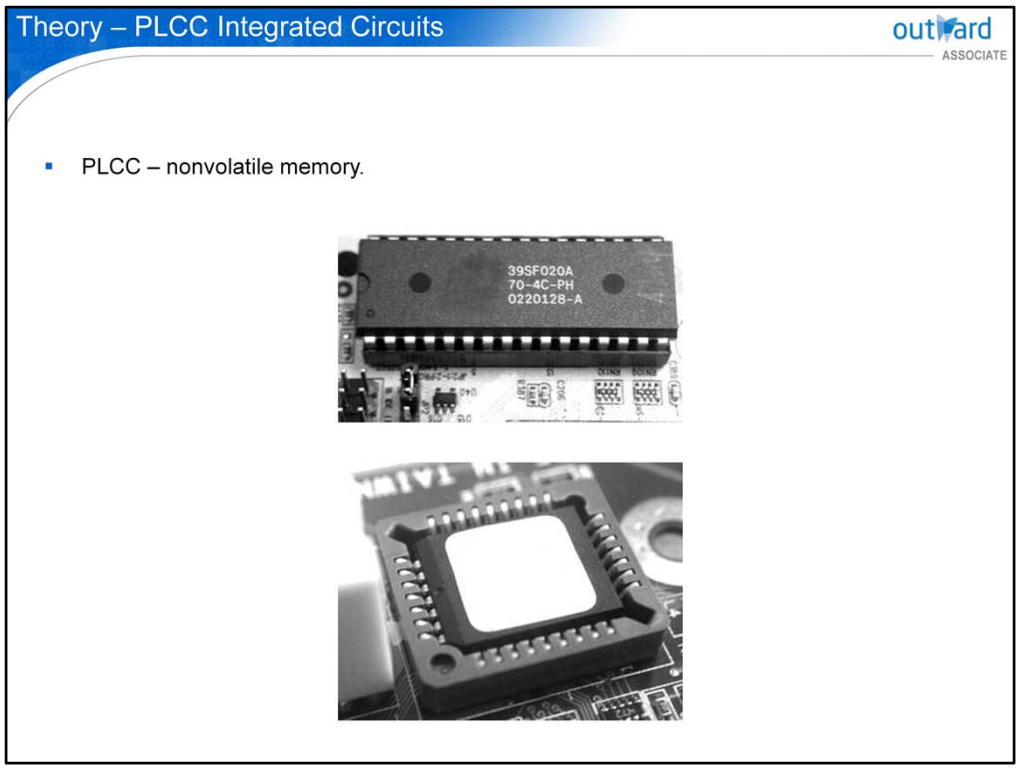
Our machines incorporate ROMs on several printed wire boards. Each ROM has programs that are specifically written to perform certain tasks that are required for that board. If the design or function of the board is modified, the programs that are contained within the ROMs may have to be rewritten. Rewriting a ROM would require replacing the ROM on the board with one containing the new data. ROM replacement would be necessary because the data on ROMs are

permanently stored and cannot be rewritten.

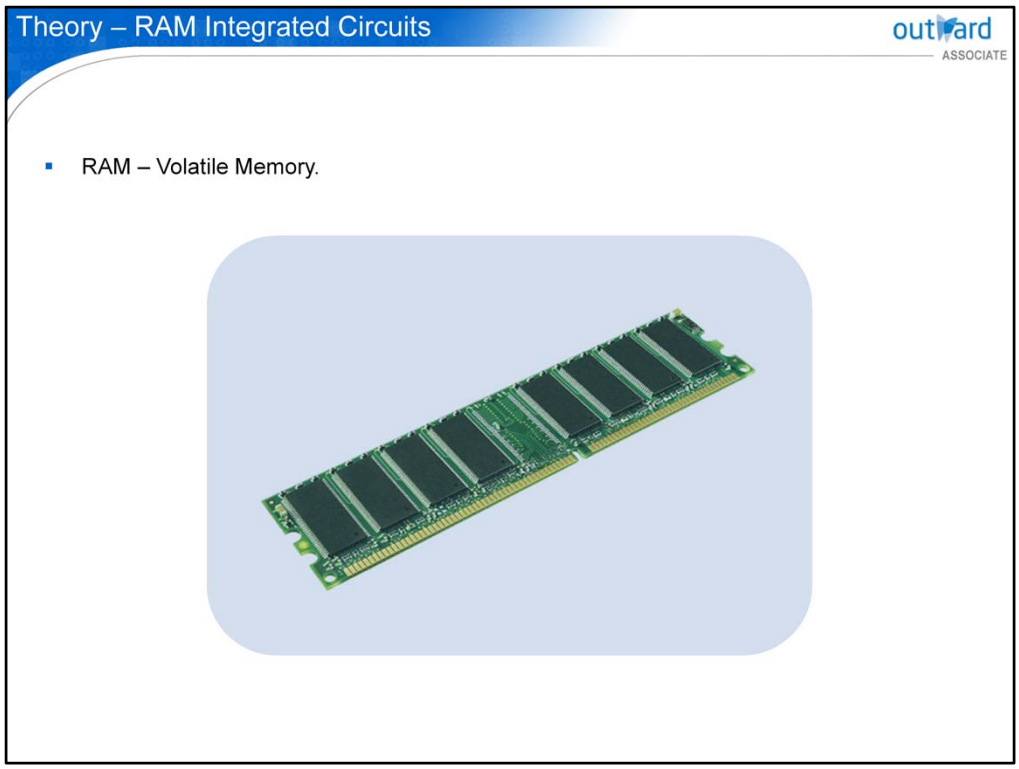
On the other hand, the Erasable Programmable Read Only Memory chip, or EPROM, can be erased and reused through a process using ultraviolet light. Thus, EPROMs, or programmable ROMs, do not require to be replaced as MFP programs change. This feature of not having to replace EPROMs, makes them the most common form of a nonvolatile memory chip used today.



Another type of ROM is called an Electrically Erasable Programmable Read Only Memory, or EEPROM. The name is a little misleading, as this memory storage device can be programmed and erased in-circuit by applying special programming signals. EEPROMs are unlike the previously covered EPROM, which must be removed from the circuit board to reprogram.



A Plastic Leaded Chip Carrier, or PLCC, acts very much like an EPROM, only smaller in scale, but performs the same types of functions. PLCCs are considered to be an older technology, and may not be used as much in systems today.

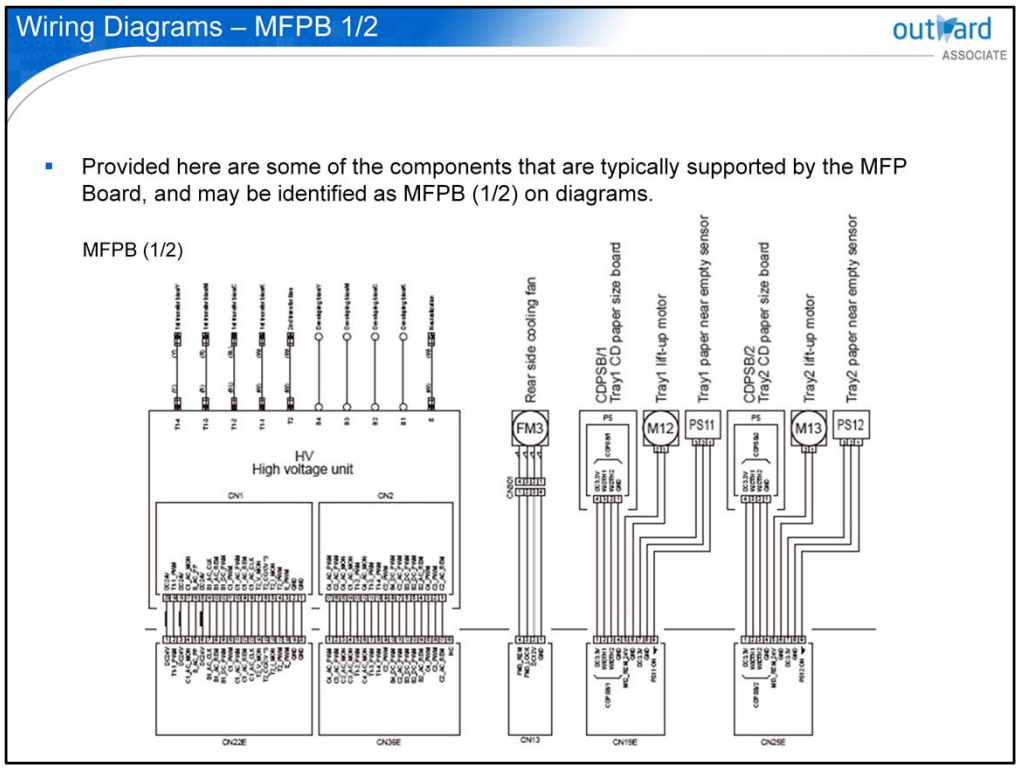


A Random Access Memory chip, or RAM, is an integrated circuit that provides electronic storage for frequently used program instructions and data. This data may include images that require printing by the print head, for example. The size of available memory usually can be upgraded as an option. The FIFO method, or first in - first out, is generally used to process data. The data is not permanently stored within the IC, and thus considered volatile memory. However, the memory may be backed up using a battery to supply power in the event of a power failure. RAM increases the general speed of a system.

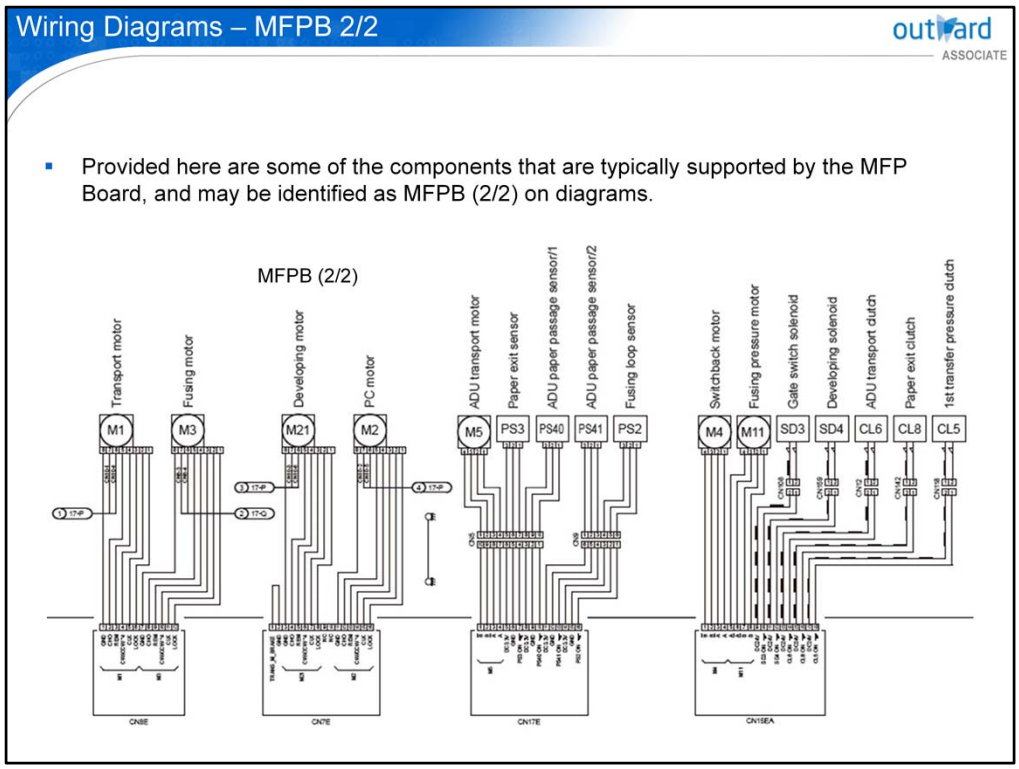
Previously, devices such as PCMCIA cards and flash cards were used to reprogram MFPs. However, this technology was largely replaced a few years back by the introduction of Universal Serial Bus devices, or USB. USBs are now an industry standard, which is designed to standardize the connection of many electronic devices.

These USB devices, also referred to as “thumb drives” or “flash drives,” for example, are used to reprogram MFPs. MFPs are reprogrammed by inserting the USB drive containing new firmware, into the MFP USB port to download its contents to the flash ROM memory.

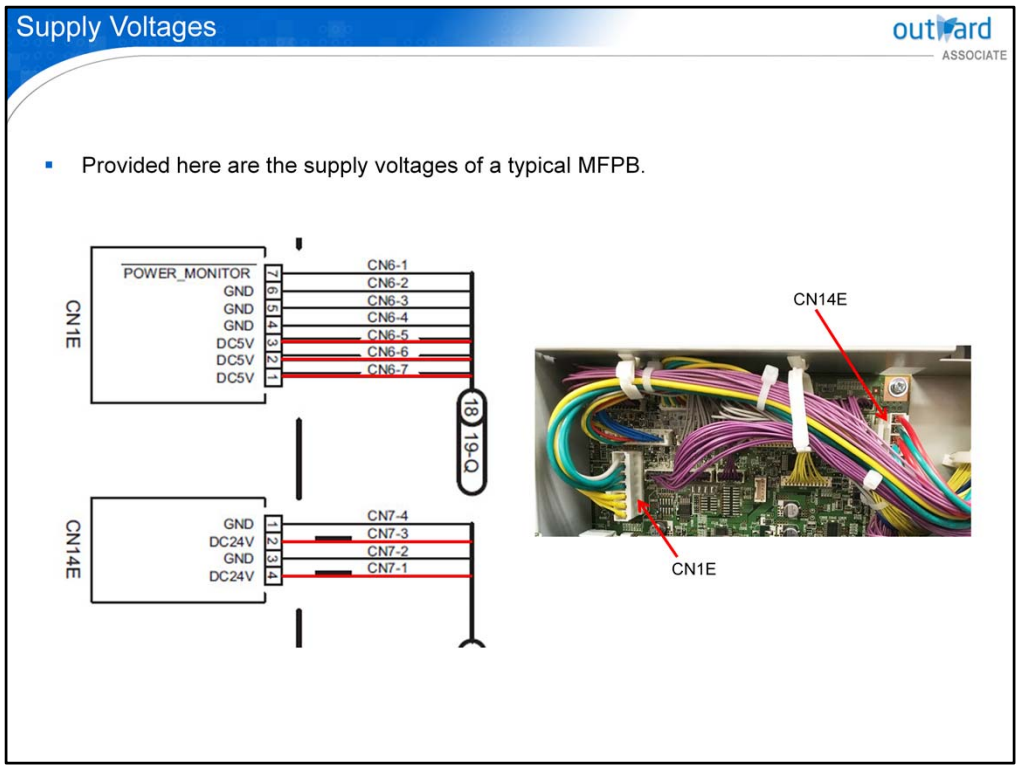
Laptop computers can also be directly connected to the MFP via a USB print port to perform similar download operations.



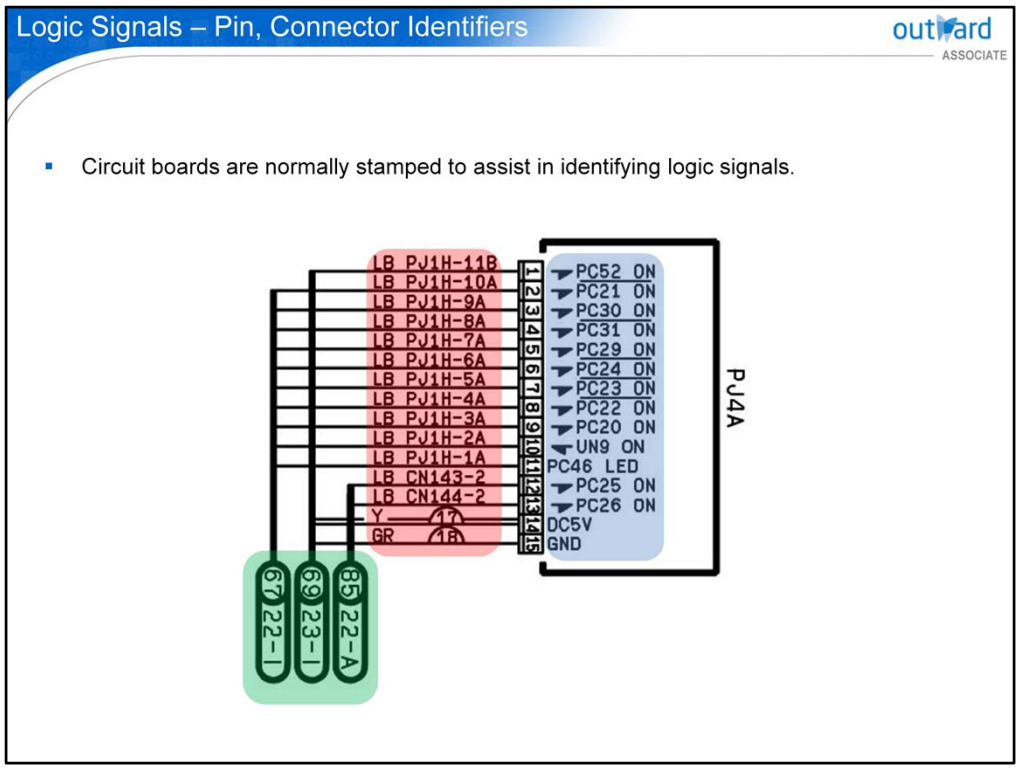
Shown here, in part, are some of the components typically supported by an MFP board, which is usually the main control board of an MFP. These include connections to units, such as the HV unit. Other supported components include photo sensors and motors, such as fan motors and paper tray motors. Through this network, components receive power, and are turned ON and OFF, regulated, and monitored to meet the demands of an MFP. Due to the numerous components that the MFPB supports, it is common to find this board divided into sections on a circuit diagram for clarity. In this case, we are viewing section one of two of the MFPB.



Shown here, in part, are some additional components that are typically supported by an MFPB, in this case, section two of two on the diagram. As shown, components such as the gate switch solenoid, developing solenoid, paper exit clutch, and ADU transport clutch are supported.

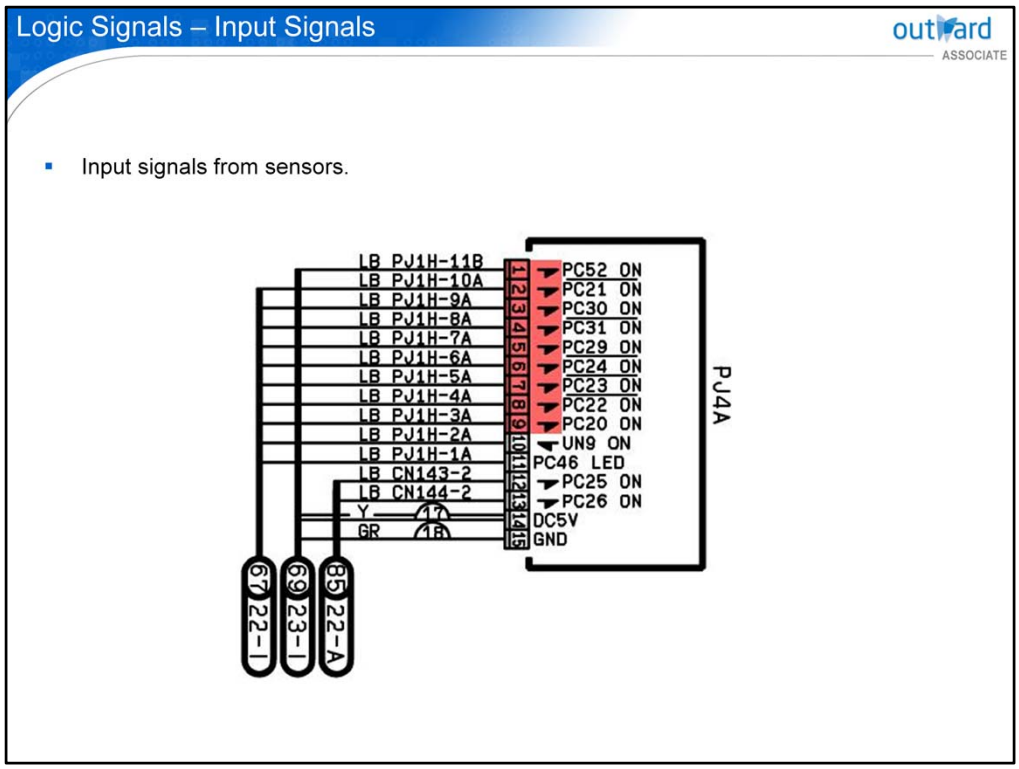


The MFPB receives a DC voltage from the DC power supply; in this case, 5Vdc is provided to CN1E and 24Vdc is provided to CN14E. Typically, 5Vdc is provided for logic circuits and sensors, and 24Vdc for motors, solenoid, clutches, or similar components.

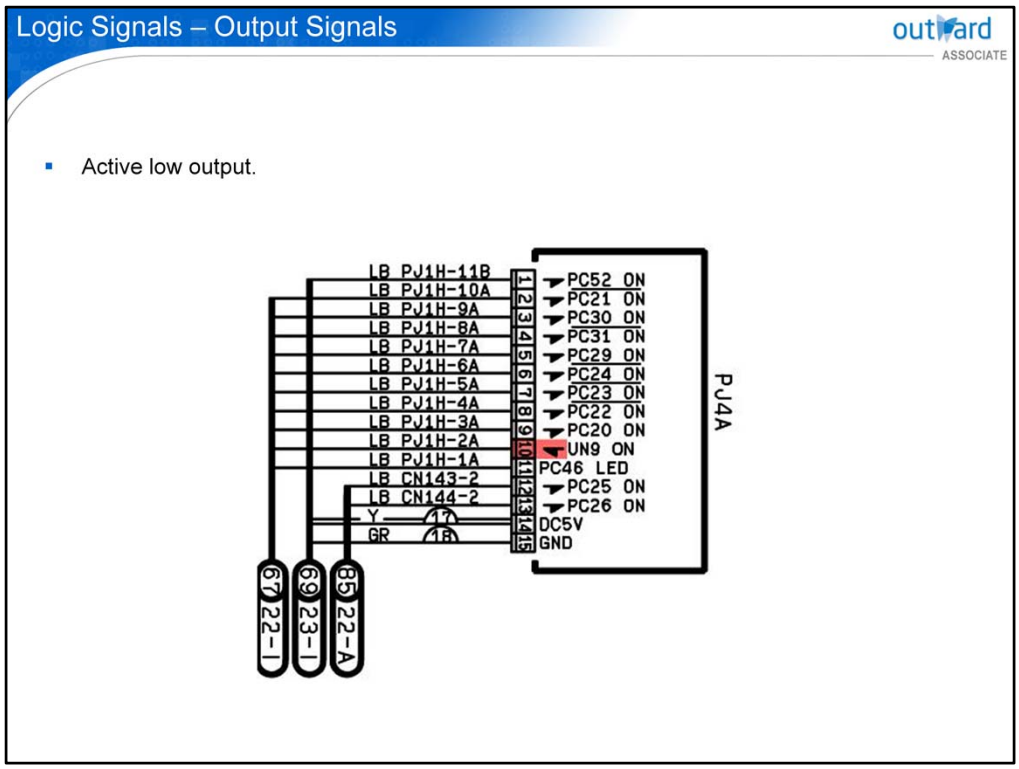


Control boards, or typically MFPBs, are relied upon to control the many functions that take place during the operation of an MFP. These boards are usually clearly stamped to help you to quickly identify the logic signals associated with each connector pin on the board. These boards also identify whether the logic signal is an input or output, and whether its active state is a high or a low. Use the board's wiring diagram within the service manual to assist in locating logic signals on the board.

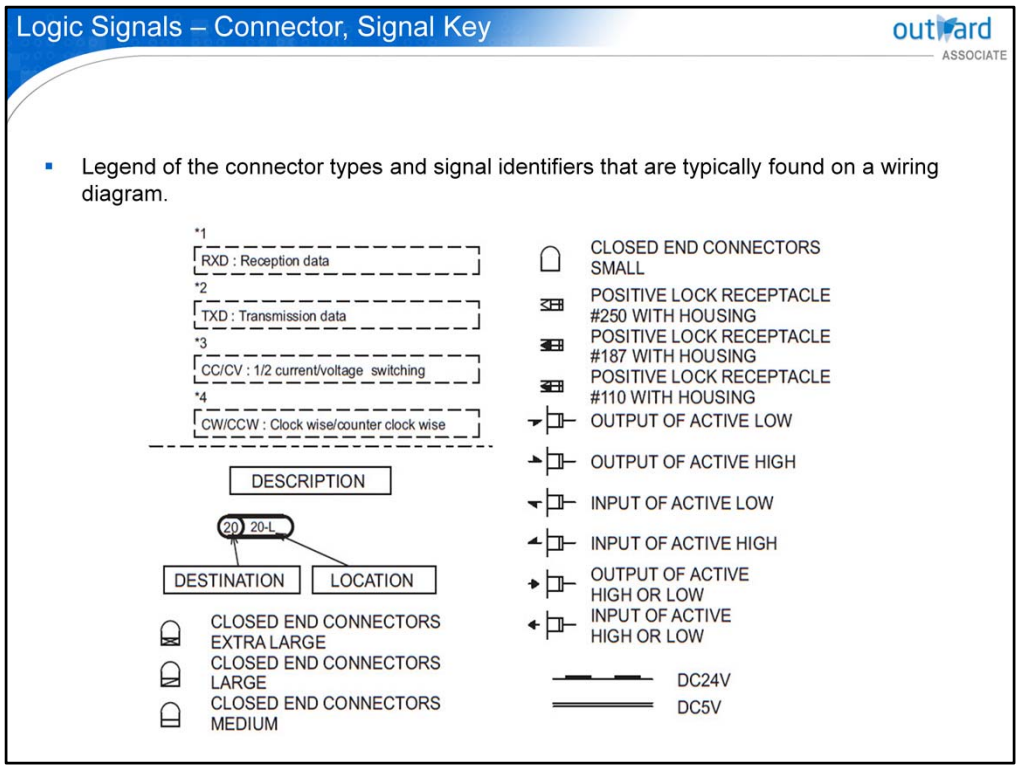
Shown here is an example of a connector with its individual pinouts, as typically shown on a wiring diagram. Identified in the blue highlighted area are the pin designators and logic states. The red highlighted area depicts the destination connector identifier. The green highlighted area identifies where the circuit continues on the wiring diagram.



First, notice the arrows at pins 1 through 9. These pins identify inputs from sensors, as the arrow is pointing in and towards the connector. Also, the flag on the arrow is pointing down, indicating that these pins are active-low inputs. Therefore, the sensor will read a high 5Vdc signal when it is unblocked, and it will read a low 0Vdc signal when it is blocked.



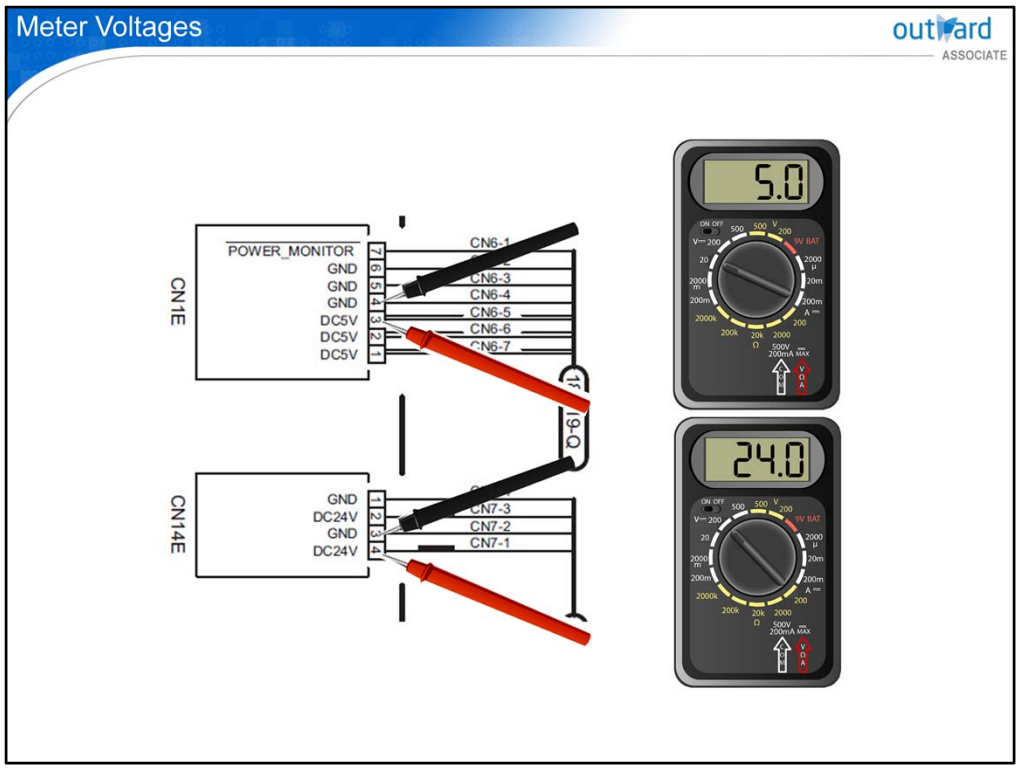
Now look at pin 10. What do you think this arrow might mean? It identifies that this pin is an active-low output. Here, the control board will drop this line to a low when it wants to turn on UN9.



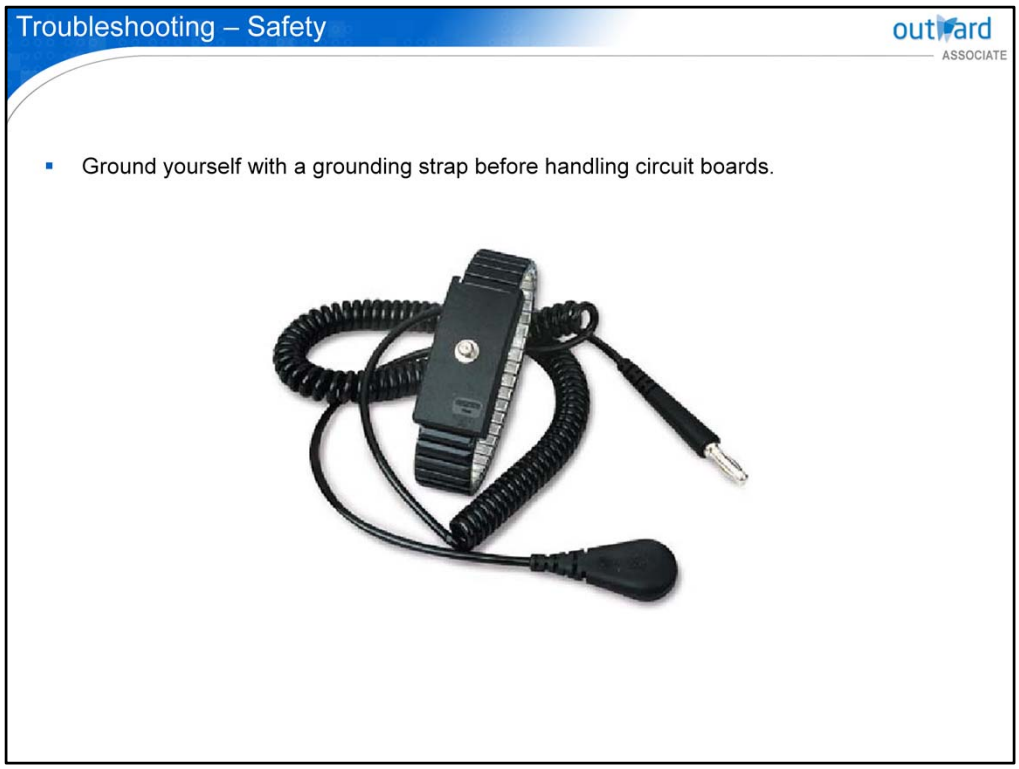
Active-low inputs and outputs are primarily the main signal types you will see. Active-high inputs and outputs are less common. These signals can be identified by the flag on the arrow pointing up, rather than it pointing down.

Also, you may sometimes see arrows with flags positioned both up and down, indicating that the pin has alternating high and low signals. These alternating signals are typical when receiving input from components that often change states. A thermistor signal, for example, changes states while alternating between two levels to maintain temperature.

Shown here is a legend of the connector types and signal identifiers that are typically found on a wiring diagram.



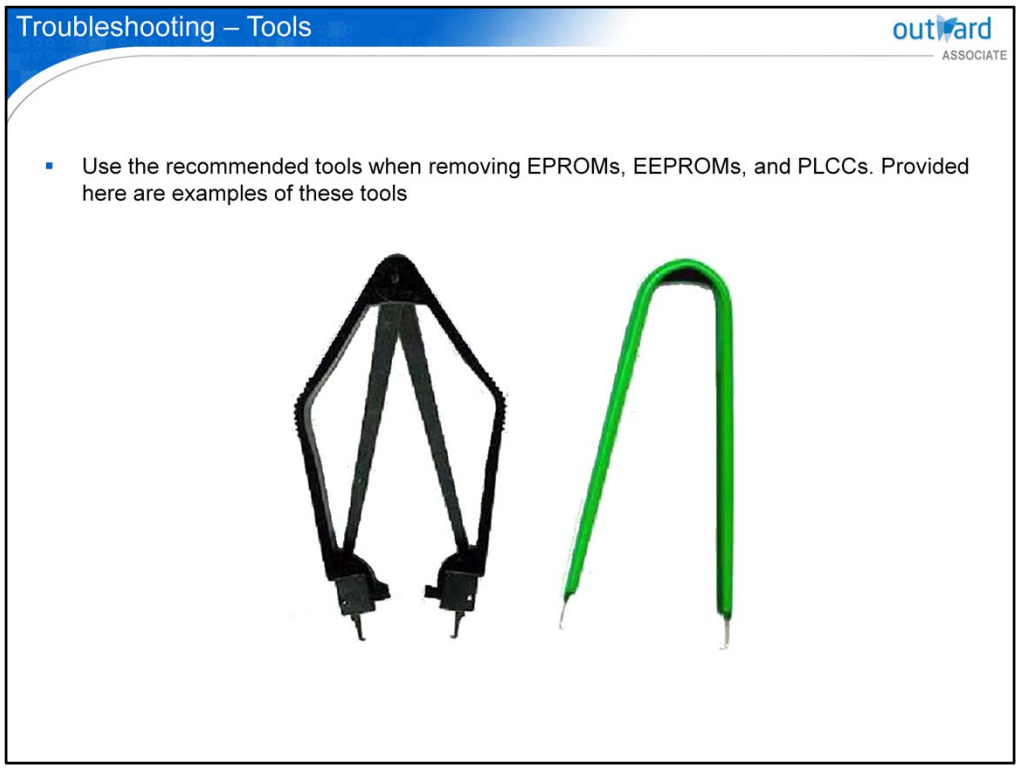
To check the voltage level at the 5Vdc connector, first turn the dial on the meter to the 20Vdc range. Now, place the negative meter lead at the GND pin and the positive lead at the corresponding 5Vdc pin. You should see a reading of 5Vdc on the display. To check the voltage level at the 24Vdc connector, first turn the dial on the meter to the 200Vdc range. Now, place the negative meter lead at the GND pin and the positive lead at the corresponding 24Vdc pin. You should see a reading of 24Vdc on the display.



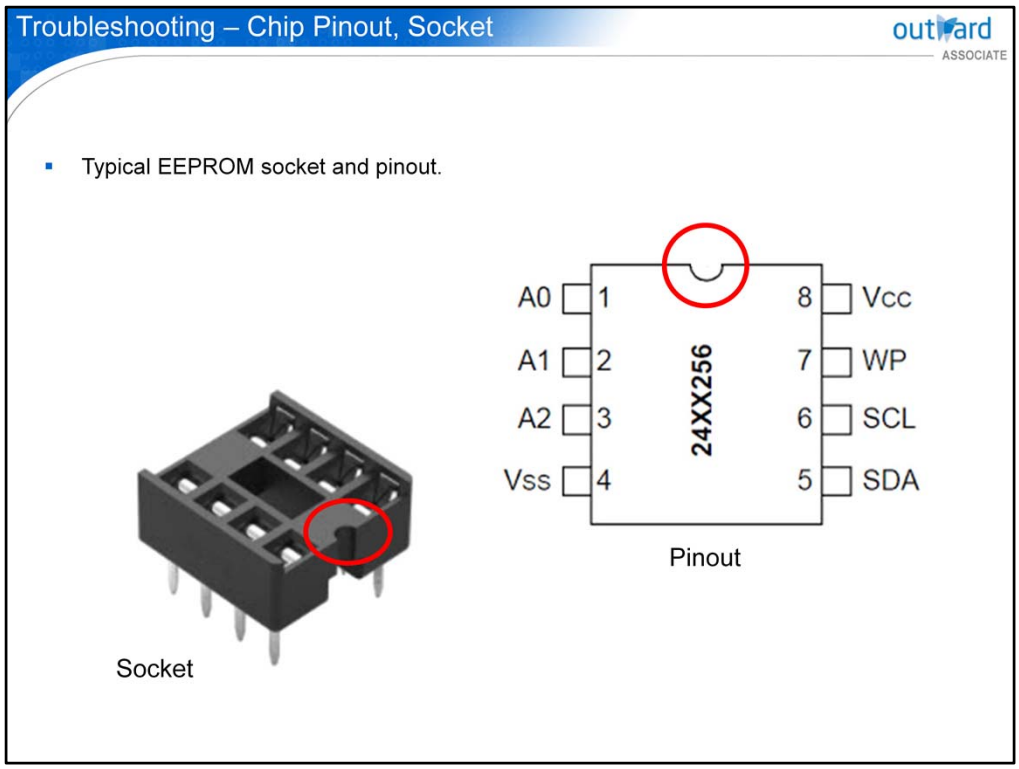
Most of the IC components on PCBs, such as circuit boards or memory devices, operate using low voltage levels. Therefore, these components may get damaged by an electrostatic charge should you accidentally touch the pins of these components.

Therefore, it is recommended that before you handle such boards, that you properly ground yourself by using a grounding strap. By doing so, electrostatic charges that are emitted from your body will harmlessly be diverted to ground, and not the components on the circuit board. Shown here is a sample of a static wrist strap.

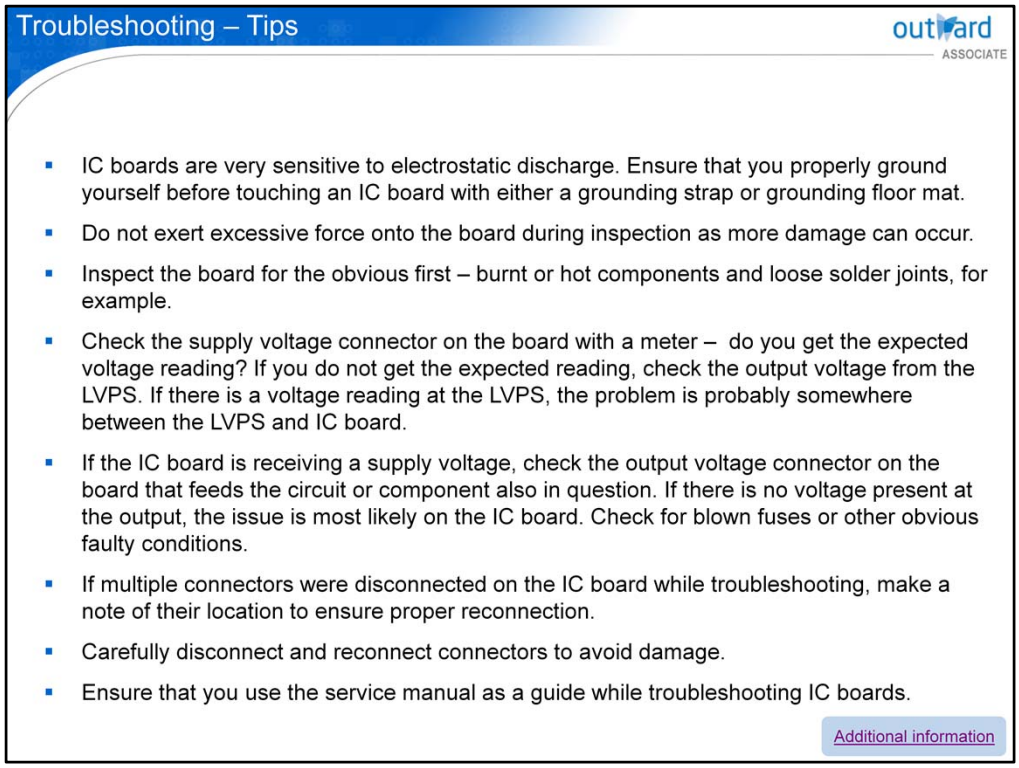
WARNING: Never use a static grounding device when the machine has power that is applied to it, as you could be electrocuted. Only use the static wrist strap when the machine is unplugged.



Shown here are the recommended tools for removing an EPROM, EEPROM, and PLCC. To remove these components, first insert the tangs of the extraction tool under each side of the chip. Then, while squeezing the tool, carefully lift the chip straight up and out from the socket, avoiding damaging the pins.



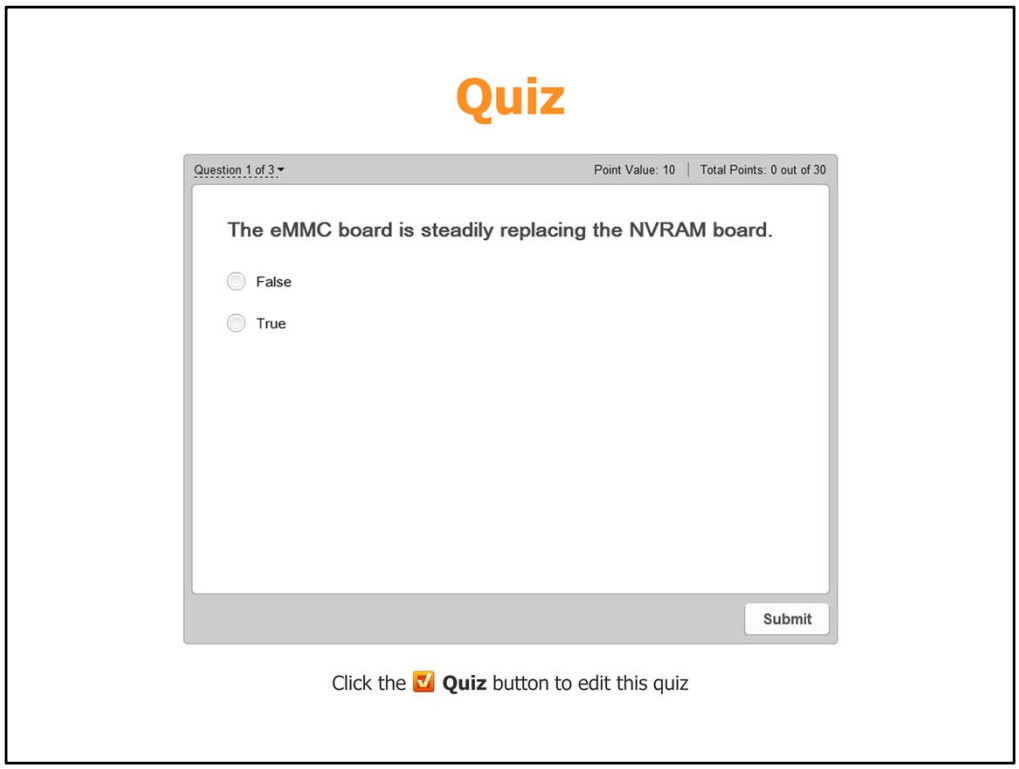
Notice that the EEPROM socket has a cutout in it. This cutout designates which side pin one of the EEPROM should be aligned at. Now look at the notch at the end of the EEPROM, which also designates where pin one of the EEPROM is located. Do not rely on the label being correctly applied as to what designates pin one. When reinstalling the EEPROM, avoid damaging the pins by carefully aligning the pins correctly to the socket. The EEPROM will not function properly if any of the pins are damaged.



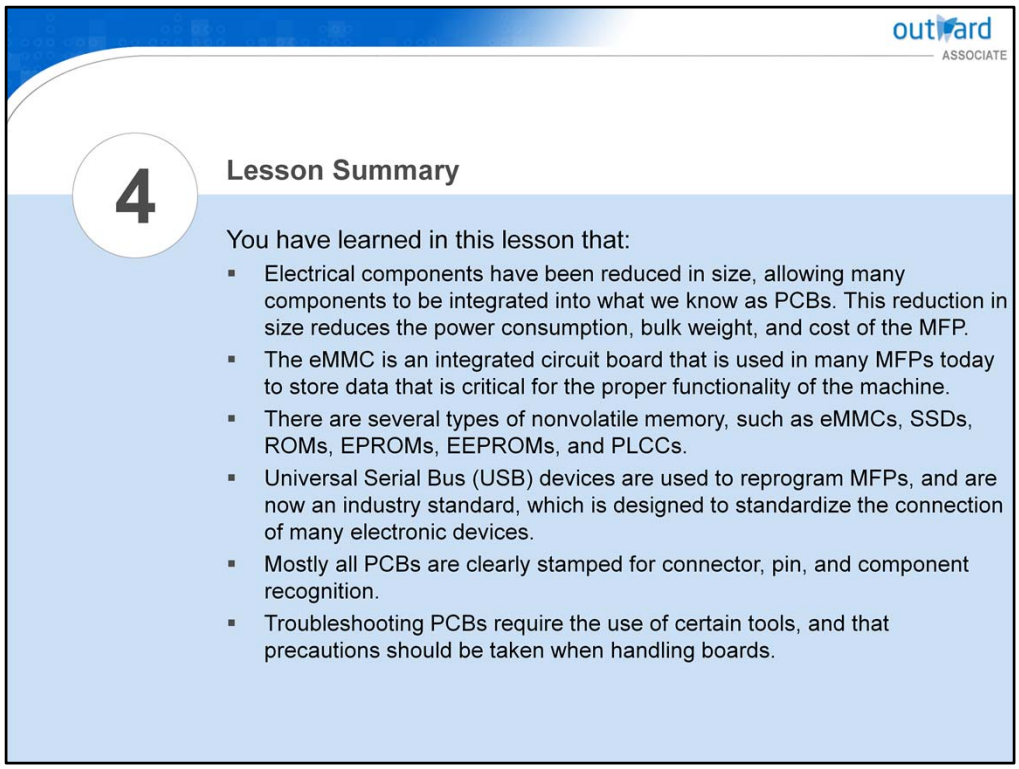
There may be times where a circuit board, such as the MFP board, is suspect for having an issue, in spite of any protection devices that are installed. Issues from failing capacitors, resistors, or IC chips can occur over time. Due to the complexity of IC boards, only basic checks should be made in the field to identify an issue, unless additional steps are specifically identified in the service manual.

When troubleshooting a circuit board, make sure that you are properly grounded to avoid electrostatic discharges that could damage the board. Do not exert excessive force onto the board during inspection. Inspect the board for the obvious first. Determine if there is supply voltage present by performing a meter check at the input connector of the circuit board. If there is supply voltage at the board, check the voltage at the board's suspect output connector to determine if the issue is beyond the board, or at the board itself. If multiple connectors need to

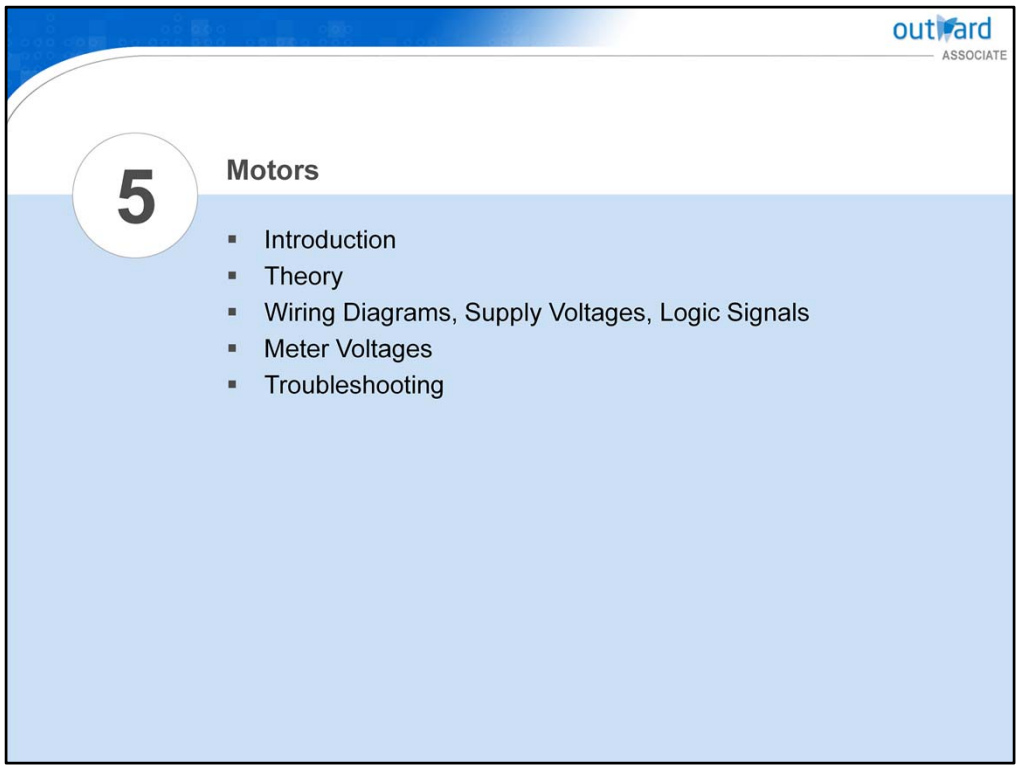
be disconnected, make a note of where they need to be reconnected, to avoid misconnection. Avoid damaging the connectors while disconnecting and reconnecting them. And lastly, refer to the service manual as a guide while troubleshooting. Select the link for additional information.



To verify your understanding of the lesson, take this quiz.



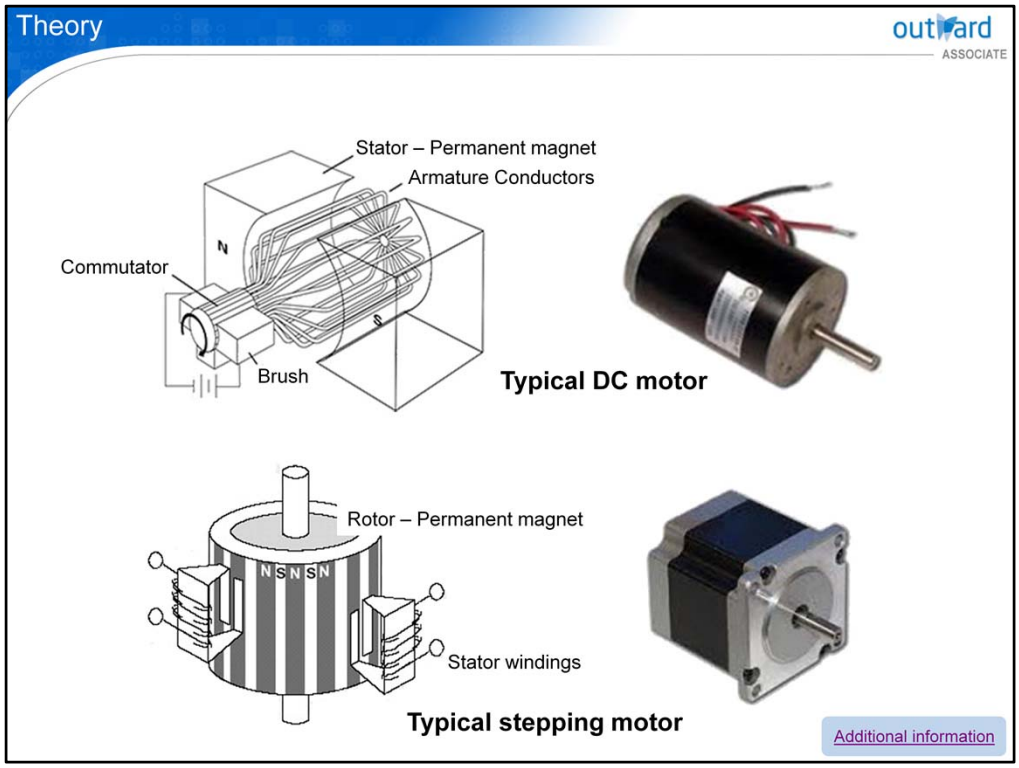
Provided here is a summary of the topics that you learned about in this lesson.



Welcome to Lesson 5, Motors. Within this lesson, you will first be provided with an overview of motors. You will then be presented with basic wiring diagrams depicting supply voltage and logic signal lines. Meter voltages will then be presented for the various motor signals, followed up by troubleshooting information.

Motors convert electrical energy into rotational, mechanical energy through a shaft, and basically fall under one of two types: AC or DC motors. Most motors used today in MFPs are DC, since an AC motor creates electrical noise that could affect the operation of the MFP.

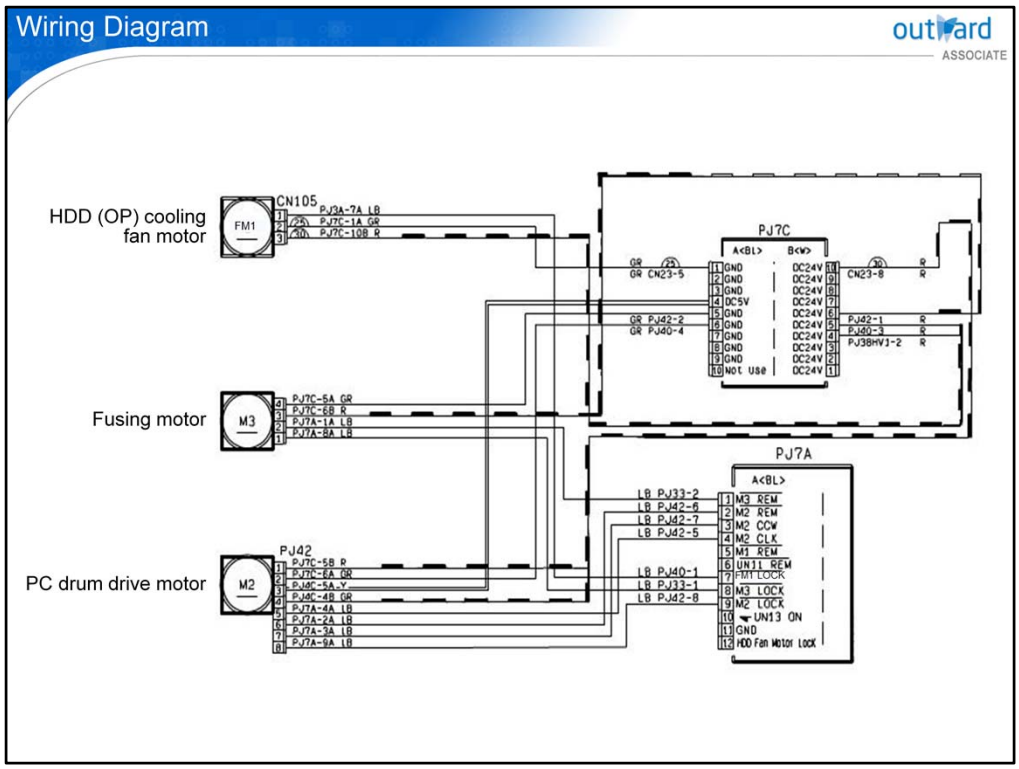
We will cover some of the most common ones. We will also describe an AC-type motor that uses a pulsating DC voltage, and how to check this type of motor.



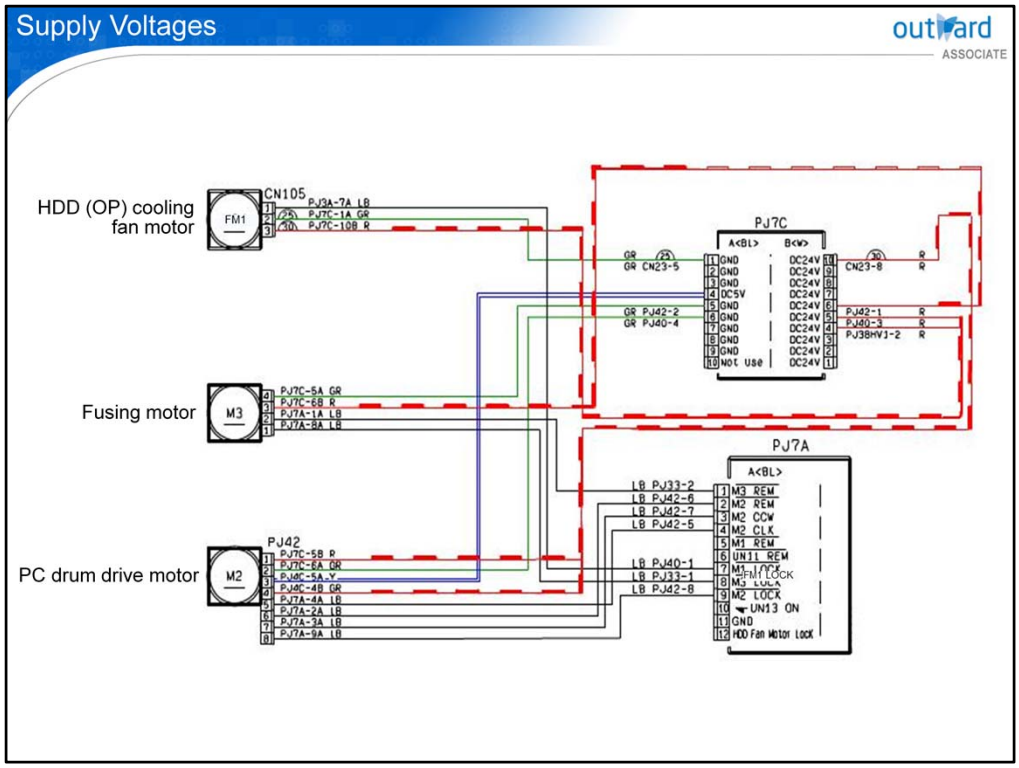
MFPs use different kinds of DC motors that are based on the required function that they have to perform. The typical DC motor found in MFPs, consist of carbon brushes and a commutator that supplies DC voltage to the armature, which consists of field windings. The polar effect of the permanent magnet that surrounds the armature, causes the armature and shaft to rotate. These motors can be constructed to rotate in one direction only, or unidirectional, or rotate in either direction, or bidirectional.

Another motor that is commonly used in MFPs is the stepping motor. These motors are electromechanical devices that convert electrical pulses into discrete mechanical movements, or steps. DC voltage pulses being applied to the surface of the magnetic rotor via the stator windings, produces these steps. The stator windings consist of alternate north and south pole bands. The faster the rate of pulses, the faster the rotation of

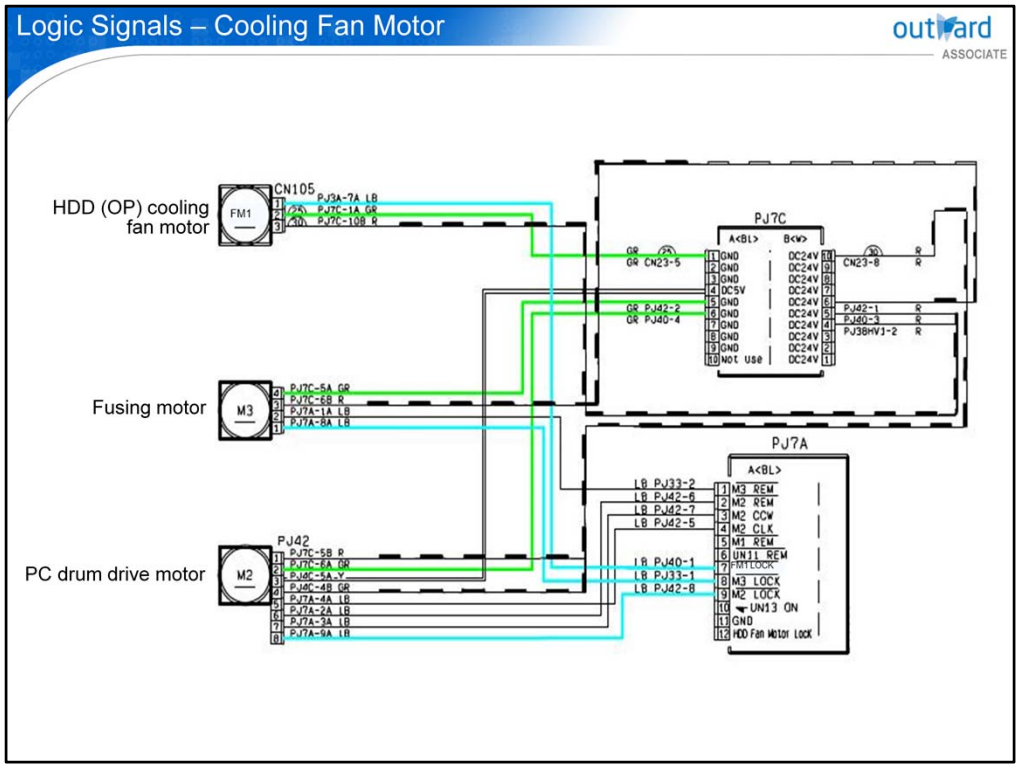
the shaft. Stepping motors are used when the speed of a mechanical unit has to be controlled precisely. Select the link for additional information.



Provided in this diagram are the controls for three different types of motors. They are PC drum drive motor M2, fuser drive motor M3, and a cooling fan motor for the hard disk drive.

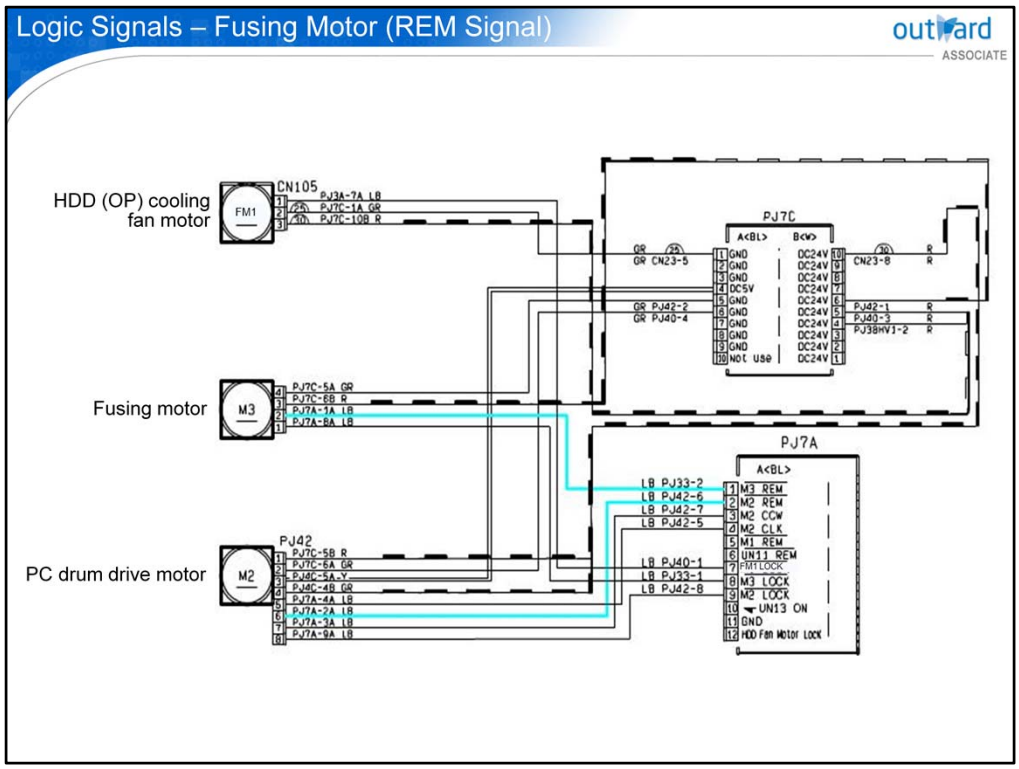


Here are the different supply voltages for each of the motors. All use 24Vdc and ground; however, the drum motor also uses 5Vdc.

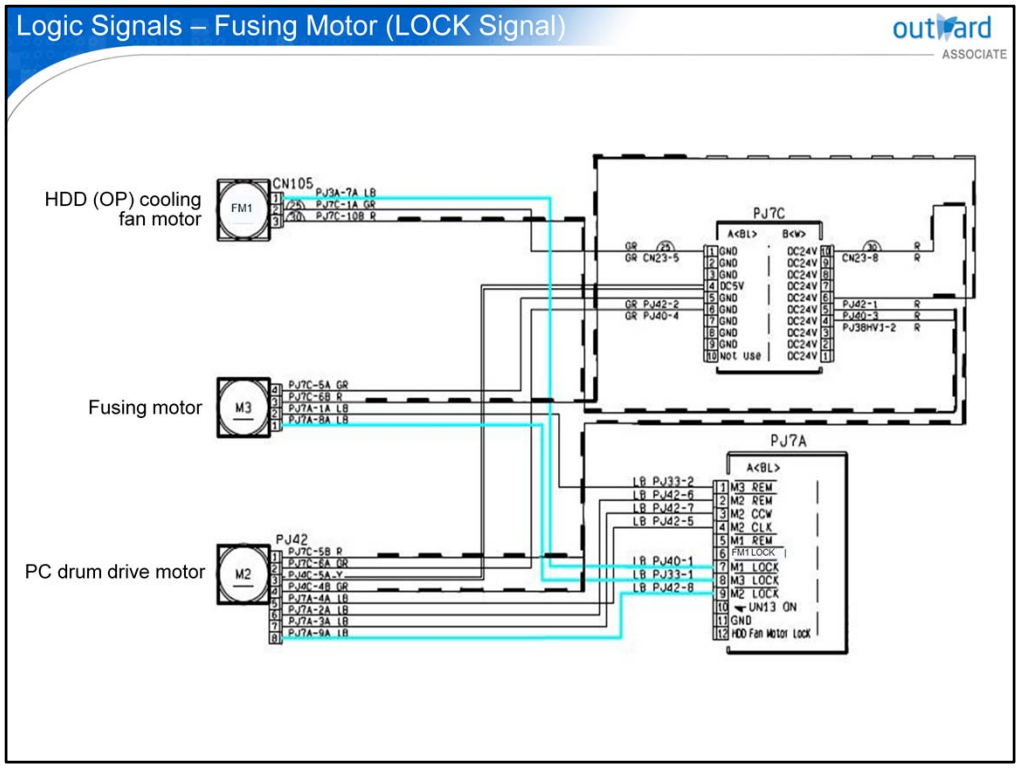


Starting with the simplest motor, the cooling fan, we can see it has 24Vdc and ground that is supplied to it all the time. The only logic signal here is a malfunction detection, or lock signal, that will inform the MFPCB that the motor is not rotating.

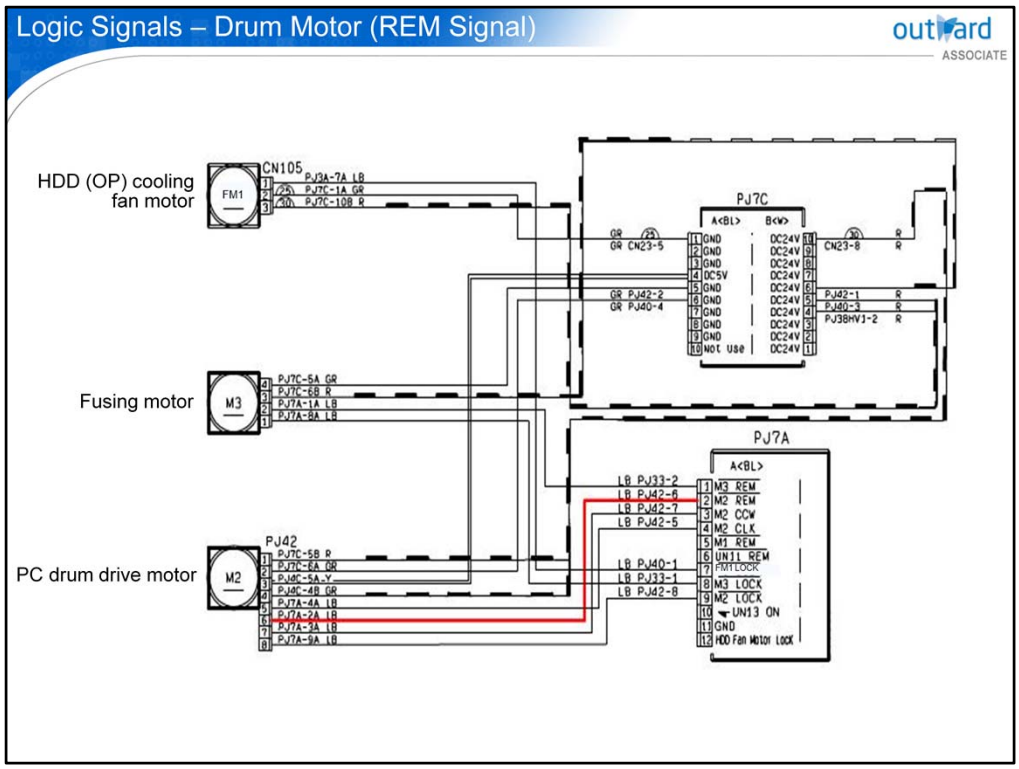
There are motors without malfunction detection lines that provide no input back to the MFPCB. Therefore, only a visual inspection of the motor or the component that is driven by the motor can determine if a malfunction occurred. This visual inspection also applies to other malfunctions that are related to the component that is driven by the motor.



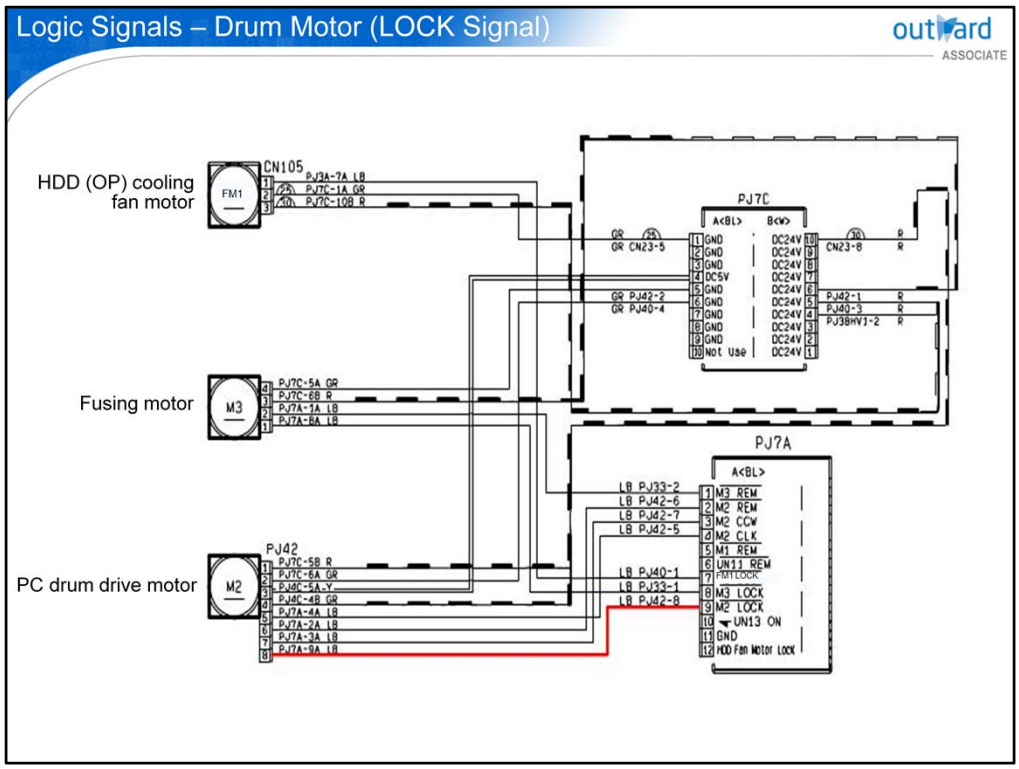
Next, we will look at the logic signals for the fusing motor. Here we have two signals. First, a REM, or ON and OFF signal, to turn the motor ON.



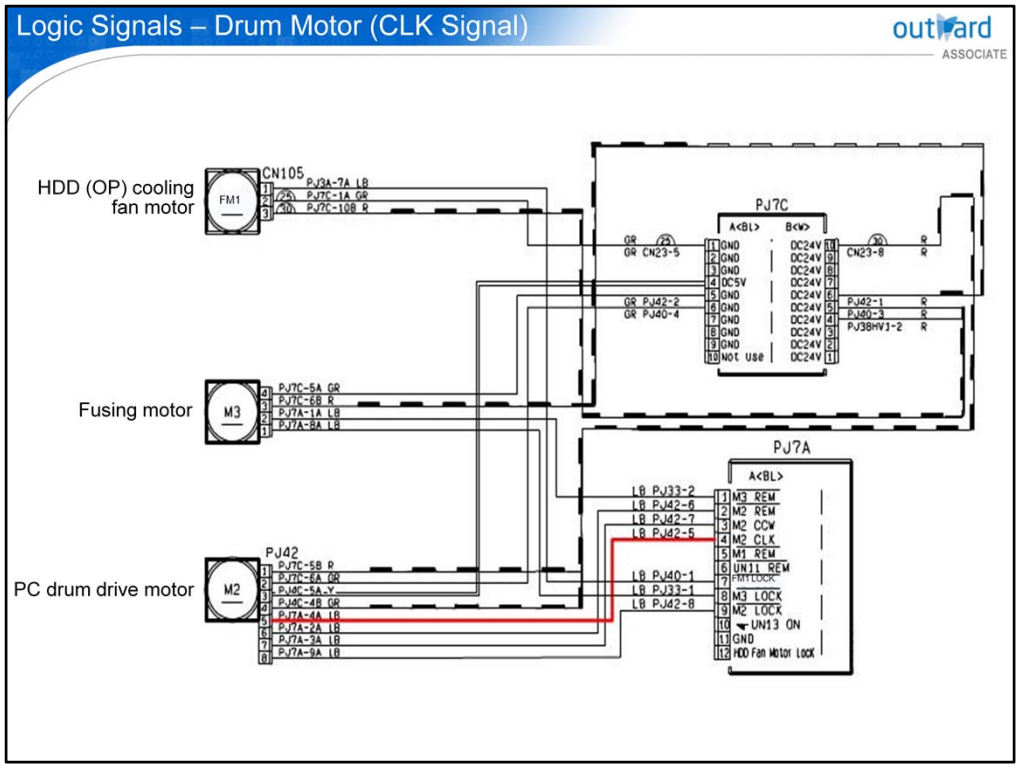
Second, a LOCK signal that provides rotation detection information back to the control board.



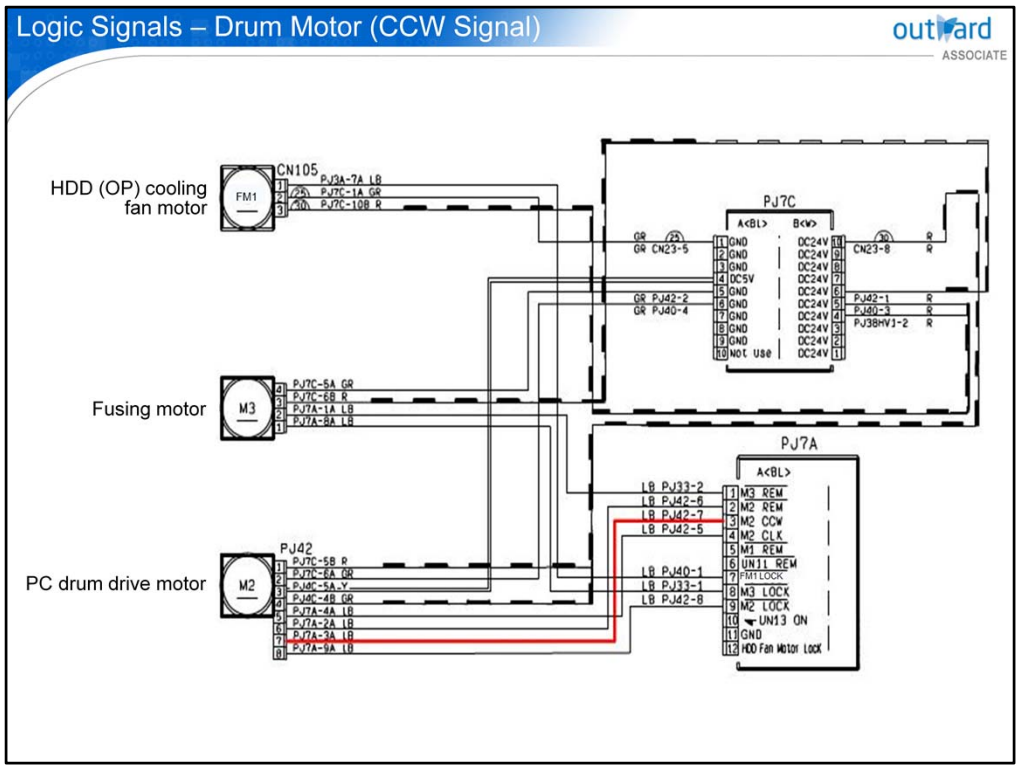
Now, we will look at the PC drum drive motor. This motor is more complex than the others, but builds on the information that you have seen from the previous motors. It has the same REM, or ON and OFF signal.



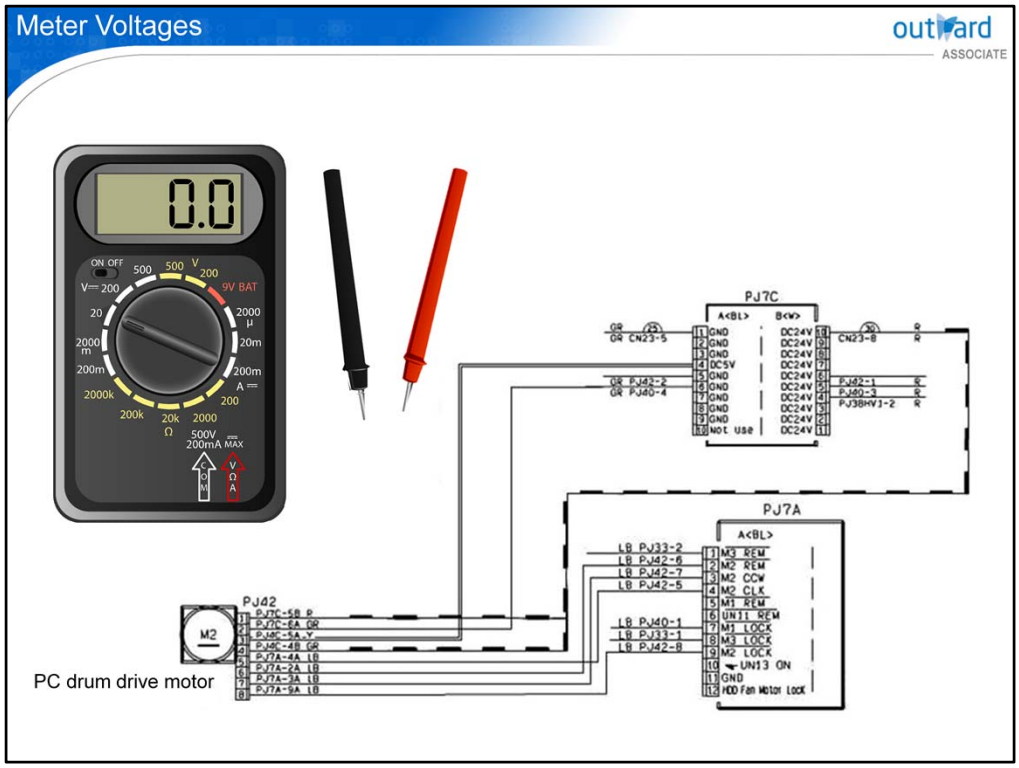
It also has the same LOCK signal or rotation detection signal.



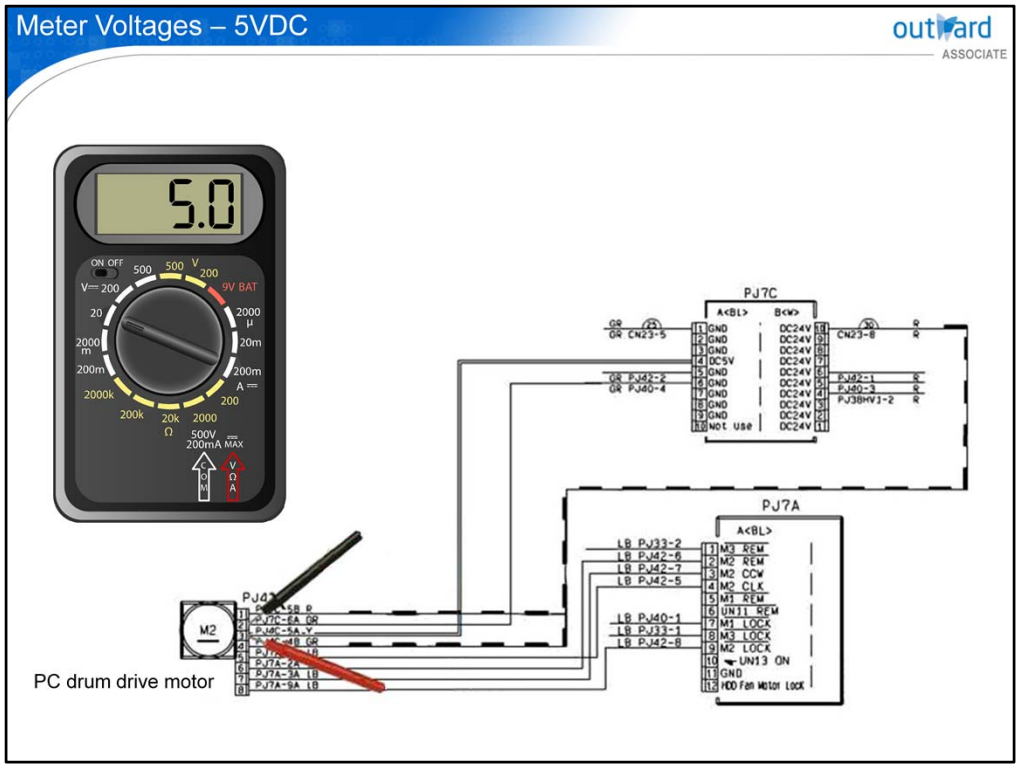
The CLK signal provides a signal that synchronizes the motor with other motors to maintain proper timing. In this case, the synchronization of the image to the PC drum.



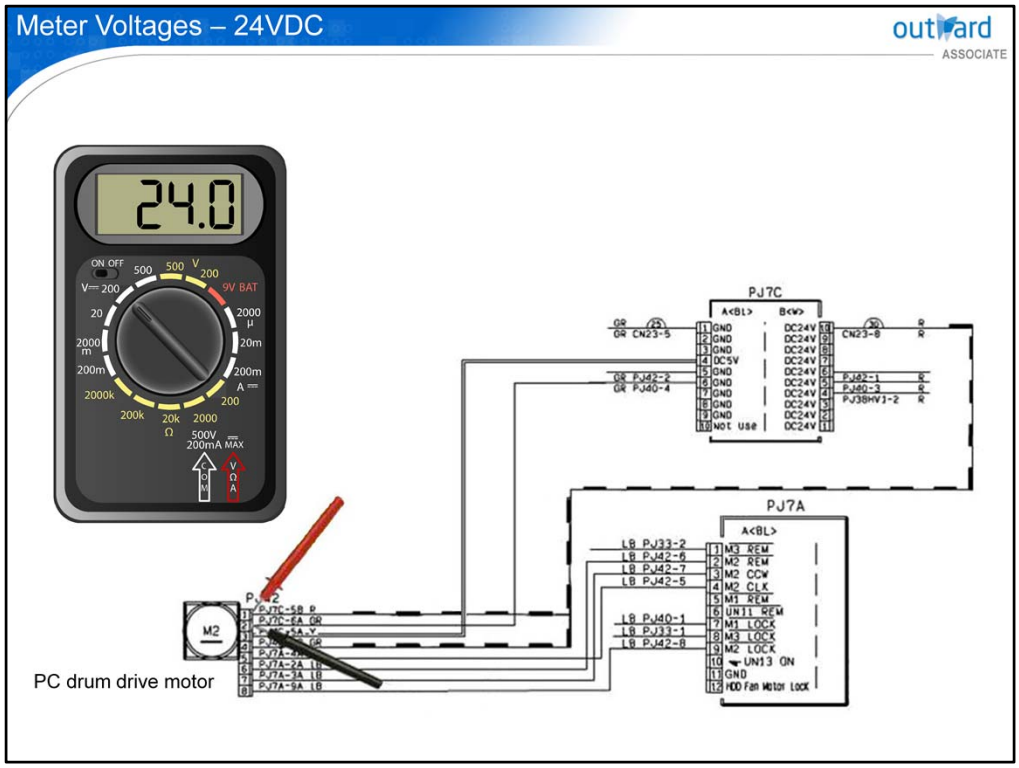
Lastly, we will discuss the counterclockwise, or CCW, signal. This PC drum motor will reverse slightly at the end of a copy cycle to help remove toner and paper contaminates between the cleaning blade and the PC drum.



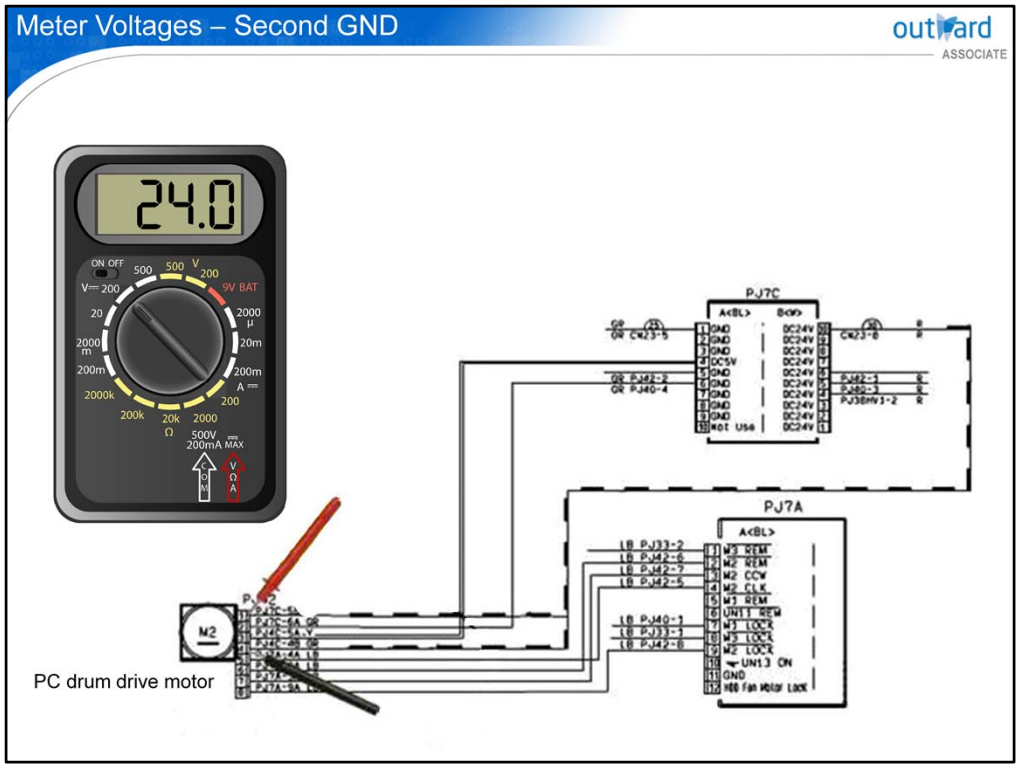
We will use only the PC drum motor for metering the voltages, since it has the same types of voltages and logic signals. This motor also has a few additional signals that we can look at.



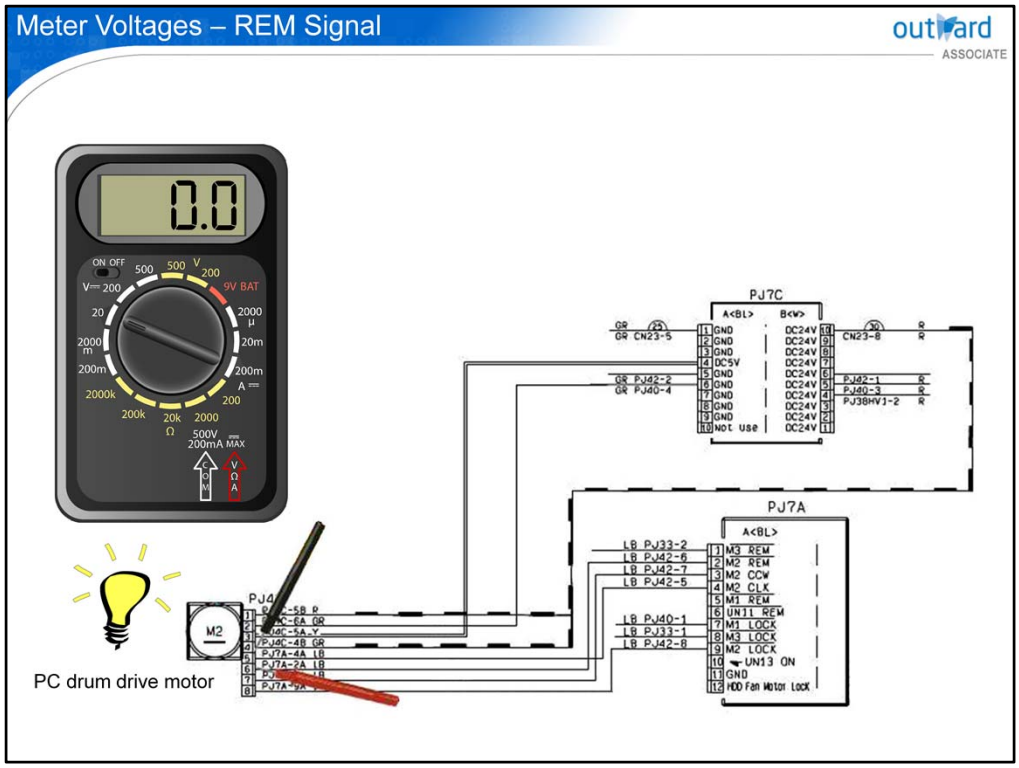
Check the 5Vdc, 24Vdc, and the ground. First, turn the meter dial to 20Vdc as identified in this scenario. Then, place the negative meter lead in the ground connection, PJ42, pin 2. Place the positive lead at pin 3, the meter will then read 5Vdc.



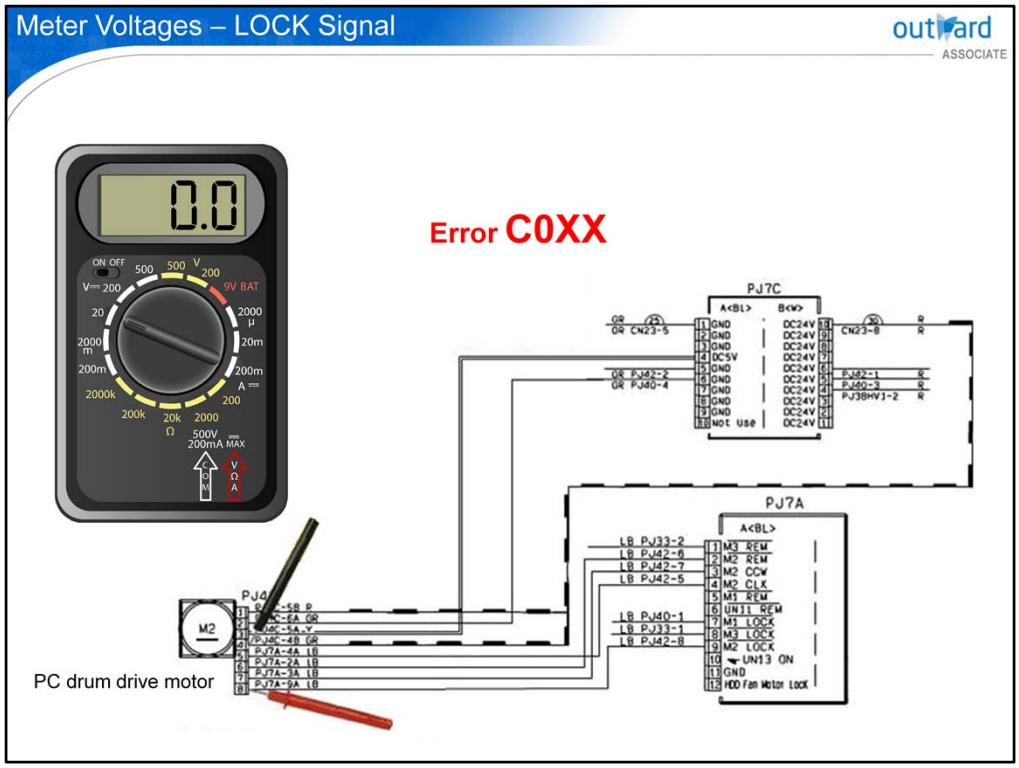
Next, turn the meter dial to 200Vdc as identified in this scenario. Then, move the positive lead to pin 1; the meter will now read 24Vdc.



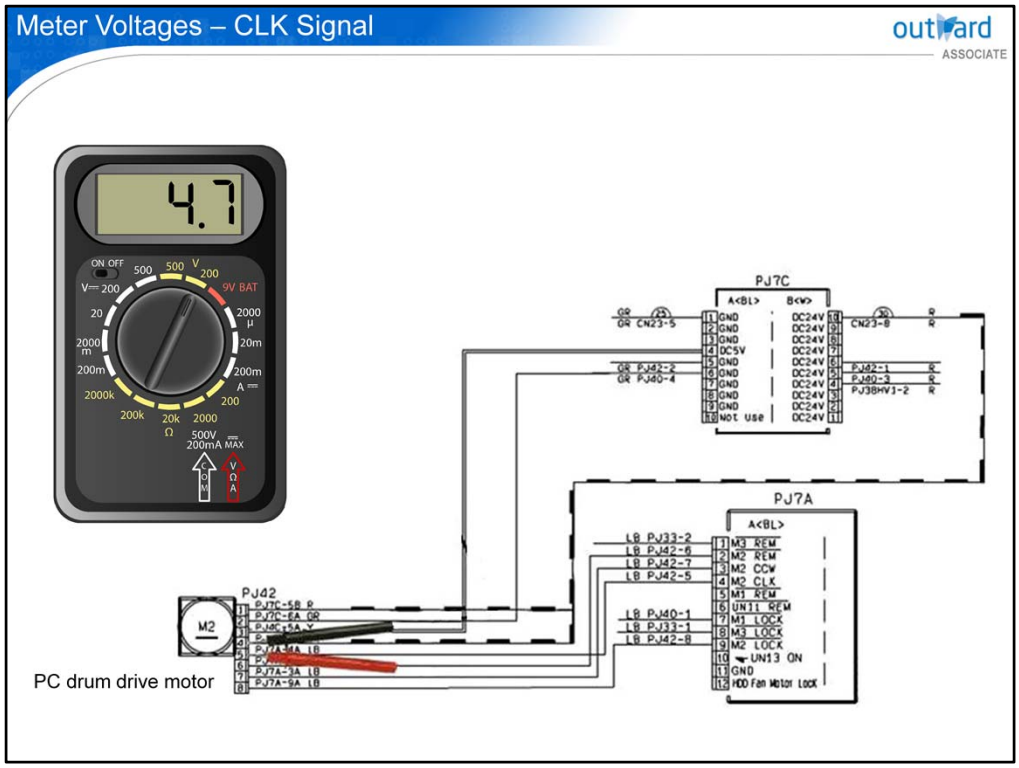
Since there are two grounds, we will also make sure that the other ground is present by moving the negative meter lead and checking the 5Vdc and 24Vdc supply voltages again.



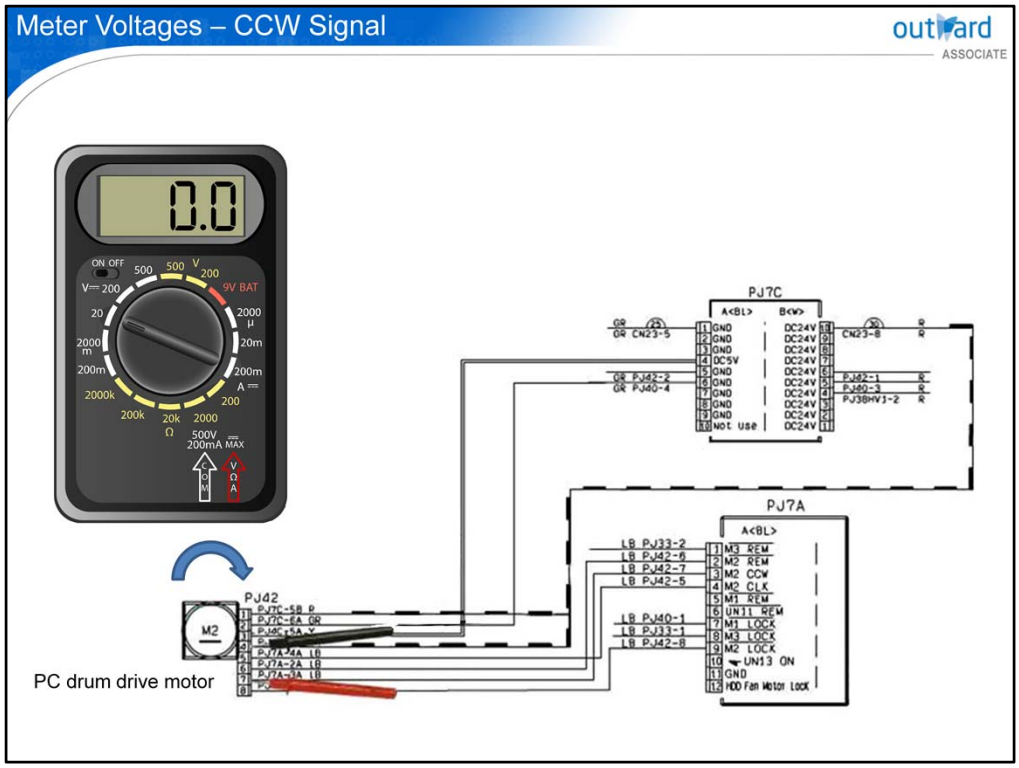
Next, check the REM, or ON and OFF signal. First, turn the meter dial to 20Vdc. Leave the negative meter lead at pin 4 and move the positive lead to PJ7A, pin 2A. The meter will initially display a high of 5Vdc, and then switch to zero volts when the motor is energized.



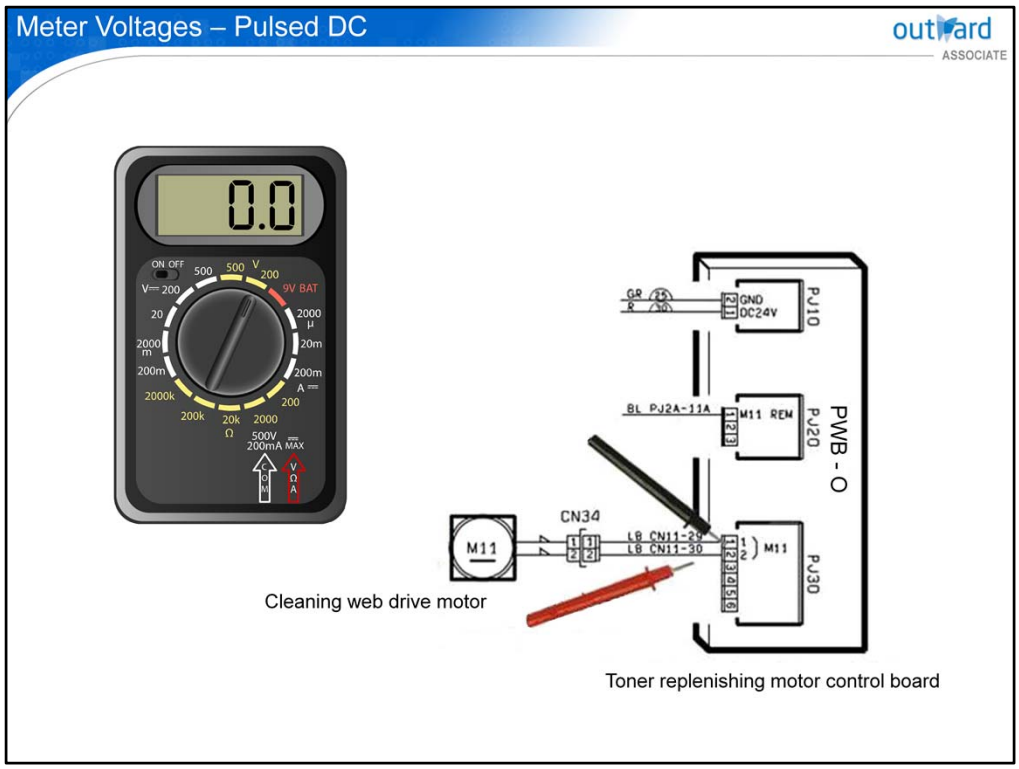
Now, check the LOCK or malfunction detection signal. Leave the negative lead at pin 4 and place the positive lead at PJ7A, pin 9A. The meter will read 5Vdc under normal operating conditions. If the motor is not rotating when it should, or the motor continues to rotate after the REM signal returns to the OFF state, a malfunction code will occur. Under this condition, the voltage that is measured will be at 0 volts.



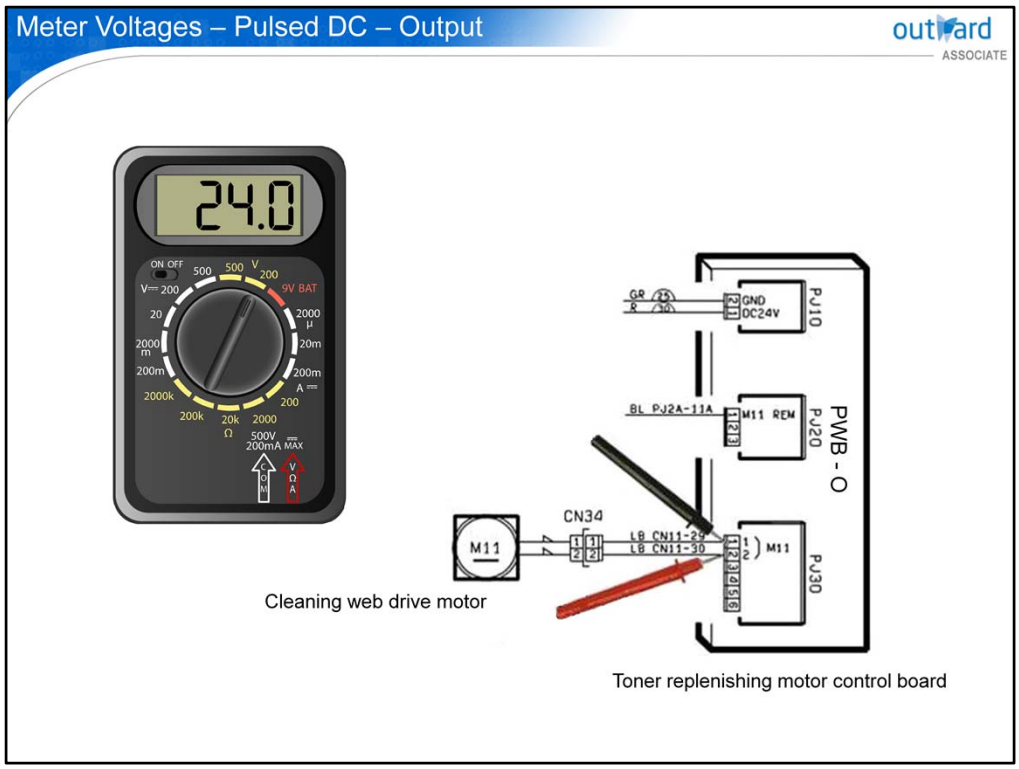
Regarding the clock, or CLK, timing signal, unless you have an oscilloscope, you will not be able to read this signal properly. This signal is a pulsating DC voltage, basically a square wave. With your meter set to DC, you will not be able to read the change-of-state as it crosses the zero volt thresholds. You will be able to read this signal by selecting 200 VAC on the meter. However, you will only see that a signal is present; you will not be able to confirm that it is working properly.



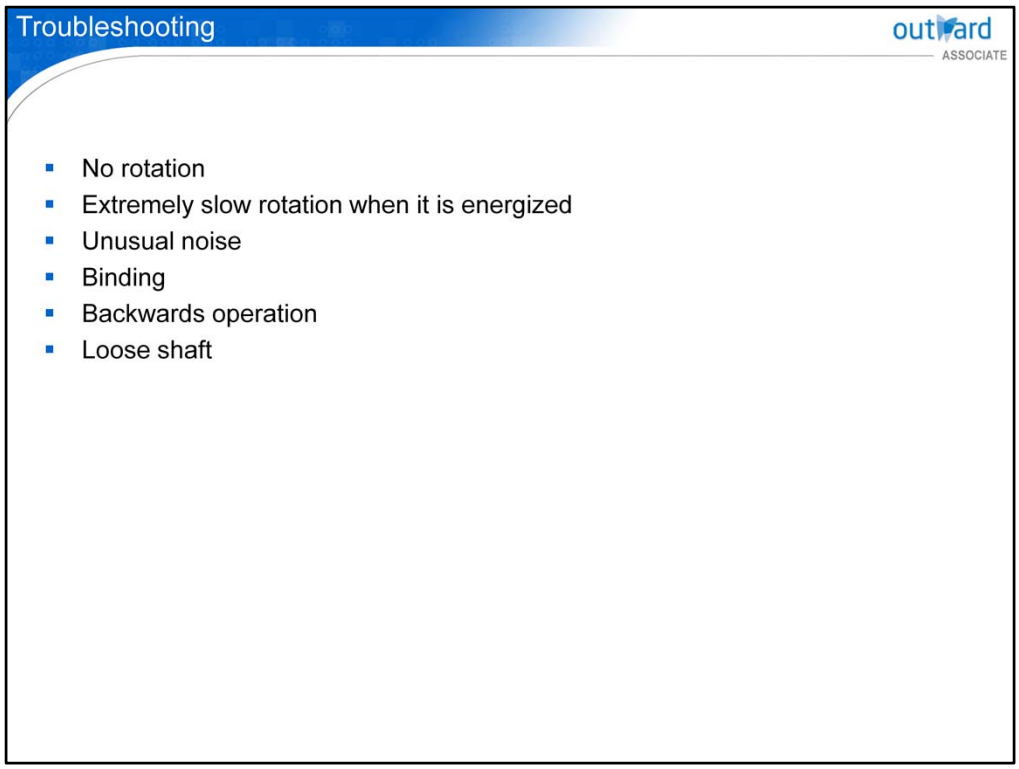
Lastly, with the meter dial set to 20Vdc as shown, notice that the CCW signal in this case will remain high as long as the motor is turning. The signal will then switch to a low state when the motor reverses direction at the end of the copy cycle.



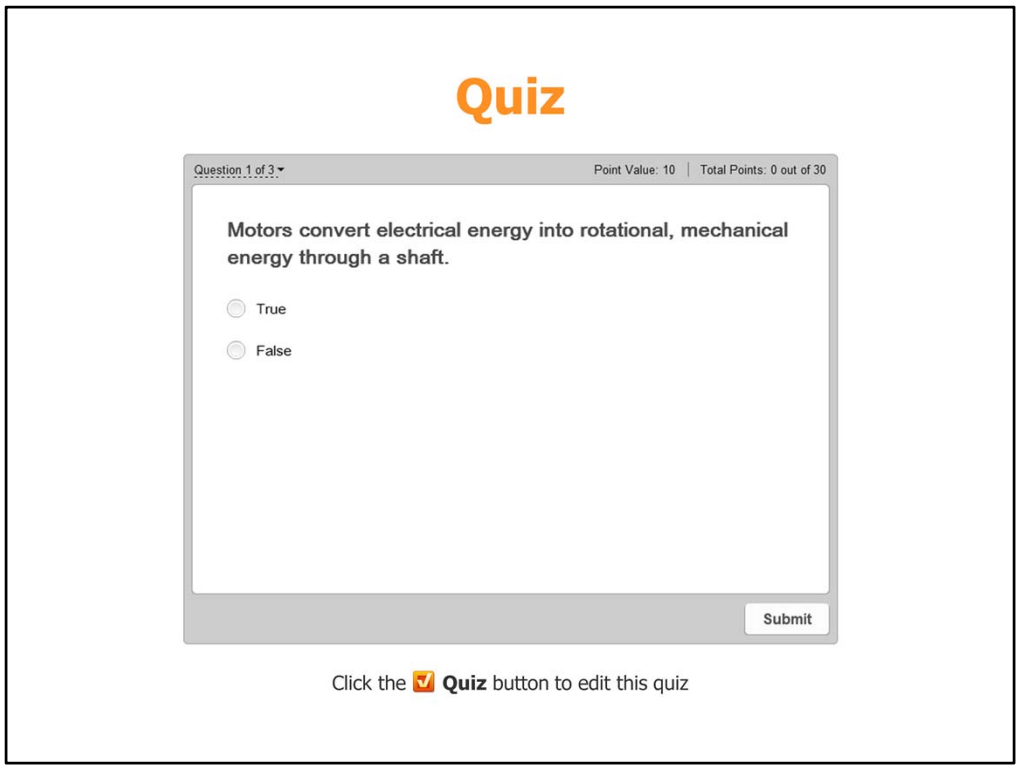
And now, the confusing AC motor. This motor is used mainly in the area of the fusing web drive and the main and sub hopper drive locations. It actually uses a pulsating DC voltage, but it must be checked using the AC voltage setting on your meter. The PCB that performs this operation, in this case, is the toner replenishing motor control board.



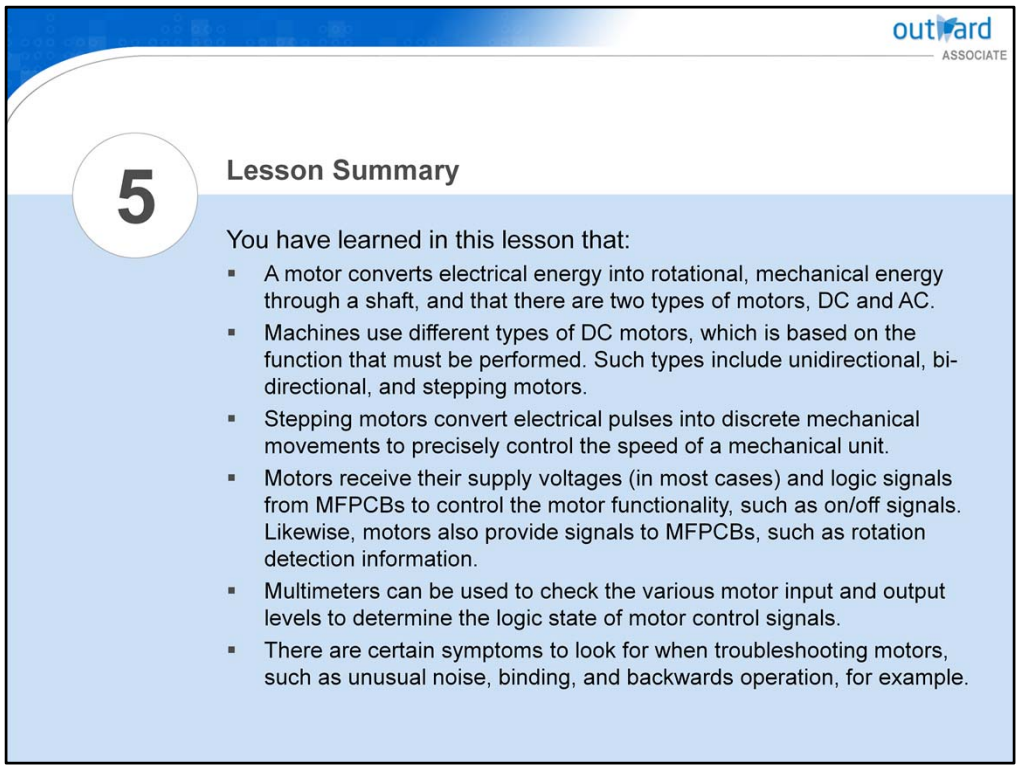
To check this type of motor, we must think of it as if it was actually being supplied an AC voltage. After selecting an AC voltage range of approximately 200 volts, we will place both leads across the motor connections at PJ30, pins 1 and 2. As in most cases, this board is supplied with 24Vdc and ground. This board is also supplied with a REM signal that tells the board to provide the pulsating DC to the specific motor. We will not cover these types of signals again, as they would be checked in the same manner as we previously covered.



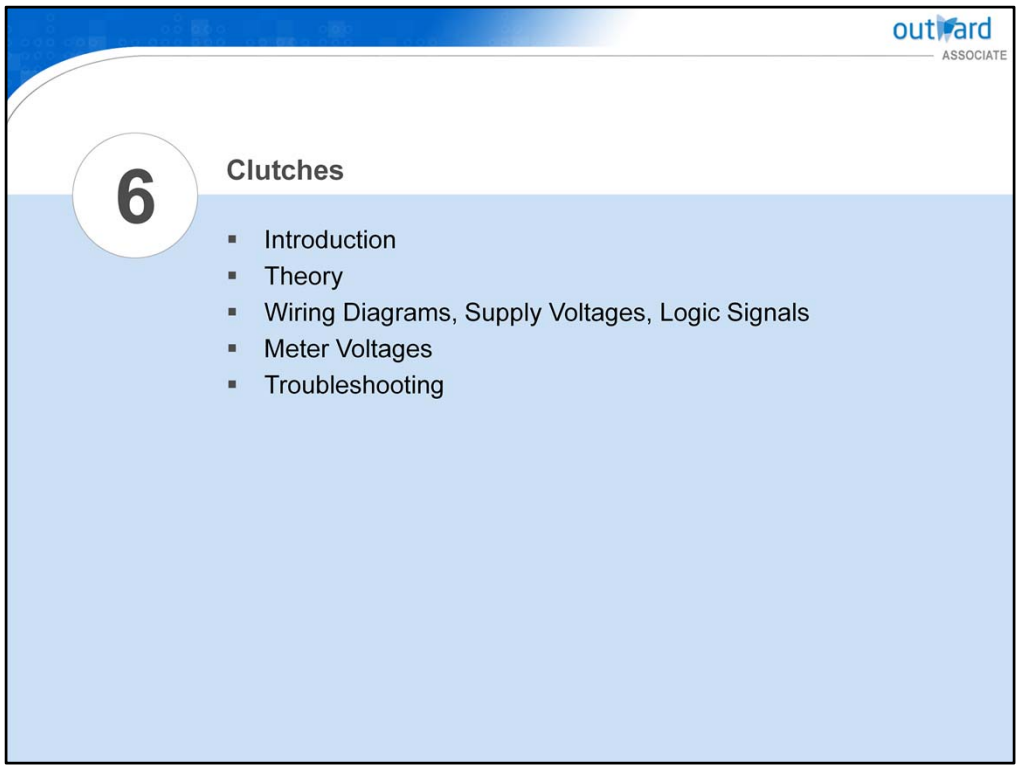
Malfunctioning motors can exhibit any of the symptoms that are listed here. Many of these symptoms will generate a malfunction code.



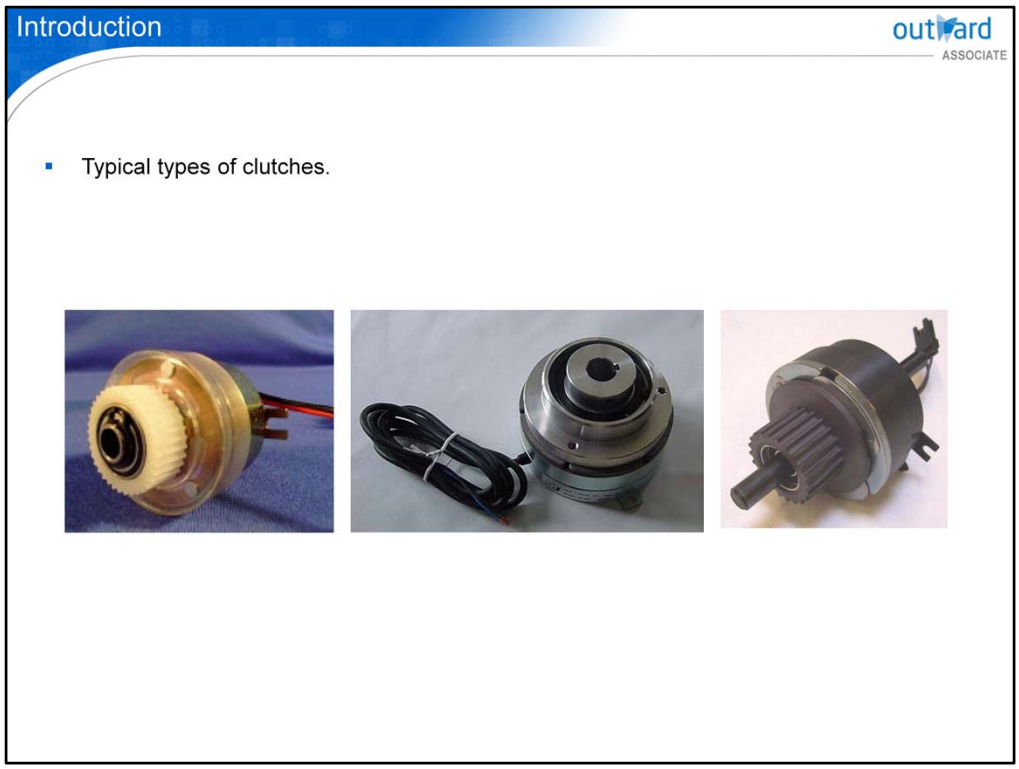
To verify your understanding of the lesson, take this quiz.



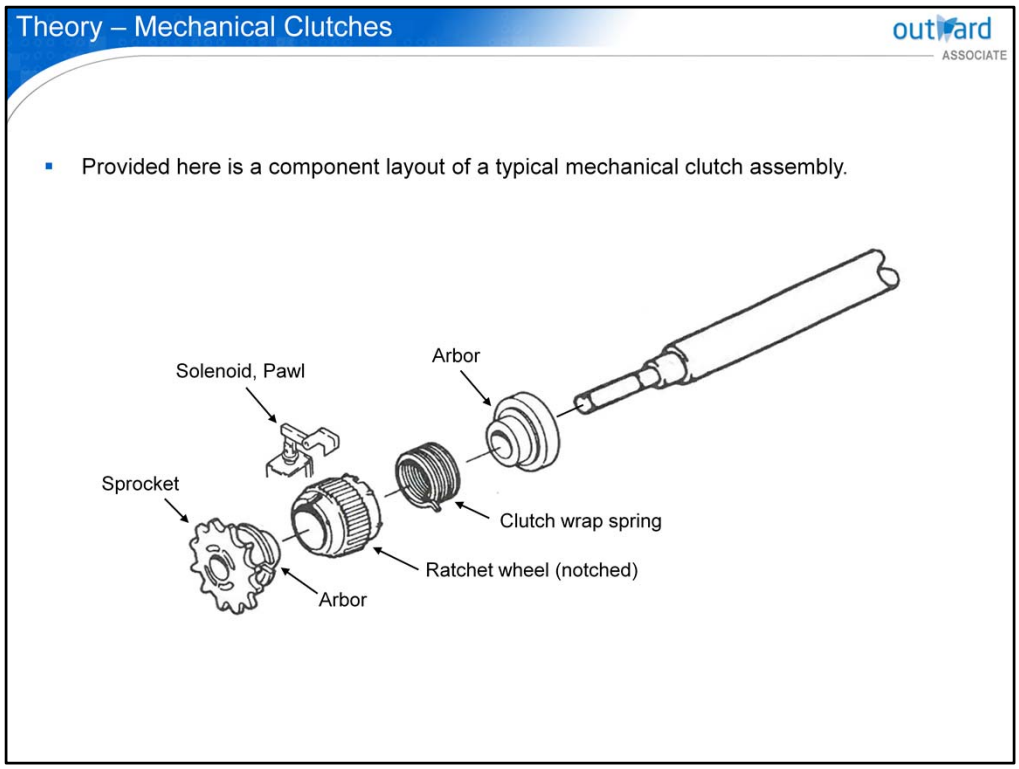
Provided here is a summary of the topics that you learned about in this lesson.



Welcome to Lesson 6, Clutches. Within this lesson, you will first be provided with an overview of Clutches. You will then be presented with basic wiring diagrams depicting supply voltages to these components. Meter readings will then be provided, followed up by troubleshooting information.

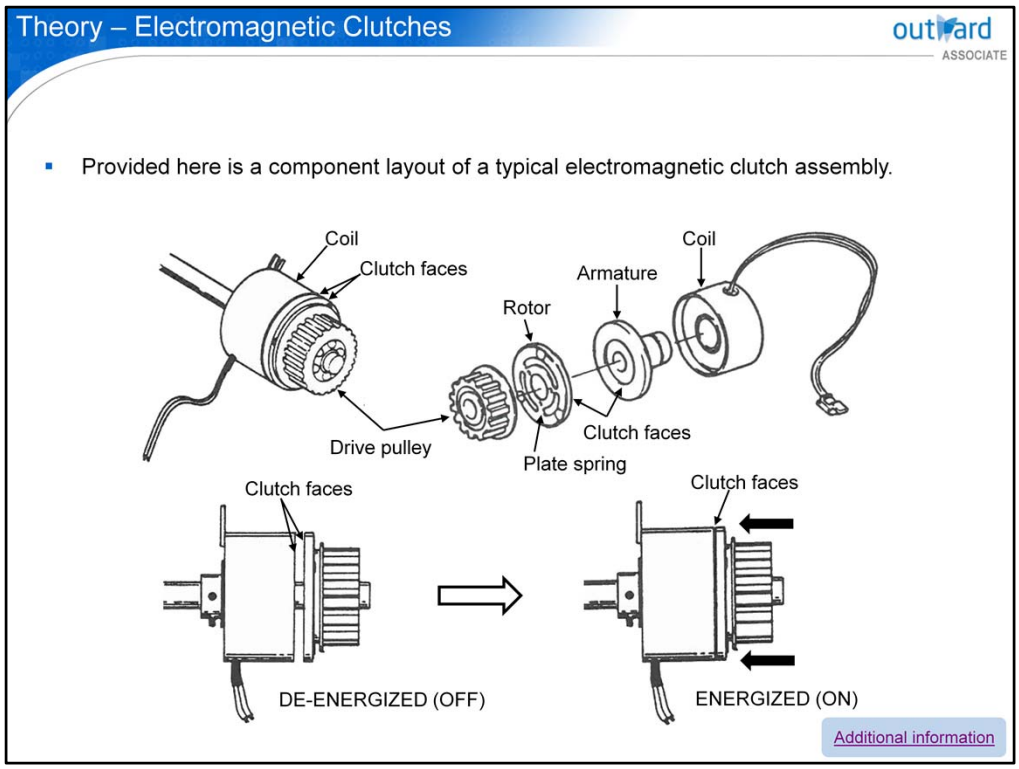


Clutches are electrical-magnetic devices that are used to transmit the drive to a roller or shaft independently from the main drive source. Clutches allow a main motor to provide drive to different areas independently, without interrupting the main drive system. Different types of clutches are available.

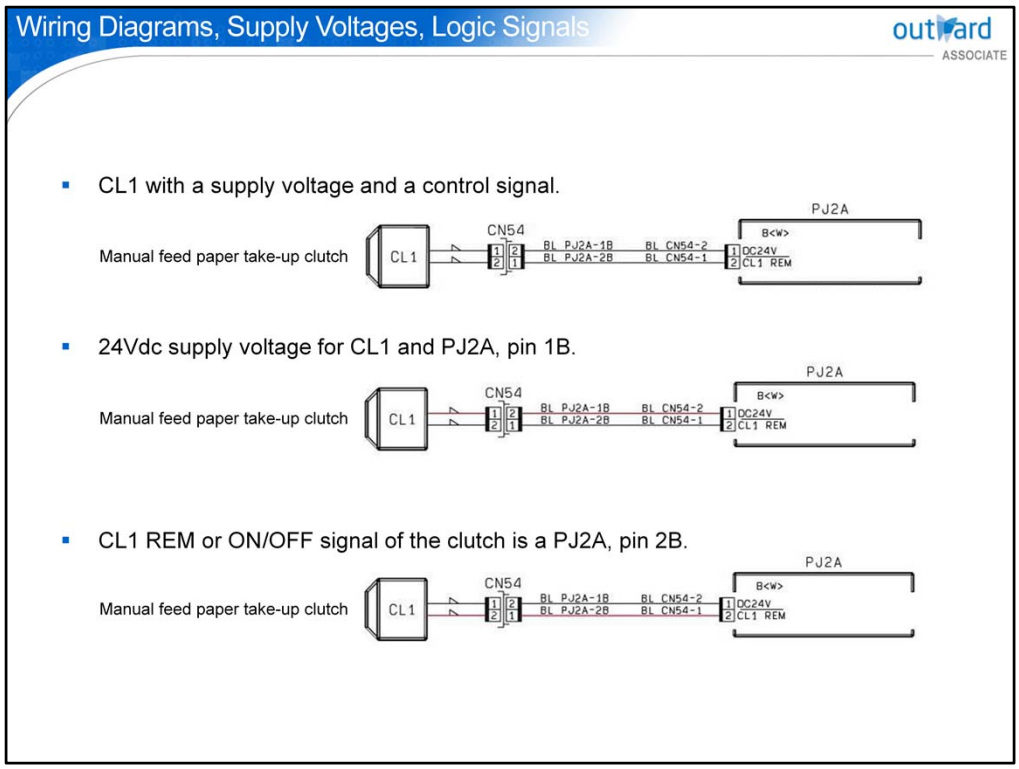


A mechanical clutch is sometimes referred to as a spring clutch, often seen on earlier models of copiers and accessories. The heart of a mechanical clutch is the steel arbor at the center, which includes a wrap spring that surrounds it. The pawl, when engaged with the ratchet wheel of the clutch, will cause the internal spring to either release from, or constrict around the arbor. The spring action that takes place depends on the type of clutch being used.

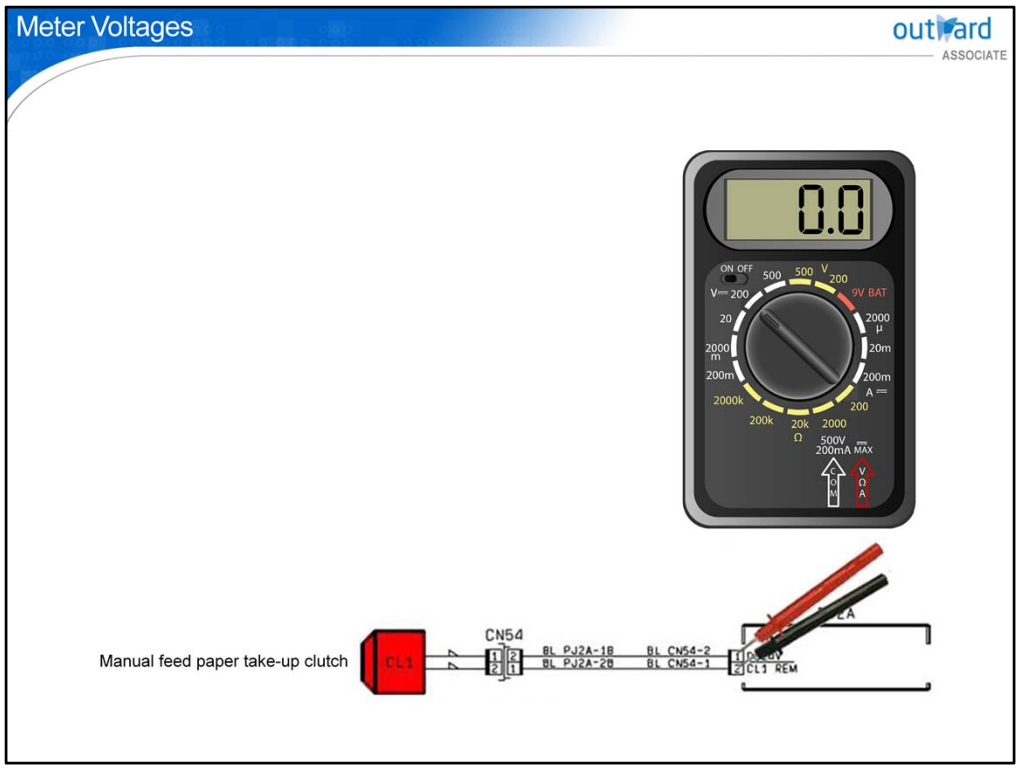
With tight-slip clutches, the spring will loosen around the arbor when the pawl engages. When the spring loosens, mechanical drive will be removed from the rollers. With loose-slip clutches, the spring will tighten around the arbor when the pawl is engaged. When the spring tightens, mechanical drive will be transmitted to the rollers.



Electromagnetic clutches, also referred to as electro-mechanical clutches, are a category of clutches not seen on earlier machines, but are used on most current machine versions. This type of clutch is comprised of components from both the electromagnetic clutch and spring clutch mechanisms, although the components and concepts can vary somewhat. With this type of clutch, an electromagnet consisting of a coil, is energized and de-energized. This process has an influence on the plate spring within the clutch. When the coil is de-energized, the plate spring is allowed to pull the clutch faces apart, and thus disconnect drive to the shaft. When the coil is energized, the magnetic field pulls the two clutches together, imparting drive from the pulley to the shaft. Select the link for additional information.



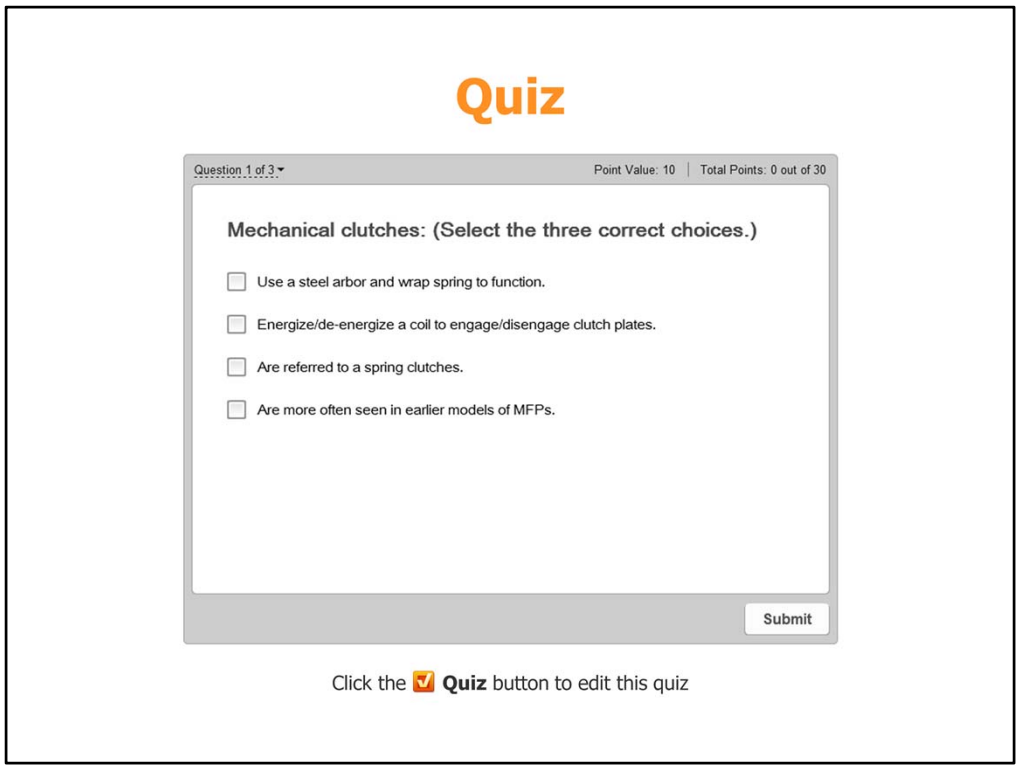
Shown here is clutch CL1 along with its 24Vdc supply voltage at PJ2A, pin 1B, and REM, or ON and OFF, control signal at PJ2A, pin 2B.



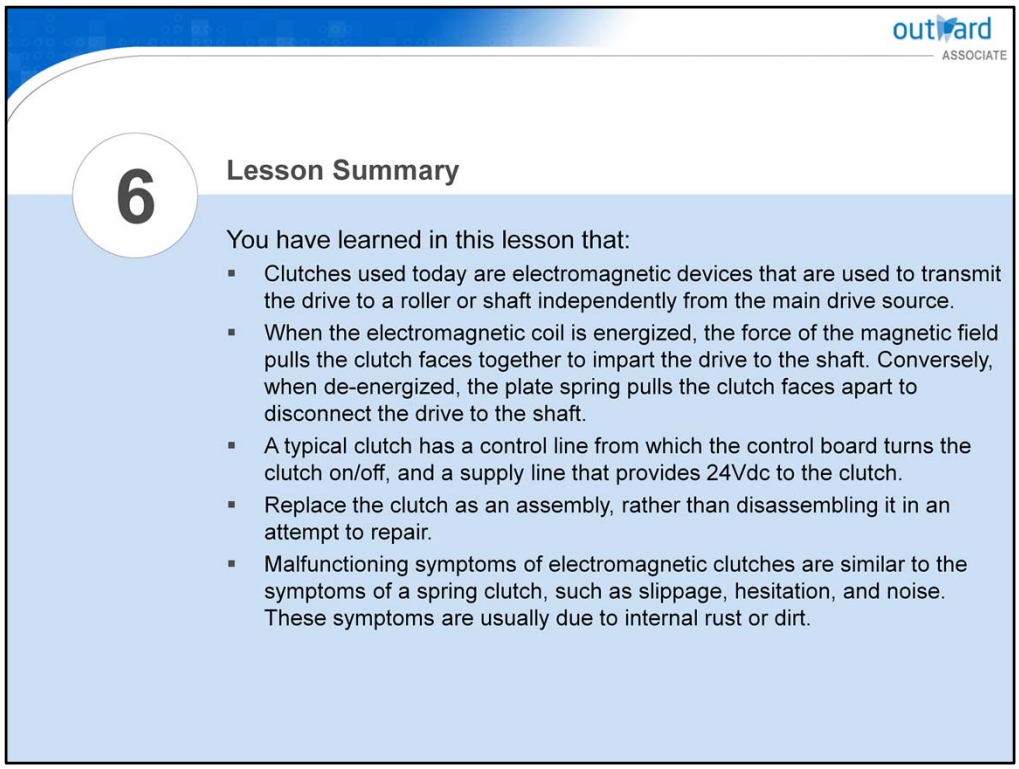
Check both the supply and the signal voltages to CL1 in one check. First, turn the meter dial to 200Vdc as identified in this scenario. With the probes across pin 1 and pin 2, there will be no potential difference, or 0Vdc, until pin 2 is switched to ground. At this point the clutch will be energized, and a value of 24Vdc should be read across the clutch.

The electromagnetic clutch is more reliable than the spring clutch. However, when maintenance is required, it is recommended that you replace the clutch assembly. Do not attempt to disassemble or clean the clutch, as irreparable damage will occur. Also, do not lubricate the clutch faces.

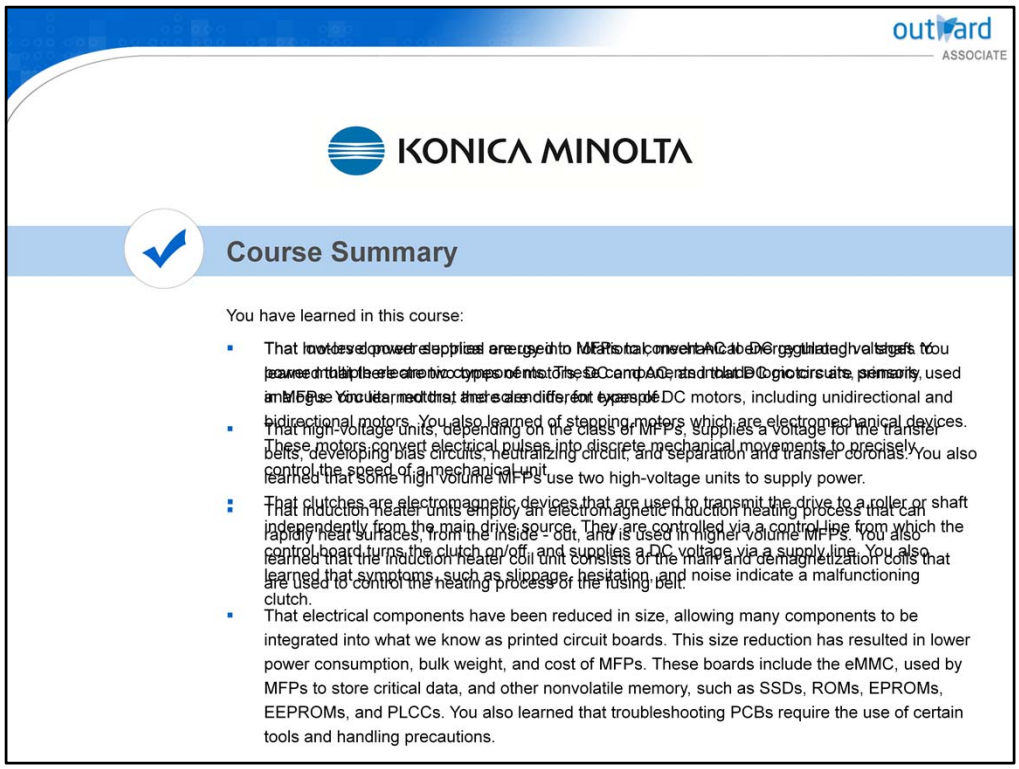
The symptoms of a malfunctioning electromagnetic clutch are similar to those symptoms of a spring clutch, such as slippage, hesitation, and noise. These symptoms are usually due to internal rust or dirt.



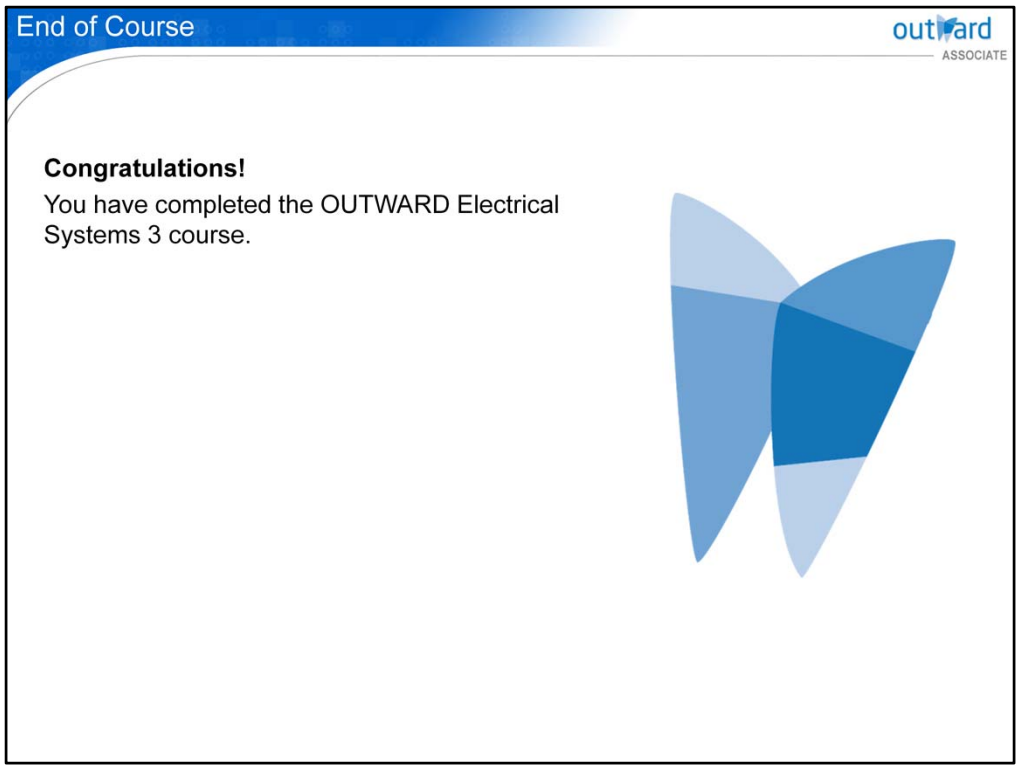
To verify your understanding of the lesson, take this quiz.



Provided here is a summary of the topics that you learned about in this lesson.



Provided here is the course summary.



Congratulations, you have completed the Outward Electrical Systems 3 course.