

ALT #2 fail light on but Alternator is still charging (MCU 100/120):

We have seen this happen a lot. The good news is there is probably nothing wrong with the aircraft.

Basic MCU Function:

The MCU has a lot of components, but the main ones are:

- **Field Control Modules:** regulate the voltage output of the alternators.
- **Current sensors:** senses the current through the loop and sends the information to the logic module
- **Logic Module:** Reads the current levels from the sensors, reads the voltage level of the essential bus, and decides when the alternator fail light should turn on, and when the low volts light should turn on.

ALT Fail Light Annunciation Logic:

The logic module has trigger level for the alternator warning light we will call the light-on threshold. The light-on threshold is set at “approximately 3 amps”*, so when the alternator current output drops below that threshold, the fail light will illuminate after a 14-22 second delay to indicate that the output is low. If at any point the alternator output raises above the light-on threshold, the light will turn off and the delay timer will restart. The Logic Module will also provide a flashing ALT fail light which indicates an over charging condition.

*Now in reality, the “approximately 3 amps” light-on threshold is actually anywhere from 3 amps all the way up to 5 or 6 amps.

Alternator and battery charging:

Depending on how long the battery is left on before the alternators start charging, the alternator will charge at some higher level and slowly decrease its output as the battery charges back up. At some point the battery will become fully charged, and the alternator output will stabilize to the level that is required to power the items that are on its electrical buss.

Conditions that happen when the light-on threshold drifts too high:

In a typical SR20/SR22 with a MCU 100/110/120/130, when the batteries stabilize and the system is fully charged, the alt#2 will charge approximately 3-6 amps to power the items on the Essential and Avionics Essential busses.

- If the light-on threshold is below the alternators stabilized output, then the fail light will not turn on unless the alternators output drops below the threshold due to a failure... So the light is operating normally.
- If the light-on threshold is at or around the same level as the alternators stabilized output, the ALT#2 Fail light will intermittently turn on. (Some may even go away when you transmit on the com, or turn on the pitot heat, etc. due to the initial spike in current, only to come back shortly after when the delay timer has been reached).
- If the light-on threshold is above the stabilized output of the ALT#2, the fail light will remain on constantly, even though the alternator is charging just fine.

Possible Causes to the problem:

There are many factors that can contribute an alternator fail light problem such as:

- Tolerances: current sensor output, logic module thresholds
- Corrosion: pins, connectors inside the MCU
- Drift: as parts age they drift away from the original operating points
- Battery aging: As the battery ages it takes less charge
- An actual problem with the alternator charging system

How to verify if alternator #2 is working:

To verify that ALT#2 is working, all you have to do is turn off alternator #1 and verify that the essential bus is still charging over 28V while the engine is running at 2000 RPM or higher.

*For a more in depth MCU function check, see the attached check list.

Possible fixes:

First off, our Engineering department has recently been made aware of this issue and they are working on a solution. In the mean time, it is not recommended to change out parts because the likelihood that the problem will not be corrected, or will return in a short time is very high.

If changing parts, be aware that all of the current sensors have some common reference voltages and grounds between them so “one bad apple can spoil the bunch”.

If you see a current indication that is “pegged” to the positive or negative extremes, then one or more of the current sensors is faulty. Also be aware that corrosion can cause false fail light indications, false current indications, and actual charging problems.

MCU 100/120 Function check

- 1 ALT 1 and ALT 2 caution lights illuminate.
 - 2 Flap position light illuminates.
 - 3 Engine instruments are operational and manifold pressure gage indicates approximately the altimeter setting.
 - 4 Ammeter select switch shows slight discharge in BAT position.
- (d) Start Engine and set engine speed at 1000 RPM.
- (e) Verify landing light, pitot heat, avionics, strobe lights, and navigation lights are on.
- (f) Switch ALT 1 ON and ALT 2 ON.
- (g) Increase RPM to 1700.
- (h) Check that LOW VOLT light is off and ammeter shows no current discharge in BAT position.
- (i) Increase RPM to 2200.
- (j) Check that LOW VOLT light is off and ammeter shows no current discharge in BAT position.
- (k) Switch ALT 1 ON and ALT 2 OFF. Verify and record operating values.

Voltage Indication		Ammeter Indication			Annunciator Illumination		
Main Bus	Ess Bus	ALT1	BAT	ALT2	LOW VOLTS	ALT 1 Steady	ALT 2 Stead
27V - 28.3V	27V - 28V	Pos < 40A	0 - Pos	0A	OFF	OFF	ON

Normal Values -->

- (l) Switch ALT 1 OFF and ALT 2 ON. Verify and record operating values.

Voltage Indication		Ammeter Indication			Annunciator Illumination		
Main Bus	Ess Bus	ALT1	BAT	ALT2	LOW VOLTS	ALT 1 Steady	ALT 2 Stead
20V - 24V	28V - 29V	0A	0A - Neg	2A - 20A	OFF	ON	OFF

Normal Values -->

- (m) Switch ALT 1 ON and ALT 2 ON. Verify and record operating values.

Voltage Indication		Ammeter Indication			Annunciator Illumination		
Main Bus	Ess Bus	ALT1	BAT	ALT2	LOW VOLTS	ALT 1 Steady	ALT 2 Stead
27V - 28.3V	28V - 29V	Pos < 40A	0A - Pos	2A - 20A	OFF	OFF	OFF

Normal Values -->



(n) Switch ALT 1 OFF and ALT 2 OFF. Verify and record operating values.

Put results here

Voltage Indication		Ammeter Indication			Annunciator Illumination		
Main Bus	Ess Bus	ALT1	BAT	ALT2	LOW VOLTS	ALT 1 Steady	ALT 2 Stead
20V - 24V	20V - 24V	0A	Neg < 40A	0A	ON	ON	ON

Normal Values -->

External Power Contactor

Alt 2 Current Sensor

Starter Contactor

Alt 2 Post

Alt 1 Current Sensor

sends amp readings to L/M

Starter Post

Batt 1 Contactor

Alt 1 Post

Batt 1 Post

Essential Bus

Main Distribution Bus

10 Pin Connector

8 Pin Conn

Ess CB Buss

Main Bus 1

Main Bus 2

Alt 2 Ess Bus

Non Ess Bus

Air Conditioning

Land Light Relay

Land Light Breaker

Logic Module

Distributes amp and indication readings to SIU, Annunciator lights indicate

also sends info volt/amp steam gauge if equipped -

Alternator Fuses

From Batt 1 to ESS Bus

From Main Bus to Ess Bus

Main Dist. Bus

125 Amps on MCU120

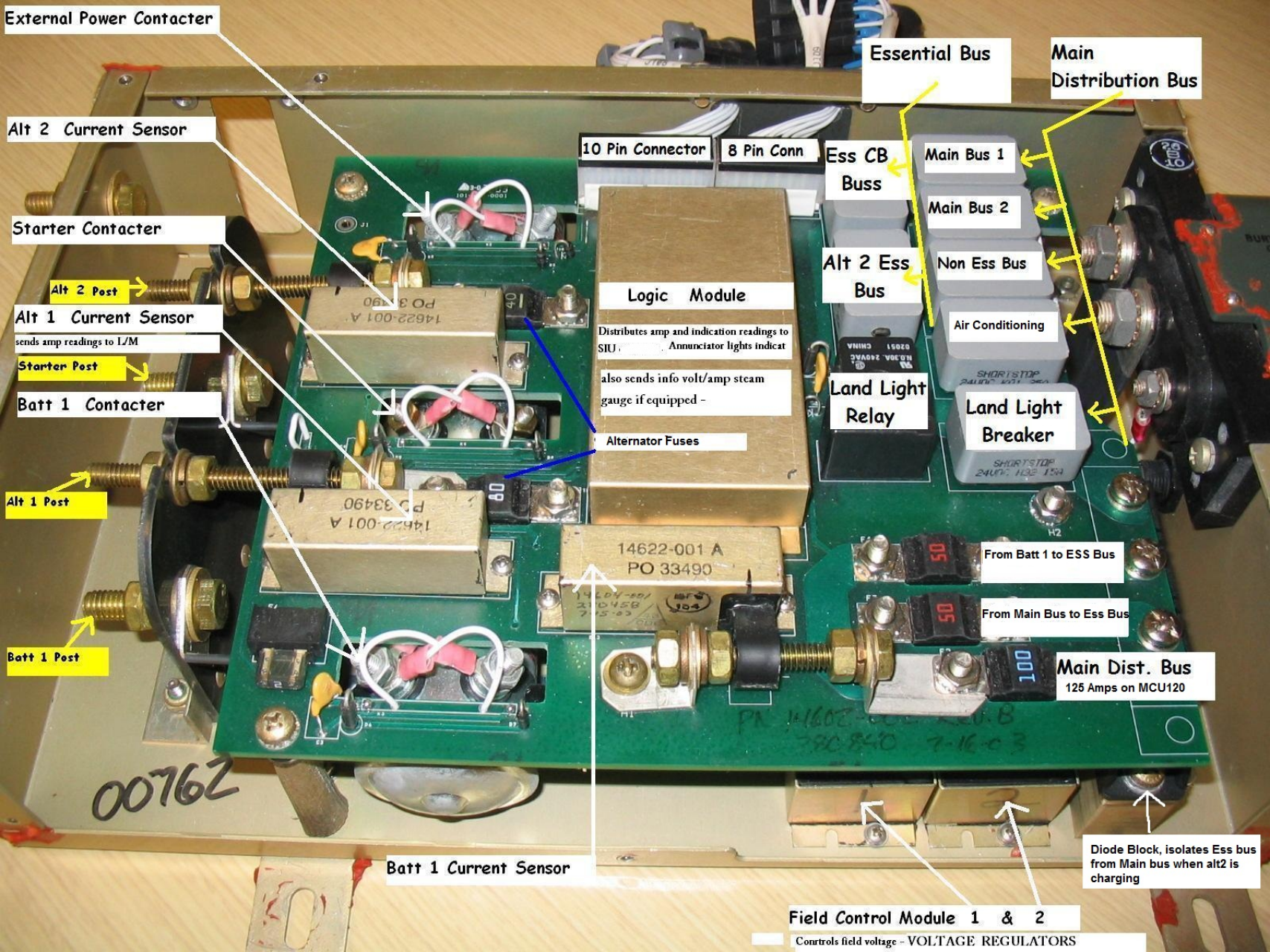
Batt 1 Current Sensor

Diode Block, isolates Ess bus from Main bus when alt2 is charging

Field Control Module 1 & 2

Controls field voltage - VOLTAGE REGULATORS

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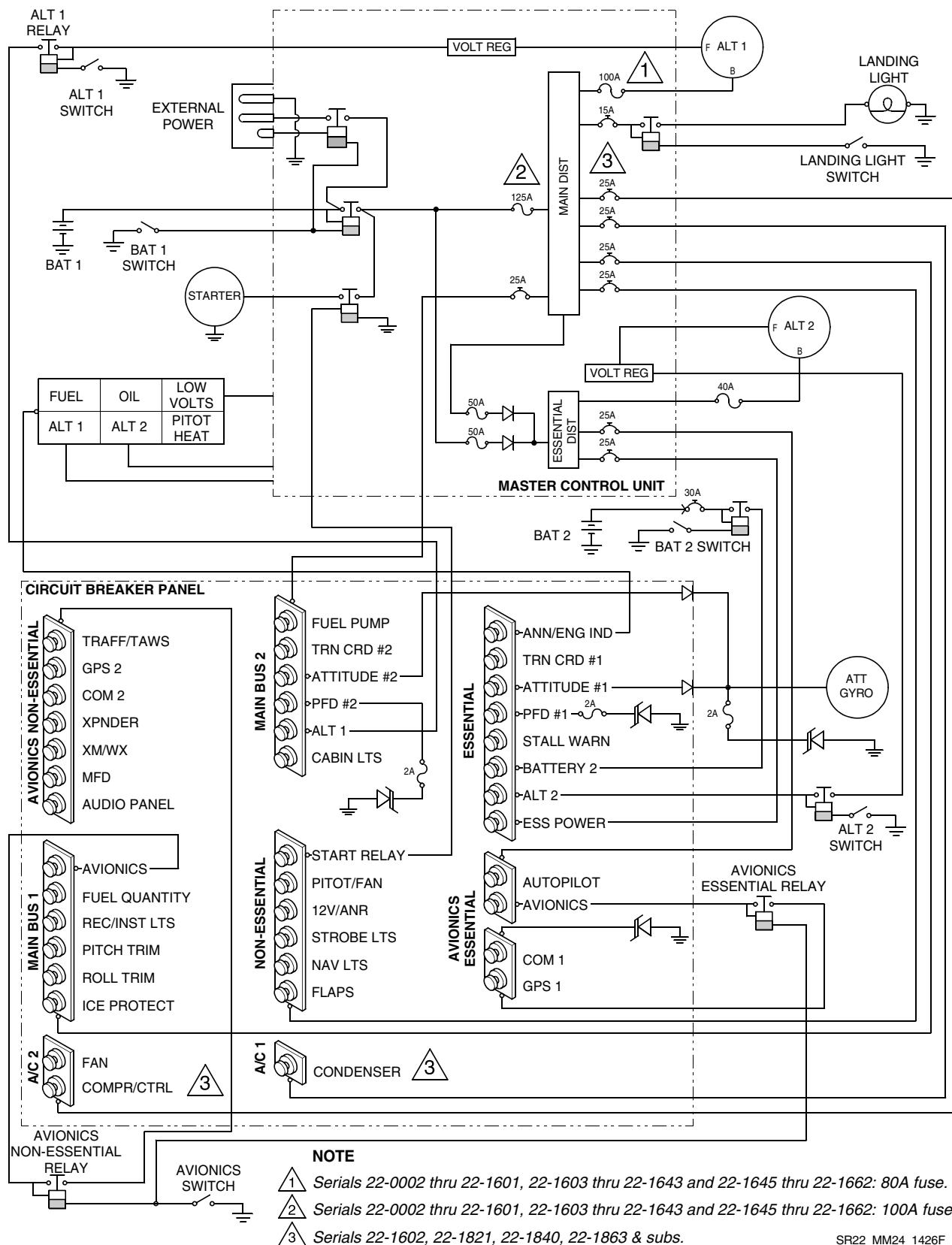


Figure 24-301
Electrical System Schematic - Serials w/o Perspective Avionics (Sheet 1 of 3)