Trendsetter VLF

EMI Filter Relocation Procedure

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Revision History

Revision	Date	Author	Comments
Draft	1999:Jun:21	C.Townsend	This procedure was originally contained in the body of a document describing the electronic registration upgrade for TSV.
A	1999:Jun:21	C.Townsend	Released by ECO C826
B	1999:Jul:12	C.Townsend	ECO C986. Minor title change. Simplified mounting of AC inlet cover using self-tap screws.
C	1999:Aug:12	C.Townsend	ECO D110. Terminal number references on switch/breaker corrected in body of procedure and wiring diagram. Added ground cable (10-3943A) to BOM and installation procedure. Added section entitled: Safety Note.

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1. SCOPE

This document describes how to relocate the EMI filter from inside the power-box to a place on the lower base-frame near the bulkhead connector panel of a Trendsetter VLF (TSV) machine.

2. BACKGROUND TO EMI FILTER RELOCATION

There are two reasons for moving the EMI filter:

1. Make room in the power-box for components related to electronic registration;
2. Reduced EMI emissions from TS-VLF machines operating with the 40Watt V-Head.

The new EMI filter location became a standard production feature on TS-VLF's beginning with machine B200 (ECO C826).

3. RELATED DOCUMENTS

- Electronic Registration Upgrade Procedure, TSV: 72-3090A.
- ECO C637: Electronic Registration, TSV.
- ECO C826: EMI/RF Enhancements, TSV.
- Doc, Schematic Power/Safety Wiring, TSV: 73-3316A.

4. TOOLS NEEDED

If the base-frame for the TSV requiring EMI filter relocation does not have mounting features for EMI bracket and cover then some hole drilling is required. Required mounting features are identified by NOTES 1, 3, 4 and 5 of Figure 1.

Tools if drilling required:

- electric or pneumatic drill, 3/8" chuck size recommended
- 6.0mm twist drill
- 3.3mm twist drill
- metric rule or tape measure
- centre punch and hammer
- hole deburring tool with v-hook bit
- safety glasses
- vacuum cleaner
- ratchet drive wrench with extension (optional)
- 7mm hex socket (optional)

Other required tools:

- common metric allen key set
- common metric wrenches
- 7mm hex nut driver
- needle-nose pliers
- side-cutter pliers
- common head style screwdrivers

5. PARTS NEEDED

The following parts are contained in kit: 05-0109.

Part #	Description	Quantity
10-3513C	Cable, AC EMI to PDB featuring ring terminals for EMI connections.	1
10-3943A	Cable, Frame GND to ENG Casting	1
10-3971A	Cable, AC Inlet to EMI	1
10-3972A	Cable, EMI bypass	1
18-3049	Cable tie, 7.5”	2
18-3133	Cable tie push mount	2
52-3072	Washer, M4, external tooth	8
52-4042	Nut, M4, self locking	6
52-4054	Washer, M4, flat	6
52-4318	Screw, M4x12	6
52-4945	Screw, M4x8, self tap	2
56-3054	Rubber trim edge for EMI cover	60mm
57-5527A	EMI filter bracket	1
57-5528A	AC inlet cover	1
74-3068	Label, high voltage	1

6. SAFETY NOTES

6.1 Personal Safety – Electrocution and other bodily injuries

Several procedures within this upgrade involve working with the high voltage circuit. Unplug the machine from the main power source when a procedure calls for this to be done and whenever you feel safer by doing so. Move cables to safe locations before drilling holes near them.

Be very careful when working with tools – particularly air driven types. Bits and cutters can break if the tool is not held steady when operating. Wear safety glasses always. Wear hearing protection when using air tools.

6.2 ESD 'Static' Safety – Equipment protection

When working on the machine you must be grounded to the machine with a 'static' wrist strap and the machine must always be grounded to 'earth'.

More about machine to 'earth' grounding:

- When plugged into a power receptacle, the machine is grounded to 'earth' automatically.
- When the machine is not plugged into a power receptacle, both you and the machine are free to float at a higher potential than 'earth'. Discharge could occur if you touch an object at 'earth' potential and this may damage ESD sensitive components. For this reason, a separate ground wire must be connected between the machine (power-box) and some other item at 'earth' potential such as a screw attached to a metal electrical outlet box. The site engineer is free to devise any method possible to ground the machine to 'earth' potential when it is unplugged from the main power source.

7. WIRING VARIATIONS – VERSION CHANGES INVOLVING THE BULKHEAD CONNECTOR PANEL

Cables and hoses connect to the TS-VLF via the bulkhead connector panel on the lower right base-frame. The first nine TS-VLF machines (BB1 through BB4 and B005 through B009) were fitted with Version 'A' bulkhead connector panels (57-1518A). Version 'A' panels did not feature the IEC 320 AC power receptacle with detachable (screw-locked) plug and cord which became production standard beginning with B010. Because of this difference, two wiring variations within this EMI relocation procedure will exist:

1. **V-Head Upgrade:** When a TS-VLF not equipped with the IEC 320 receptacle is field upgraded, the bulkhead connector panel and AC power cord will be replaced with latest versions. Wiring will be completed as per Figure 7.

2. **Electronic Pin Registration Upgrade:** When a TS-VLF not equipped with the IEC 320 receptacle is field upgraded, the bulkhead connector panel and AC power cord will not be replaced. Wiring will be completed per Figure 8.

8. EMI FILTER RELOCATION PROCEDURE

1. In this order - power down the machine; unplug the main power cable from its electrical source and disconnect main power cable from bulkhead connector panel.
2. Unfasten and remove cable connectors J11 and J12 from Power Distribution Board (PDB).
3. Unfasten EMI filter unit from power-box wall.
4. Disconnect cable 10-3490A from the EMI filter. This cable is now obsolete.
5. Remove ground screw anchoring ground wires of cable 10-3513x. This cable runs from PDB to Power Switch. Ground screw is located below PDB on wall of power-box.
6. Disconnect black and white wires of cable 10-3513x leading to power switch. The power switch is located on the bulkhead connector panel (lower right base-frame).
7. Completely remove cable 10-3513x from the machine. It is no longer required.
8. Depending upon the age of the frame, you may have to locate and drill two 4.5mm holes in the lower right base-frame rail. These holes are flagged by NOTE 5 (Figure 1).
9. Depending upon the age of the frame, two M4 studs may already exist at locations marked by NOTE 1 (Figure 1). If there are no studs, do one of following:

    - Locate and drill two 3.3mm holes according to dimensions shown in Figure 1.
    - Temporarily install EMI bracket 57-5527A to top frame rail using two M4X12 screws – Figure 3. Fit and centre cover 57-5528A over EMI bracket. Transfer two mounting hole locations to base-frame. Remove cover and EMI bracket. Drill 3.3mm holes in base-frame matching those flagged by NOTE 1 (Figure1).

    Notice features flagged by NOTE 2 (Figure 1). In later frames, slots may exist at those locations and are intended for mounting the EMI cover. Studs are installed here during regular production to help hold the EMI cover. Unfortunately, there is very little room between the floor and bottom skin to allow easy installation of these studs when the machine is resting on mounting feet at the customer site. Do not bother drilling holes or installing studs in the locations flagged by NOTE 2 (Figure 1). The cover is held secure enough by two fasteners installed at locations flagged by NOTE 1 (Figure 1).
10. If there are no holes at places flagged by NOTES 3 and 4 (Figure 1) then create them using a 6.0mm drill. De-burr the underside of the hole flagged by NOTE 4 (Figure 1). This is important because a burr here may damage components later routed under the flange.
11. Take this opportunity to vacuum all metal chips from inside machine. This is an important safety measure. Metal chips can become the source of future electrical shorts or mechanical jambs.

12. Before proceeding, double check machine is unplugged from electrical power source and main power cable is disconnected from machine.
13. Route new cable 10-3513C from the PDB to new location for EMI filter along same path as the former power cable. Cable will run inside cable ducts and pass through cutout in the power-box wall. Install connector to J12 (AC –PCB) on the PDB. Attach two ground wires at the connector end of this cable to grounding the point located below PDB on power-box wall – remember star washer against sheet metal. Install two cable anchors (18-3133) in holes flagged NOTES 3 and 4 (Figure 1). Loosely install cable ties but do not tighten until later in this procedure.
14. Install the 10-3972A bypass cable into the J11 (EMI-PDB) connector of the PDB.
15. Attach the EMI filter to the underside of the filter bracket using four M4x12 screws with M4 nuts and external tooth washers. If the bracket has studs attached, use those instead. See Figure 2 for orientation of EMI filter with respect to the bracket. See Figure 3 for fastener placements.
16. Connect three wires of cable 10-3971A to side marked “LINE” on EMI filter. Black and white (or red in some cases) wires connect to insulated terminals and green connects to the middle terminal. Consideration for polarity of the black and white (or red in some cases) wire connections does not matter until step 19. Figure 7.
17. The braided ground strap (part of cable 10-1434A) formerly connecting engine casting to secondary grounding point on frame is now too short and will be replaced in function by ground extension cable (10-3943A). Neatly fold and tie wrap the old ground strap so it is stored out of the way. Undo the fastener attaching the old ground strap to engine casting and include terminal of new ground strap. Reinstall fastener and star washer to capture terminals of both the old and new ground straps. Figure 6.
18. Connect ground wire of cable 10-3971A, ground wire of cable 10-3513C and new engine casting ground strap 10-3943A to secondary M5 grounding point on base-frame – remember star washer next to painted base-frame. Figures 7 or 8.
19. Connect black and white wires of cable 10-3971A to power switch. Black connects to Pin 12 and white (or red in some cases) connects to Pin 22. Figure 7.
20. Connect black and white wires of cable 10-3513C to side marked “LOAD” on EMI filter. Figure 7.

CAUTION: Match colour position of black wire on “LOAD” side to black wire on “LINE” side of EMI filter. Failure to do so will lead to electrical malfunction.

21. Check connections of three wires from AC inlet receptacle. Ground wire to the primary grounding point on base-frame – check for star washer next to painted base-frame. The black wire is attached to Pin 11 of the power switch and the white wire attached to Pin 21 of the power switch. Figure 7.
22. Fasten the EMI filter bracket to holes in rail using two M4x8 self-tapping screws and two external tooth M4 washers. Ensure the external tooth washers are placed between the bracket and the frame rail. Figure 3.

23. Glue a 60mm length of rubber trim (56-3054) along semi-circular cutout in the AC cover. Use “Black Max” instant adhesive or equivalent. Figure 4.
24. Take a few minutes now to check the accuracy of the Filter wiring circuit including connections to ground, J11 and J12 on the PDB, power switch and AC inlet. Figure 7.
25. Center the AC cover over the EMI filter bracket, making sure that no cables are pinched or stressed. Tidy wiring underneath if necessary. Install fasteners to hold cover ensuring correct placement of star washers. Figure 3.
26. Attach the high voltage label to the AC cover. Figure 4.
27. Adjust position of cable 10-3513C so end of cable jacket (under heat shrink) is about 5mm inside AC inlet cover. Tighten tie wrap (nearest AC inlet cover) onto the cable. Figure 5.
28. Follow cable 10-3513C toward power-box. Provide some slack in the cable between cable anchors as shown in Figure 5 – tighten cable tie.
29. Tidy cable 10-3513C inside power-box. Replace all duct covers.
30. If no other work is to be done to the machine - ensure power switch is still in the “Off” position; reattach power cable and tighten strain relief clamp. Plug the machine back into its electrical power source.

9. ILLUSTRATIONS

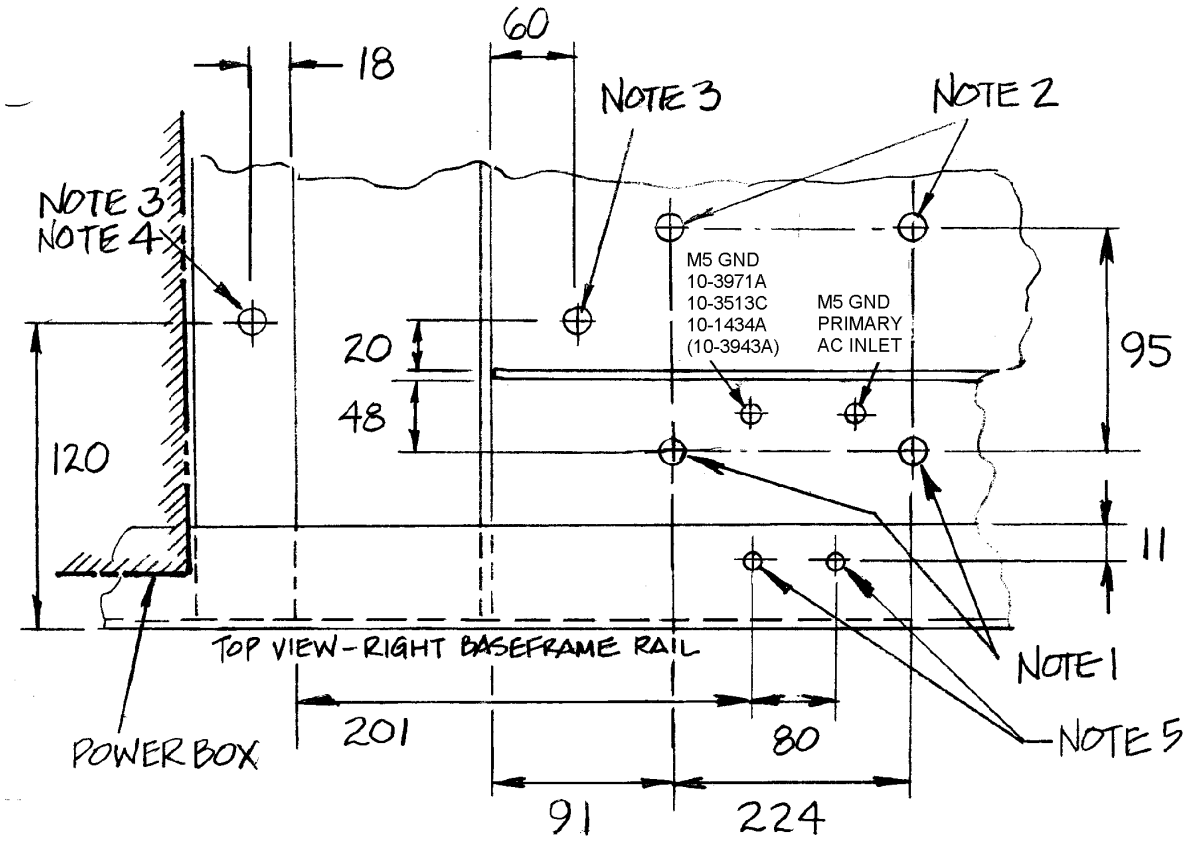


Figure 1: Base-frame layout (millimetres) for EMI relocation features.

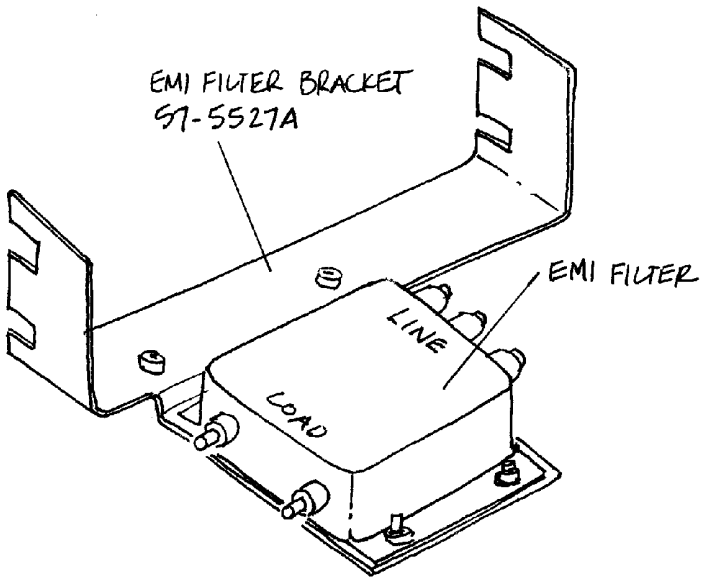


Figure 2: EMI filter and bracket.

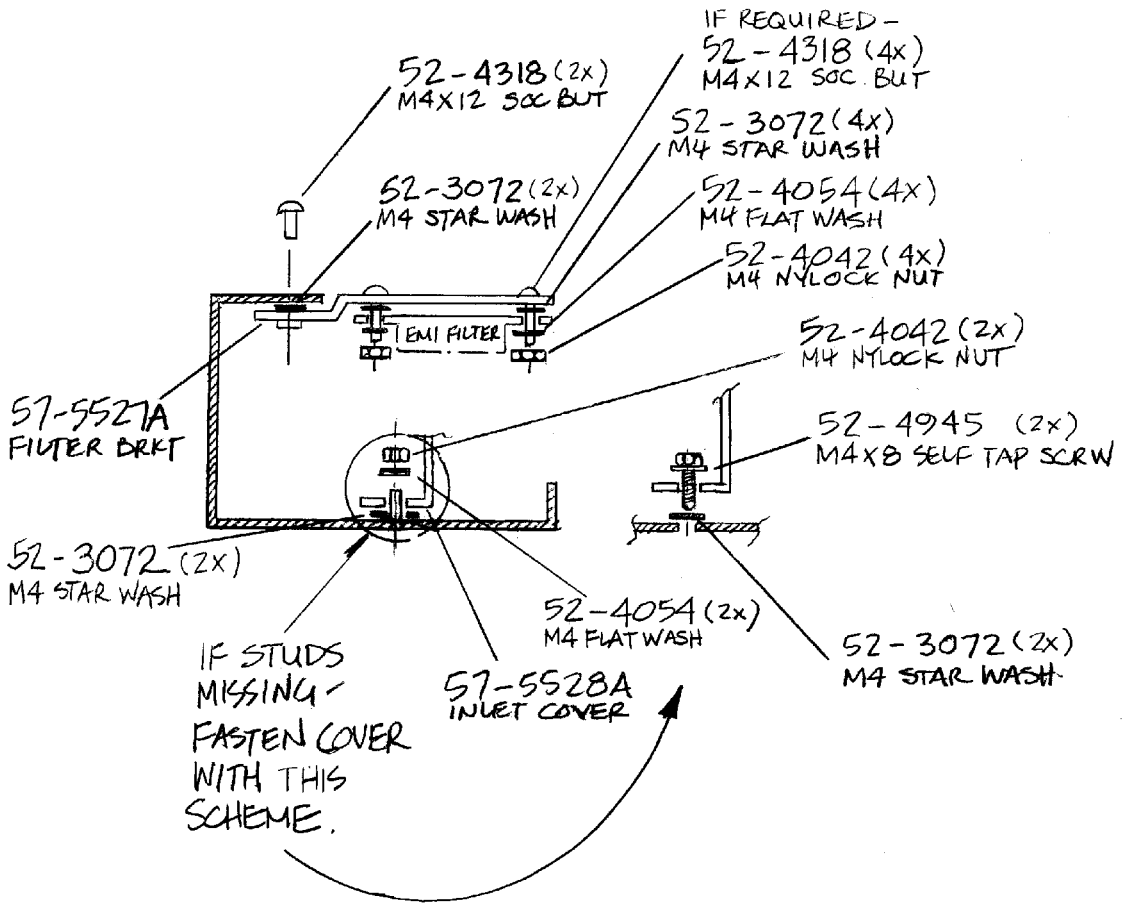


Figure 3: Fastener arrangement.

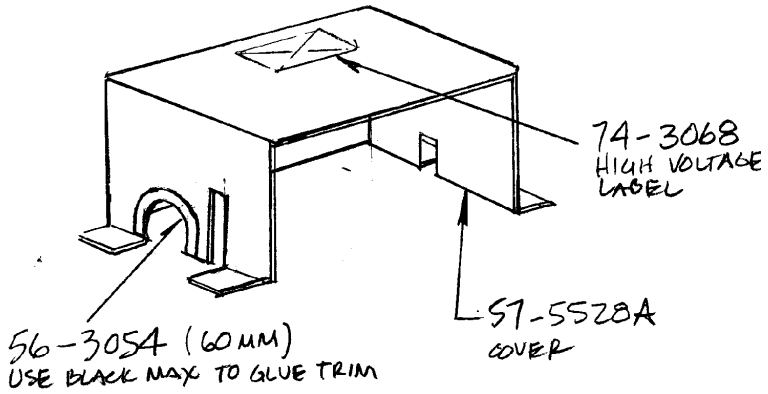


Figure 4: AC inlet cover details.

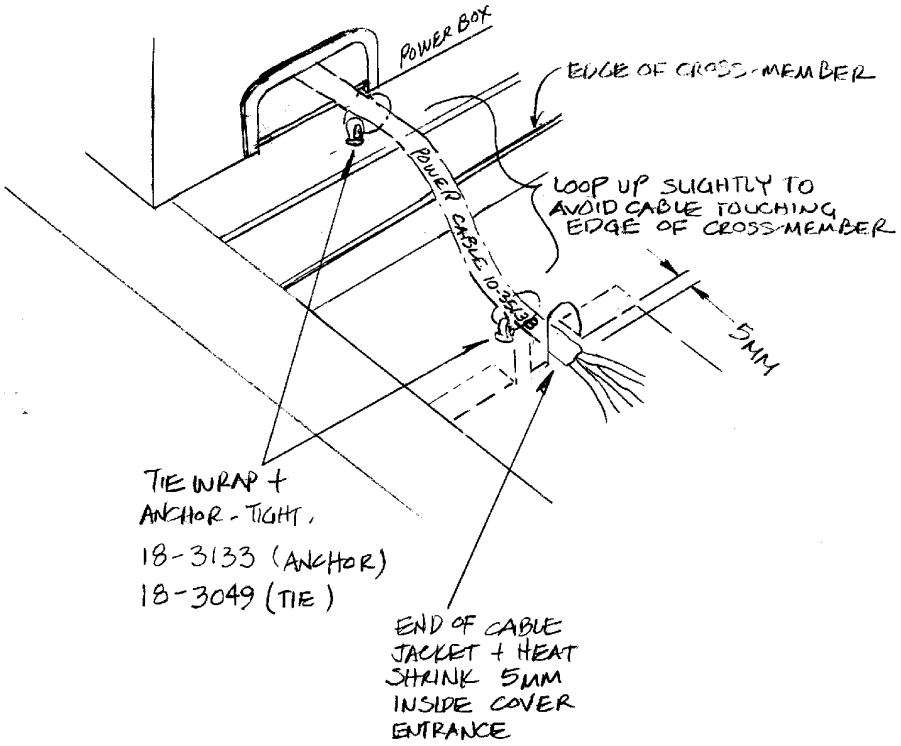


Figure 5: Final position and anchoring of power cable.

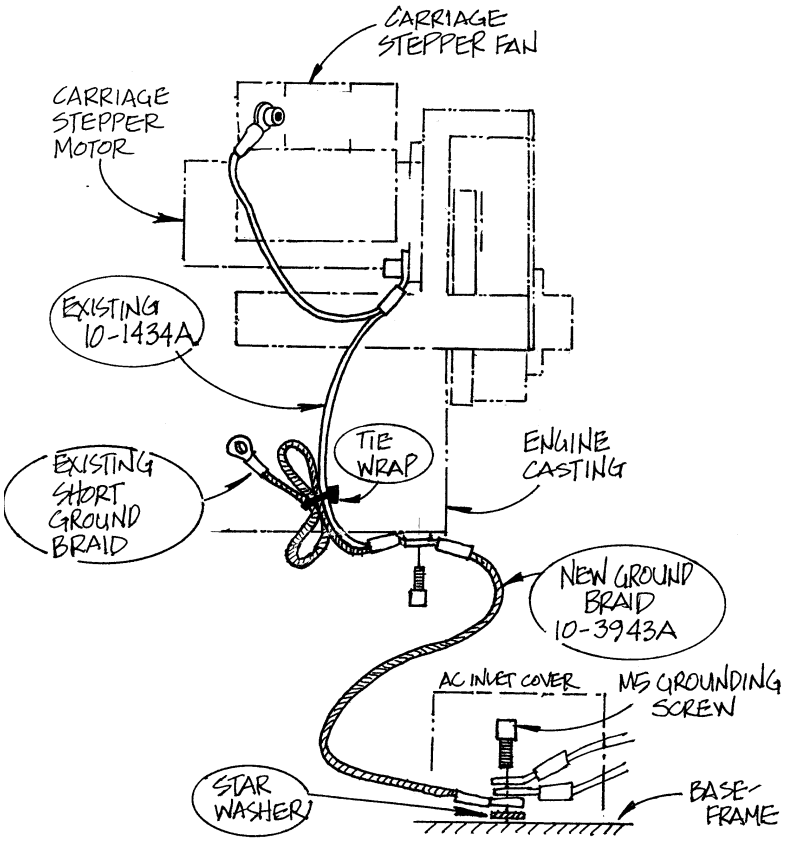


Figure 6: Installation of new ground strap between engine casting and base-frame.

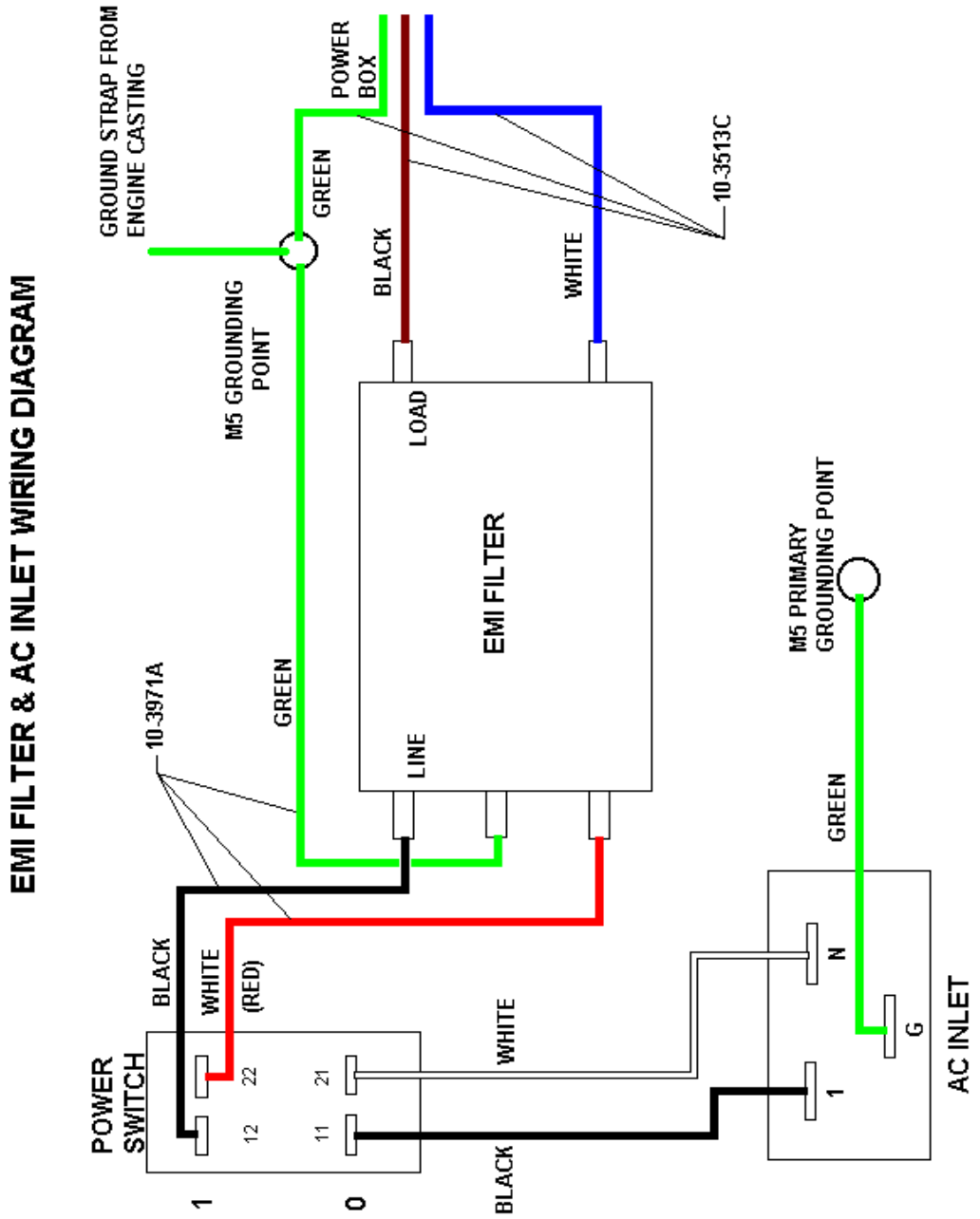


Figure 7: EMI filter and AC inlet wiring diagram for machines equipped with IEC 320 AC inlet receptacle.

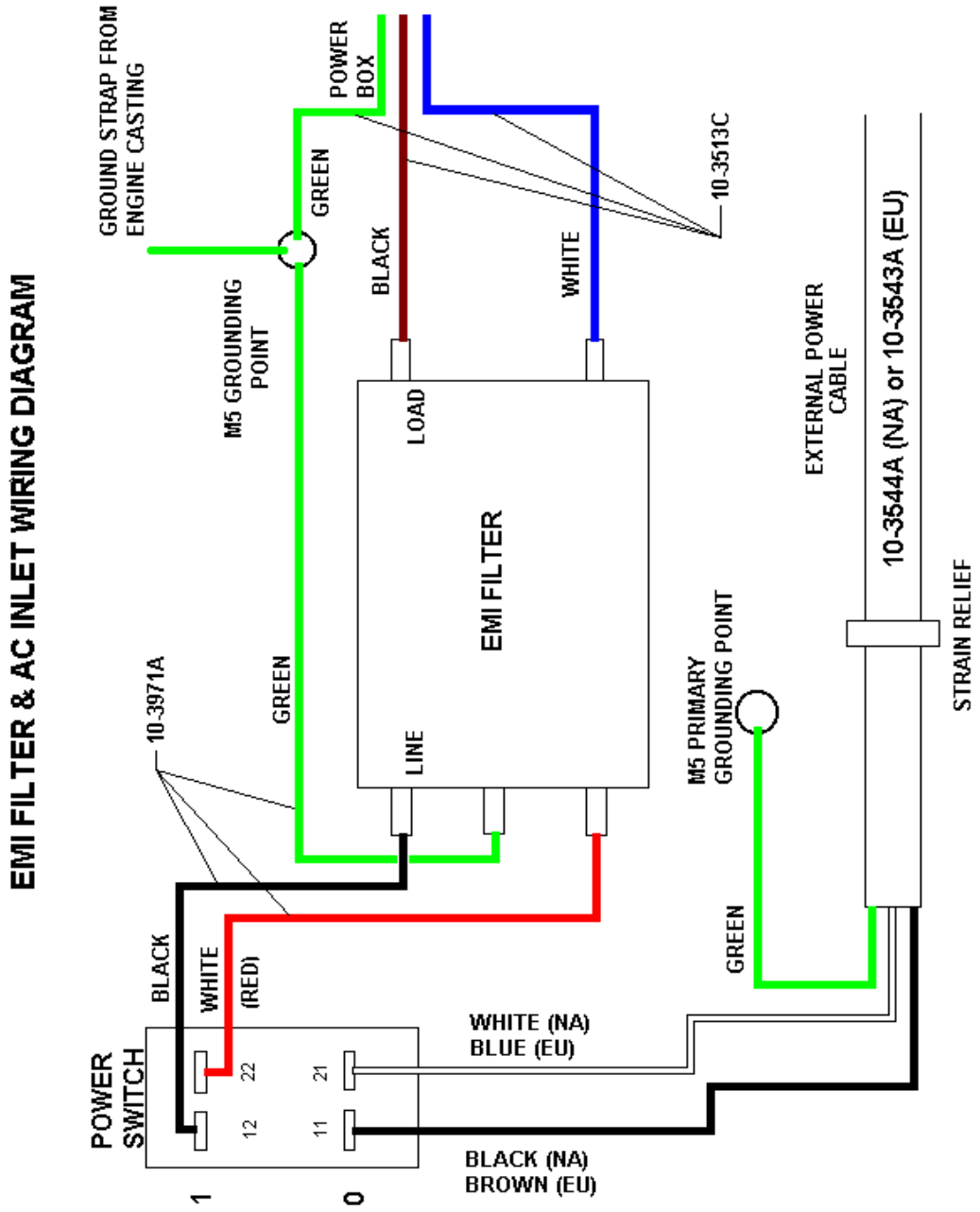


Figure 8: EMI filter and AC inlet wiring diagram for earlier machines not equipped with IEC 320 AC inlet receptacle.