

ANILAM

4200T Lathe Kit Installation Manual

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Section 1 - Introduction

This installation manual describes how to install ANILAM 4200T Lathe.

Installation Process Overview

Each installation process includes any or all of the following topics:

- **Objective:** The primary purpose(s) of the procedure.
- **Tools:** Equipment needed to perform the installation.
- **Parts:** A list of the parts referenced in the procedure, including part numbers and descriptions.
- **Procedure:** Step-by-step installation instructions.

Read and understand the instructions and objectives before performing a procedure.

IMPORTANT: This manual is for experienced machine tool builders, rebuilders, and factory-trained technicians. Only qualified persons should install components.

Use the drawings at the end of each chapter as references.

IMPORTANT: In the text, you will find references to an automatic oiler system. To maintain a valid warranty on mechanical parts, an automatic oiler must be installed. One can be purchased with the CNC package. Call an ANILAM dealer for price and availability.

CAUTION: The CNC system requires a dedicated 115 V AC line direct from the fuse or panel box to the computer. An isolated step-down transformer connected to the three-phase power source is also acceptable. Lines supplying power to other equipment could cause random, intermittent problems and possible irreparable damage to the CNC or associated equipment. Failure to supply a dedicated line to the computer could void the warranty on system electronics.

When the machine is performing to mechanical specification, the CNC is capable of positioning any axis within ± 1 count of accuracy. On a knee mill, this equals 0.0005", 0.0002", or 0.0001" (machine resolution).

These values are absolute and constantly maintained. Most inaccuracies result from machine errors, including linear errors, and pitch and yaw errors.

ANILAM CNCs are built to precise standards. However, errors result as components wear with use, bend under load, shift due to oil clearance tolerances, or reverse direction of travel.

Before you begin an installation, carefully unpack the complete assembly in a clean work area with enough room to spread out the kit contents. Check all packing material and cartons for loose hardware before discarding. For easy access, bolts are packaged with the hardware to which they attach. Do not mix hardware kits' parts.

NOTE: Kits include hardware for both SAE and metric installations. Use whichever installation procedure is appropriate for the machine. Installation procedures in this manual reference SAE hardware.

Required Tools

Table 1-1 lists all tools required for Lathe machine installation.

Table 1-1, Lathe Installation Required Tools

Level	6" Rat Tail File
Center Punch	Drill Motor 3/8 Chuck
Ball Peen Hammer	5/16 Drill
Soft Mallet	1/4" Drill
Tape Measure	#7 Drill
6" Scale	#21 Drill
12" Combination Square	#29 Drill
Magnetic Indicator Base	#36 Drill
Sliding Surface Gauge Base	Small Tap Handle
.0005" Indicator	Large Tap Handle
Set of Allen Wrenches-English 0.050"-3/8"	3/8-16 Tap
Set of Allen Wrenches-Metric	5/16-18 Tap
Pin Punch	1/4-20 Tap
Dial Calipers	10-32 Tap
8" Adjustable Wrench	8-32 Tap
3/4" Socket	6-32 Tap
1/2" Drive Ratchet	Set of Transfer Punchers
#2 Phillips Screwdriver	Digital Volt Multimeter (3 1/2 Digit)
#1 Phillips Screwdriver	12" 3/8 Drive Extension
Large Flat Blade Screwdriver	Set of Allen (Hex) Sockets 3/8 Drive
Medium Flat Blade Screwdriver	Wire/Spade Crimpers
3/32 x 1 1/2" Flat Blade Screwdriver	Spanner Wrench
Needle Nose Pliers	Scribe
Side Cutters	8" Mill File

Section 2 - Wiring Guidelines and Grounding Concepts

This section contains the following wiring guidelines and grounding concepts:

- ❑ General Wiring Guidelines
- ❑ Proper Wiring of System Grounds
- ❑ Amplifier Wiring Guidelines
- ❑ Isolation Transformer Installation Guidelines

General Wiring Guidelines

CAUTION: Follow the electrical guidelines described below for any configuration that deviates from a standard CNC configuration. Failure to follow these guidelines can result in damage to the equipment or bodily injury.

IMPORTANT: Do not apply power until instructed to do so.

IMPORTANT: To ensure safe operation, all wiring should conform to local and national codes.

IMPORTANT: You must properly ground the CNC, other control devices, and the enclosure. An authoritative source on grounding requirements for most installations is the National Electrical Code.

Follow general wiring guidelines as listed below:

- ❑ Do not run signal wiring and power wiring in the same conduit. Where paths must cross, make their intersections perpendicular.
- ❑ Segregate I/O wiring by signal type. Route wiring with different signal characteristics by separate paths whenever possible. To prevent crosstalk, do not run harnesses that contain different signal types parallel to one another.
- ❑ Establish a low-impedance, single-point ground. All noise reduction techniques depend upon proper grounding.
- ❑ Routing and grounding servo wiring is more important than wire length.
- ❑ Make signal wiring as short and direct as possible.

CAUTION: EMERGENCY STOP switches must be installed in the system. Ensure that the relay contacts have a sufficient rating for the application.

- The Emergency Stop button and Overtravel limit switches are wired in series. When any of them opens, the servo is de-energized. This will remove power from the machine. Correct installation is vital for safety.

WARNING: Do not alter these circuits to defeat their function. Serious injury or machine damage could result. Observe all applicable codes as to the placement and labeling of EMERGENCY STOP switches.

General Grounding Guidelines

This section specifies procedures for grounding an ANILAM CNC package during installation. Proper grounding, the foundation of all noise control techniques, is helpful in limiting the effects of noise due to electromagnetic interference (EMI) and is essential for the proper operation of CNC equipment.

WARNING: The CNC and the enclosure must be grounded properly. Observe all applicable codes and ordinances when wiring the control system.

In addition to the grounding required for the CNC and its enclosure, you must provide proper grounding for all controlled devices in the application. Be sure to provide each device with an acceptable grounding path.

Electrically Bond the CNC System to the Machine

The metallic components of the CNC system servo box and console provide an equipotential chassis ground when properly bonded to the machine. This will result in a very low resistance from the electrical ground of the CNC system to the metal of the machine tool. The following procedures will ensure the electrical bond.

Establish Bonding Points on the Machine

To establish a proper ground, remove all anodizing, paint, and other coatings down to the bare metal. Do this at the points where you have drilled holes into the machine to mount the enclosures. A threaded hole into the machine is not a proper ground. Instead, remove the paint (or coating) around the hole, down to the bare metal. If it is not feasible to use the mounting holes for electrical bond points, establish suitable bond points elsewhere. Connect these later using flat wire braid, at least 3/8" width.

Use Interior or Exterior Tooth Lock Washers between Points of Contact

Use interior or exterior tooth lock washers between each point of metallic contact to ensure a good electrical path. Choose interior or exterior washers based on mechanical concerns.

Clean All Stand-Off and Mounting Assemblies to Bare Metal at Points of Contact

The goal is to create continuous metal-to-metal surface contact from the machine to the two enclosures. This is easier to accomplish at some points in each installation than at others. Again, the threaded holes are not proper grounds; just as the threads of the mounting bolts are not proper ground paths. The best path is two bare metal surfaces with the proper tooth lock washer between them. The closer the installation is to this model, the better the ground.

Clean All Paint to Bare Metal from the Enclosure at the Points of Contact

CNC subpanels and subassemblies are electrically bonded to their enclosures. Since it is impossible to predict which surfaces will be the best bond points to the machine, all surfaces are painted except for those masked off for grounding. Determine the bond points, and remove any paint at these points to allow good contact using internal or external tooth lock washers.

Proper Wiring of System Grounds

Verify that building grounds conform to local codes at the time of installation. The CNC requires two ground paths from the building wiring: one using the 110V AC line cord, and one using the 3-phase, 230V AC wiring connected during installation. Each enclosure has an assigned central ground point.

<p>NOTE: If in doubt that a proper building ground exists, consult a qualified electrical technician.</p>
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Servo Drive Enclosure Central Ground Point

Make electrical grounding from the unpainted tab to the rear of the spacer. Use the ground braid, P/N 33000064, found in Servo Mounting Kit, P/N 32500328. Refer to **Figure 2-1, Central Grounding Buss Bar (Servo Enclosure)** and **Figure 2-2, Installing the Grounding Harness on the Enclosure**.

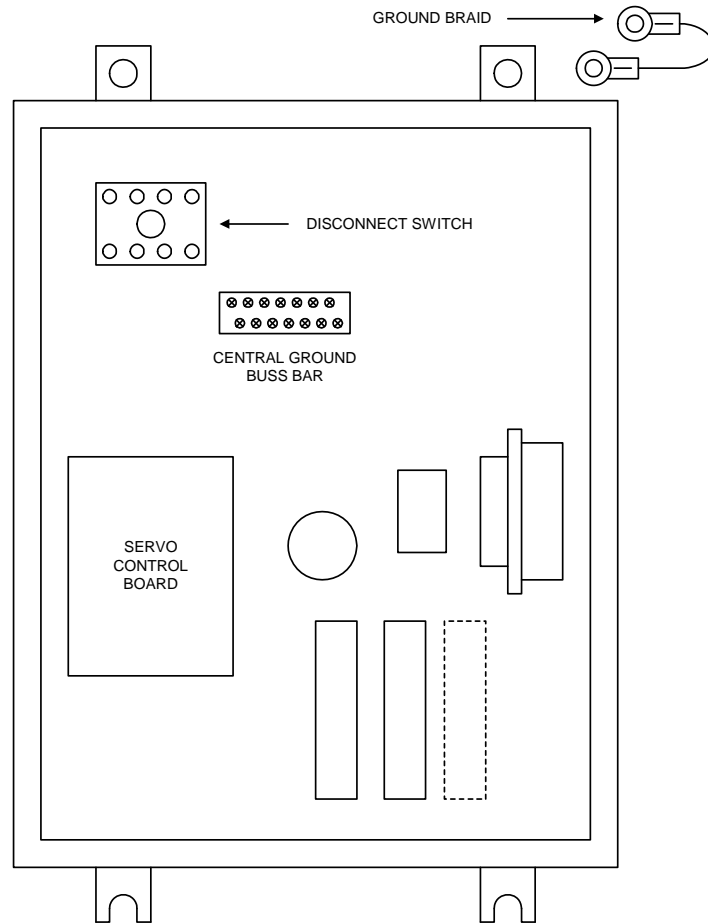
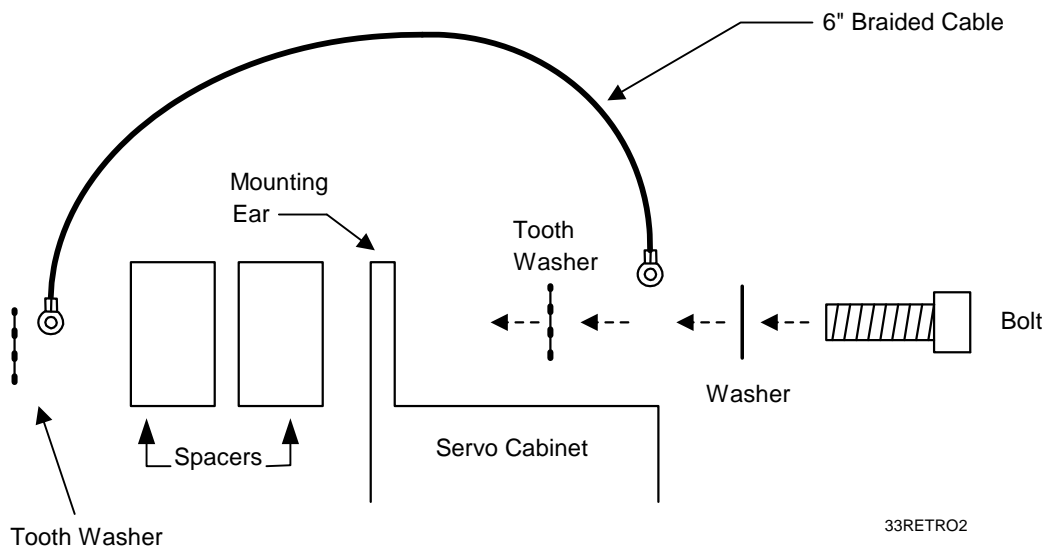


Figure 2-1, Central Grounding Buss Bar (Servo Enclosure)



33RETRO2

Figure 2-2, Installing the Grounding Harness on the Enclosure

Amplifier Wiring Guidelines

ANILAM cabling is designed and tested to optimize grounding, safety, and noise reduction. Any change to these components could negate or diminish performance. Please check with ANILAM before making design changes.

The following information is offered as reference material:

- ❑ Electrical equipment inherently generates Radio-Frequency Interference (RFI), and wiring acts as antennae that transmit this interference.
- ❑ Motors inherently generate electromagnetic interference (EMI). Unless the wiring is very short, shielding on the motor wires is necessary to meet FCC RFI/EMI guidelines and to protect other equipment from the adverse effects of RFI/EMI.
- ❑ Always use shielded wire. The shield must be connected to the amplifier base plate, which must be earth grounded.
- ❑ To decrease shock hazard, run a conductor of the same gauge as the motor wires, or make another direct metallic connection from the motor case to the amplifier base plate.
- ❑ Earth grounding is required to meet the National Electrical Code (NEC) requirements and to suppress RFI/EMI.

IMPORTANT: The signal wiring to the tachometer and the signal inputs to the amplifier are susceptible to noise pickup. Excessive noise pickup will cause erratic amplifier operation. Run each signal-input line in separate twisted-pair, shielded cable for optimal performance.

Terminate the tachometer lead at the amplifier. Ground the signal-input lead at the motion board. Keep signal lines as far as possible from any power or motor wires.

Isolation Transformer

An isolation transformer is sometimes used in the AC line to the controller. This type of transformer provides isolation from the power distribution system and is often used as a step-down transformer to reduce line voltage. Any transformer used with the controller must have a sufficient power rating for its load. This power rating is generally expressed in volt-amperes (VA).

- ❑ An electrostatic-shielded isolation transformer with a rating of 2 KVA is recommended for the control system.
- ❑ If output devices are connected through the transformer, add their maximum VA requirements to determine the correct transformer size.

Section 3 - Installation Procedures

Preparing the Lathe for Installation

Objective:

- To prepare the lathe for installation.

Servo Cabinet Installation

Objective:

- To attach the servo cabinet to the right side of the column.

Tools:

5/16 Drill	Allen Wrenches
3/8-16 Tap	Adjustable Wrench
Hammer	Level
Center Punches	

Parts:

Part Number	Description
31901070	Ground Harness, Dual Box
66100118	Flat Washer, 3/8"
66100303	Hex Nut, #3/8-16
66100728	Socket Head Cap Machine Screw, 3/8-16 x 1-1/4"
66100745	Socket Head Set Screw, 1/4-20 x 1"
85600013	Spacer, 1.25 x 0.75 x 0.44al
85600058	Spacer, 1/8"
86100576	Hex Socket Machine Screw, 3/8-16 x 2-1/2"
86100580	Hex Socket Cap Machine Screw, 3/8-16 x 1-1/2"
86300174	Lock Washer, #3/8" Split
86300203	Flat Washer, 3/8"

Procedure:

This procedure requires hardware included in Mounting Kit, P/N 32500328.

NOTE: An assortment of spacers is provided to accommodate different machines.

NOTE: You will install the grounding harness, P/N 31901070, during this procedure.

1. Center-punch two locations, both at least 10-1/2" from the floor. (Holes must be 10 inches apart.)

NOTE: It is important that the servo cabinet does not interfere with free travel of the slide or other moving parts.

2. Drill and tap 3/8-16 at the two punched locations.
3. Install two 3/8-16 x 1-1/4" Allen screws, P/N 86100580, two 3/8 washers, P/N 86300174, two flat washers, P/N 86300203, and 1/8" spacers, P/N 85600058.
4. Install screw to the machine to a depth of approximately 1/4". Leave the bolts loose enough to allow the tabs of the servo cabinet to slide between the outside washer and the front face of the spacer.
5. Locate the servo cabinet. The servo cabinet has a red ON/OFF disconnect on the front of the cabinet.
6. Unfasten the four thumb screws on the bottom of the servo cabinet, and remove the filter assembly. This is required to gain access to the mounting tabs.
7. Lift the servo cabinet onto the bottom bolts, allowing the tabs on the bottom of the servo cabinet to slide between the front face of the spacer and the washer on the 3/8" Allen screw.
8. Bring the top of the servo cabinet toward the side of the machine until the cabinet is level. Transfer the top holes to the machine. Remove the box. Drill and tap holes to 3/8-16.
9. For an optimal ground connection, remove a 1/8-inch ring of paint on the machine around the right (rear) hole just tapped. Refer to **Figure 2-1, Central Grounding Buss Bar (Servo Enclosure)** and **Figure 3-1, Installing the Grounding Harness on the Rear of the Machine.**

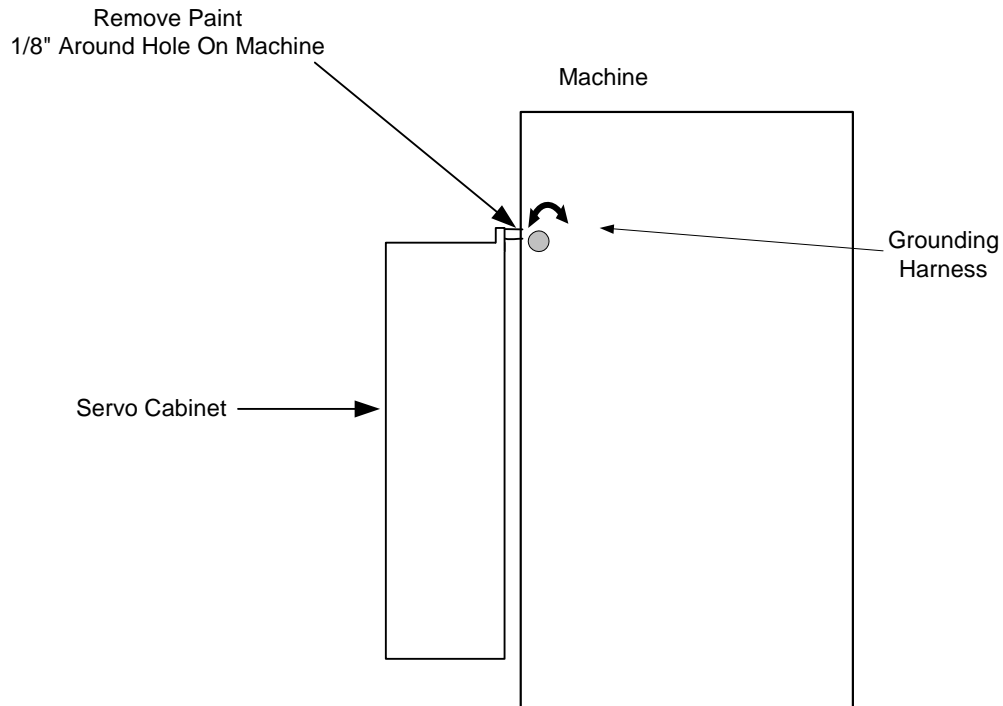
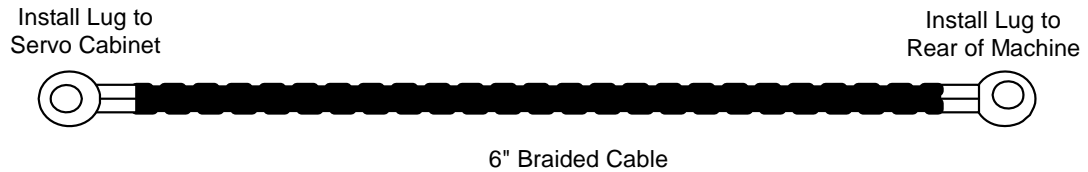


Figure 3-1, Installing the Grounding Harness on the Rear of the Machine

10. Level and square the servo cabinet using the 1/4-20 set screws. Transfer-punch two locations through the top spacer.
11. Lift the servo cabinet back onto the bottom spacers. Attach the top of the cabinet to the machine base with two 3/8-16 x 1-1/2" Allen screws, P/N 86100576, two lock washers, P/N 86300174, two 3/8" flat washers, P/N 86300203, and the proper combination of spacers to keep the cabinet level.
12. Locate two 3/8-16 x 1-1/4" Allen screws, P/N 86100580, two 3/8 washers, P/N 86300174, two flat washers, P/N 86300203, and 1/8" spacers, P/N 85600058. Refer to **Figure 3-2, Installing the Grounding Harness on the Enclosure.**

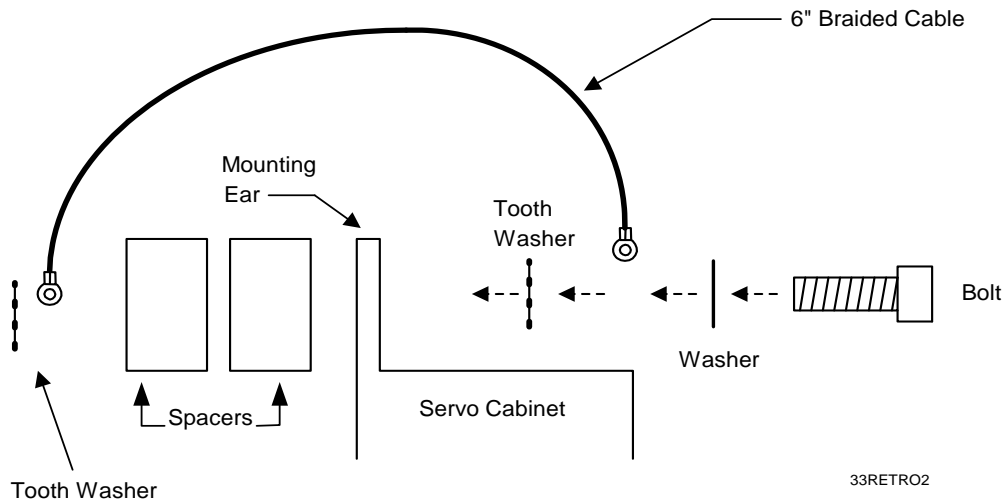


Figure 3-2, Installing the Grounding Harness on the Enclosure

13. Insert two Allen screws and washers through the front of the top mounting tabs of the servo cabinet.
14. Place the spacers over the screws from the back of the mounting tabs. Hold the mounting bar against the spacers so the screws are through the slots in the mounting bar and attach the bar, using a washer, lock washer, and nut on each screw. Do not tighten them.
15. Before installing the last bolt, install the grounding harness lug on the top-rear mounting ear of the cabinet.
16. Level and square the servo cabinet and tighten completely.
17. Reinstall the filter assembly on the bottom of the servo cabinet.

Console Arm and Console Installation

Objective:

- To attach the console to the machine. The console-mounting bracket will be attached to the console arm.

Tools:

Level	Phillips Screwdriver
Allen wrench set	

Parts:

This procedure requires parts included in hardware kit, P/N 33000919.

Item	Qty	Part Number	Description
2	1	23000175	Yoke, Console Mounting
3	1	23000171	Arm, Machine
4	1	23000187	Block, Leveling
5	1	86600254	Hwr. Knob, 3/8"-16 x 3/4" Stud
6	1	66100118	Washer, Flat 3/8"
7	2	86100584	Screw, 3/8" x 16X 3/4" Socket Button HD.
8	2	85600044	Washer, Rubber
9	1	86800109	Handle, Tapped, Adjustable
10	2	86300205	Washer, Flat, 0.876 x 0.516 x 0.062
11	1	86100975	Bolt, Hex., 1/2"-13 x 3" LG.
12	1	86100976	Bolt, Hex., 3/4"-10 x 3" LG.,
13	1	86100977	Bolt, Skt. HD., 5/8"-11 x 3" LG., W/2" x 0.75" Dia. Shoulder
14	4	86100406	Set Screw, 6MM x 20MM Long

Procedure:

1. Locate the Console Arm Mounting Kit, P/N 33000919. This box contains the console mounting arm, P/N 23000171, the console mounting yoke, P/N 23000175, one adjustable handle, P/N 86800109, and the hardware. Refer to **Figure 3-3, Console Arm and Mounting Bracket**.

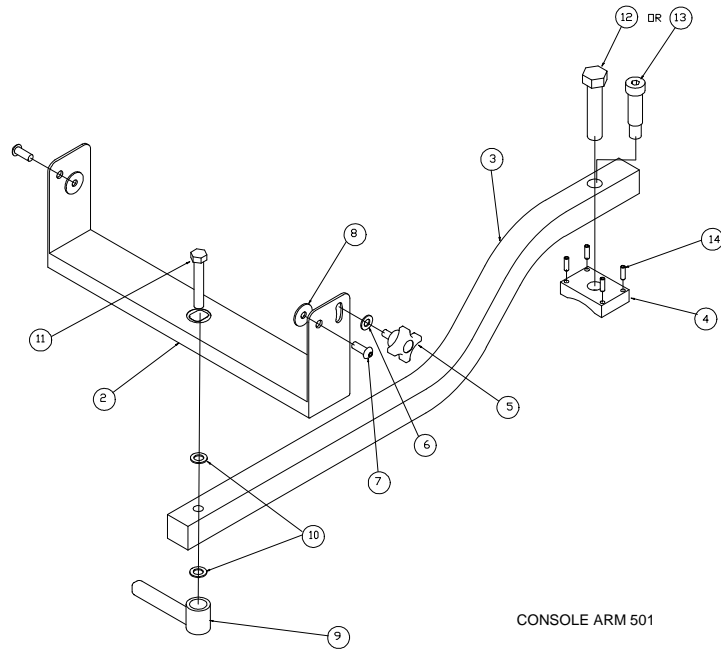


Figure 3-3, Console Arm and Mounting Bracket

2. Attach the leveling block, using the bolt with appropriate thread: P/N 86100976 or P/N 861000977. Ensure the leveling block, P/N 23000187, is level and square. Tighten completely using four set screws, P/N 86100406.
3. Locate one P/N 86100975 bolt, two flat washers, P/N 86300205, and one adjustable handle, P/N 86800109.
4. Insert the console mounting arm between the tabs of the mounting bracket.
5. Insert the P/N 86100975 bolt from the top through the bottom of the bracket, with the threads facing down.
6. Mount the console on the bracket, using the two 3/8" button-head screws, P/N 86100584, and two washers, P/N 85600044, into the sides of the console. Install the knob, P/N 86600254, and washer, P/N 66100118.
7. Place flat washer, P/N 63000205, on top of the arm, centered on the hole at the end of the arm.
8. Lift the console and set it on the mounting arm so that the bolt, P/N 86100975, goes through the hole.
9. Attach the bolt, P/N 86100975, on the console bracket to the mounting arm with a lock handle, P/N 86800109, and one flat washer, P/N 86300205.

10. Attach the interconnect cable, P/N 33000856, (hardwired to the servo box) to the bulkhead connector on the rear panel of the console. The connector is keyed and can only be inserted when it is in proper orientation. Refer to **Figure 3-17, Console Rear Panel – Outside View**.

11. Lock the retaining latch.

NOTE: Steps 12 and 13 apply only to those consoles that have AC power cables extending from their rear bottoms. If your console does not have such a cable, ignore the following steps.

12. Refer to **Figure 3-4**. The AC power harness, P/N 36000262, cord from the console into the AC outlet on the servo box.

13. Secure cable with tie wraps.

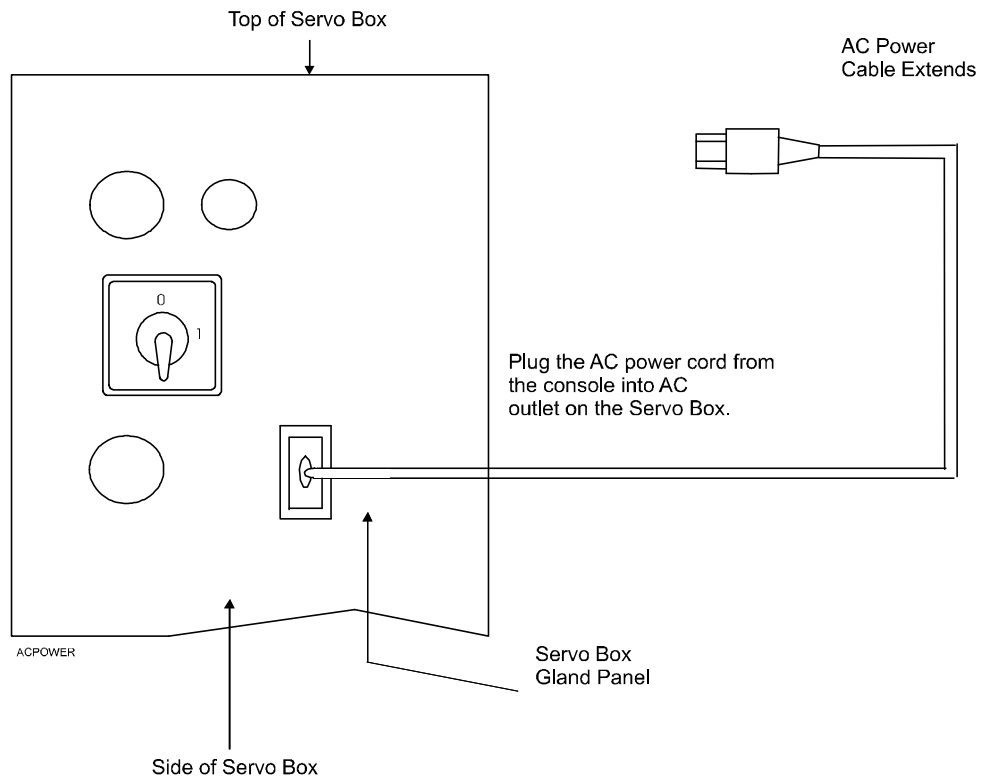


Figure 3-4, Monitor AC Power Connection

Spindle Motor Wiring

Objective:

- To replace the existing spindle motor wiring.

Tools:

Electric Tape	Phillips Screwdriver
Flat Screwdriver	

Parts:

Part Number	Description
31900425	Spindle Harness

Procedure:

NOTE: There are two holes provided in the top-rear of the servo cabinet for incoming and outgoing three-phase power.

Refer to **Table 3-1** for wiring directions.

Table 3-1, Wiring the Spindle Motor

Type of cabinet being installed	Wiring Directions
Servo cabinet with no M functions	The harness will be wired to the drum switch. The spindle motor cable used is P/N 31900423.
Servo cabinet with M functions	The harness will be wired directly to the spindle motor, and the drum switch should be removed. The spindle motor cable used is P/N 31900425.

1. For systems without M-functions, wire the spindle motor as follows:
 - Take the existing four-conductor cable assembly leading out of the drum switch to T1, T2, and T3 of the three-phase contactor in the servo box.
 - Wire the incoming three-phase power to the top side of the disconnect switch as shown in **Figure 3-5, Spindle Motor Configuration Without M-Function** and **Figure 3-6, Spindle Motor Configuration With M-Function**.
 - Attach all grounds to the central ground buss bar.

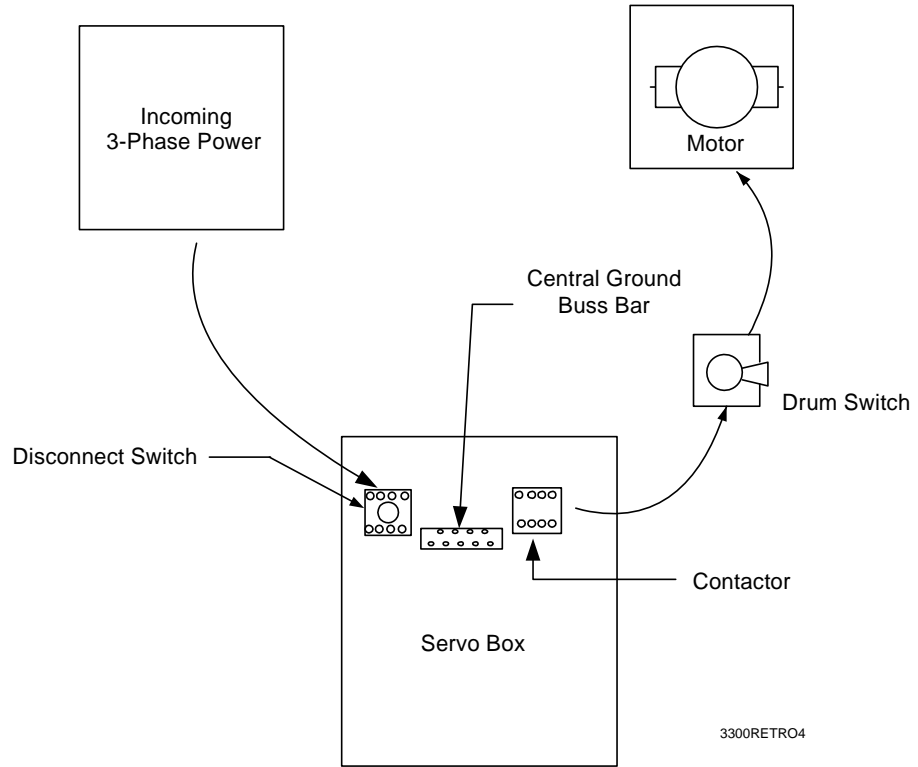


Figure 3-5, Spindle Motor Configuration Without M-Function

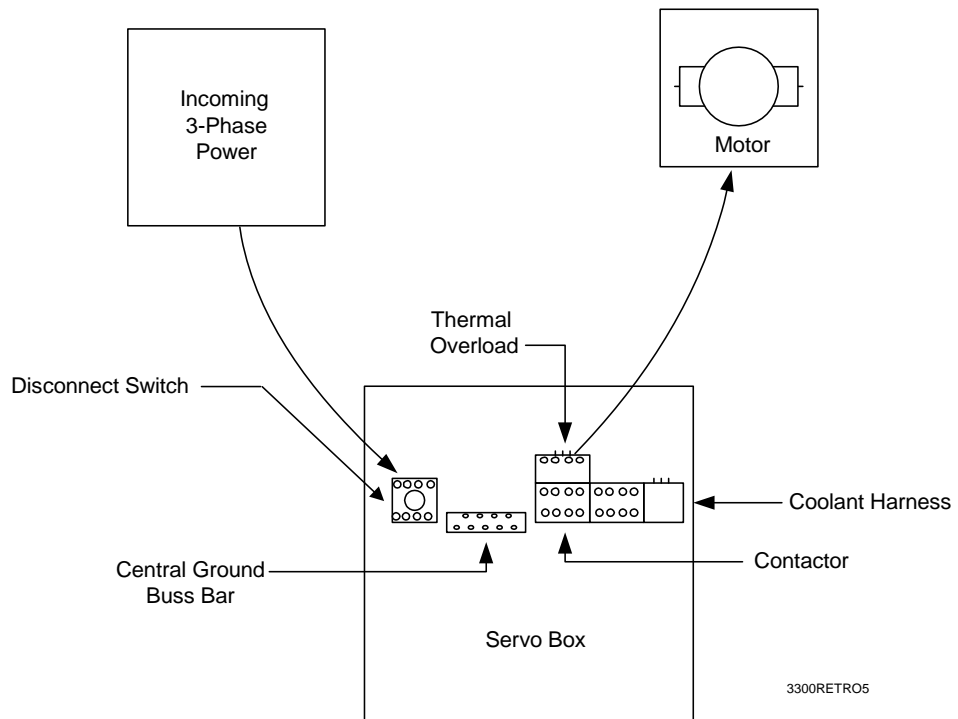


Figure 3-6, Spindle Motor Configuration With M-Function

2. For systems with M-functions, wire the spindle motor as follows:
 - ❑ Remove the assembly, all existing motor wiring, and reversing switch from the machine. Replace them with the spindle harness, P/N 31900425. Insert the end of the harness with the 90° connector into the junction box on the body of the spindle motor, and install it.

<p>NOTE: The ends of the cable have one straight and one 90° connector. The 90° connector usually is attached to the drum switch or the motor, but you can use either end.</p>

- ❑ Attach the ground wire from the spindle harness to the existing ground wire site.
 - ❑ Attach the incoming three-phase power leads to the appropriate leads, as specified by the manufacturer.
 - ❑ Install the non-terminated end of the harness in the upper right rear hole of the servo cabinet. Secure the harness with the connector.
 - ❑ Connect the three-phase power wires to the three terminals located above the thermal overload. Attach the ground wire to the central ground buss bar located below the fuse block.
 - ❑ Attach the incoming three-phase power to the three top right terminals of the disconnect switch.
3. For systems with coolant pumps, wire the coolant pump as follows:
 - ❑ Remove the existing wiring from the pump, and attach the coolant pump harness, P/N 31900426, to the electrical junction box on the coolant pump.
 - ❑ Connect the coolant pump harness as specified by the manufacturer.
 - ❑ Insert the opposite end of the harness into one of the lower holes on the servo cabinet.
 - ❑ Secure the Sealtite connector and connect wires to the coolant contactor T1, T2, and T3.

System Cabling

Objective:

- To attach the motor cables to the servo cabinet.
- To install the limit-switch cables and console to the servo box interface cable.

ANILAM can supply a variety of motor sizes with various cable lengths and styles for your lathe installation. These are documented in the *4200T Lathe Kit Two- and Three-Axis Standard and CE Drawing Package*, P/N 70000631.

Motors are available in 3 torque specifications: 1.6 NM, 3.0 NM, and 4.5 NM. All are metric “C” face mounting. Mechanical details and complete specifications for each of these motors can be found in the *Drawing Package*.

Your lathe installation will require appropriate mounting and clearance for the motor-cable assemblies; as well as, a means to couple the motor to the ballscrew. These arrangements are the responsibility of the builder.

Machine considerations may require the building of custom cables. In which case, the motor connections can be made directly to the MS connector on the servo cabinet. The mating connector is MS3106A 24-7P, ANILAM part number 80200145. Cabling detail is also detailed in the *Drawing Package*.

Procedure (if motor/cable assemblies are used):

1. Locate the X-axis motor assembly with attached cable.
2. Screw the end to the X-axis connector in the bottom of the servo cabinet. The X-axis connector is labeled inside the servo cabinet.
3. Locate the Z-axis motor assembly with attached cable.
4. Screw the end to the Z-axis connector in the bottom of the servo cabinet. The Z-axis connector is labeled on the inside of the servo cabinet.

Servo Cabinet Wiring

Objective:

- To wire the servo cabinet.

Tools:

Small Flat Screwdriver	Phillips Screwdriver
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Procedure:

Refer to the *4200T Lathe Kit Two- and Three-Axis Standard and CE Drawing Package*, P/N 70000631, at the back of this manual. See the Drawing that shows the servo cabinet wiring to use with your CNC.

Refer to **Figure 3-5, Spindle Motor Configuration Without M-Function** and **Figure 3-6, Spindle Motor Configuration With M-Function**. Route incoming 3-phase power wires to the disconnect switch and tighten them securely. The ground conductor of the three-phase cable should be terminated with a ring lug and attached to the Servo Enclosure Central Ground Buss Bar.

There is a wire way attached to the top of the servo cabinet. It is reserved for the incoming 3-phase power and the outgoing 3-phase power to the spindle. Use the wire ways whenever possible.

Check all of the existing connectors, boards, relays, and wires to ensure nothing has come loose during shipping.

Spindle Inverter or External Servo Axes (Option) Connection

Objective:

- To connect the spindle inverter or external servo axes (option).

Parts:

Part Number	Description
33000098	Cable

Procedure:

Cable 33000098 allows you to connect spindle drives or external servo axes. See **Figure 3-7**. The cable is open-ended and 8-feet long. If you require a longer cable, contact ANILAM. On 5000M Three-Axis Kit and 3000M Three-Axis Kit systems, connect the cable to the Molex connector labeled **3**. On 5000M Four-Axis Kit systems, connect the cable to the Molex connector labeled **4/RO1**.

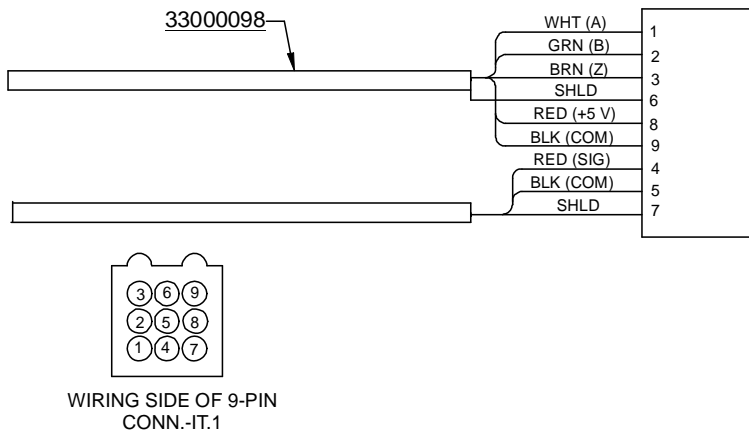


Figure 3-7, Cable, Drawing P/N 33000098

See **Table 3-2** for DAC command signal outputs and encoder signal inputs. DAC output is +10V DC to -10V DC; encoder inputs must be 5V DC, TTL quadrature with zero marker pulse.

Table 3-2, Cable Pinout

Pin	Name
1	WHT (A)
2	GRN (B)
3	BRN (Z)
4	RED (SIG)
5	BLK (COM)
6	SHLD
7	SHLD
8	RED (+5 V)
9	BLK (COM)

Vector/Home Switches Connection

Objective:

- To connect the vector/home switches to the SCB and the CAN I/O boards.

Procedure:

The CAN I/O systems hard code the vector/home switch connection to node 0. This can be node 0 on the SCB or an individual CAN I/O addressed as node 0. Connection is to node 0 only.

Connection of vector/limit switches is hard coded to individual input bit. See **Table 3-3**.

Table 3-3, CAN I/O Systems Vector/Limit Switches

Bit	Pin	Input	Bit	Pin	Input
0	1	X+	5	6	Z-
1	2	X-	6	7	W+
2	3	N/A	7	8	W-
3	4	N/A	8	9	N/A
4	5	Z+	9	10	N/A

Connect vector/home switches to SCB using **P3** Phoenix Block, pins 1 through 10. Connect vector/home switches to CAN I/O boards using **P5 DB25**, pins 1 through 10. SCB inputs must be **+24V DC** (source) input. Depending on the board type, CAN I/O board inputs can be either **24 COM** (sink or +24V DC (source)).

If vector limits are used, enable them using the *4200T CNC Setup Utility Manual*, P/N 70000414, "Section 2, Enabling Vector Limits." If home switches are used, select the proper type of homing in the *4200T CNC Setup Utility Manual*, "Section 2, Machine Home." You can enable either or both types of switches at the same time.

CAUTION: Do not assign Input Functions or IPI inputs to the same input bits as vector or home switches.

Automatic Oiler (Option) Installation

Objective:

- To install an automatic oiler to provide oil to the ballscrew and the machine ways.

Tools:

Allen Wrenches	10-32 Tap
Transfer Punches	Wire Strippers
#21 Drill	Crimping Tool
1/4-20 Tap	

Parts:

Part Number	Description
15700013	Lube Pump
86000154	Sealtite Fitting (1/2" – Straight)
86000158	Sealtite Fitting (1/2" – 90°)
86100345	Button-Head Screw, 1/4-20 x 1"
86600042	18-22 AWG Spade Lug
86600049	18-22 AWG Butt Splice
91000925	1/2" Diameter Sealtite
91400149	48-Inch Oil Line
91400156	27-Inch Oil Line
91400157	Compression Sleeve
91400158	Compression Bushing
91000352	20 AWG Black Wire
91000355	20 AWG Green Wire
91000358	20 AWG White Wire

Procedure:

Parts required for this procedure are included in Autolube Kit, P/N 15700090.

NOTE: It is assumed that a manual oiler and its oil line have been previously removed from the machine.

1. Unpack the parts provided with Autolube Kit, P/N 15700090. Locate the 6-foot piece of black 1/2-inch diameter Sealtite, P/N 91000925, the 48-inch oil line, P/N 91400149, and the oil-pump assembly, P/N 15700013.
2. Determine a mounting site for the oil pump on the base of the machine. Normally, this would be the rear of the machine base.

3. Make the electrical connections through one of the lower holes in the rear of the servo cabinet.
4. The oil line will connect to the top of the oiler and run to the existing oil manifold on the machine where the line from the manual oiler was removed.
5. Hold the oiler level against the machine base and mark two holes for hardware to install the pump, P/N 15700013, to the machine. Drill and tap 1/4-20. Use two button-head screws, P/N 86100345, to attach the oiler to the machine.
6. Slide one compression bushing, P/N 91400158, and one compression sleeve, P/N 91400157, onto one end of the 48-inch oil line. Insert this end of the assembly into the threaded fitting on top of the oil pump and tighten. Place one compression bushing and one compression sleeve on the non-terminated end of the oil line and insert it into the open hole in the existing oil manifold from which the original oil line was removed. Tighten the bushing.
7. Remove the existing oil line that feeds oil from the manifold on the knee to the manifold under the edge of the saddle. Use the 27-inch oil line, P/N 91400156, with two compression bushings and two compression sleeves to replace the original oil line.
8. Remove the motor cover from the top of the oil-pump assembly to access to the electrical connections. Consult the documentation provided with the oil pump to determine the correct electrical connections.
9. Cut the black plastic Sealtite harness, P/N 91000925, to the appropriate length to run between the electrical junction box on the oiler and the hole in the rear of the servo cabinet. Place a 90° Sealtite fitting, P/N 86000158, on the servo cabinet side of the harness and one straight Sealtite fitting, P/N 86000154, on the oil pump end of the harness.
10. Run the white, green, and black wires provided, P/Ns 91000352, 91000355, and 91000358, respectively, through the Sealtite harness. Remove the 1/2" NPT lock nut from the straight Sealtite fitting, and attach it to the oil pump. Connect the black and white leads from the Sealtite harness to the appropriate wires on the pump motor according to the oiler documentation. The kit includes butt splices, P/N 86600049, and spade lugs, P/N 86600042, to facilitate this. Be sure to connect the green wire to the ground lug inside the junction box. Reinstall the cover on the junction box.

11. Feed the non-terminated end of the Sealtite harness through one of the lower holes in the rear of the servo cabinet. Use three spade lugs, P/N 86600042, on the ends of the wires to attach the black and white wires to screw terminals 5 and 6 of the P1 connector on the servo control board as shown in the wiring diagrams later in this manual. Refer to the *4200T Lathe Kit Two- and Three-Axis Standard and CE Drawing Package*, P/N 70000631, at the end of this manual. Attach the green wire to the central ground buss bar in the servo box.
12. Close the servo box door, and power-up the system. Press **SERVO RESET** to verify that the servo motors have power.
13. To confirm that the oiler is working, look inside the oil reservoir and note that the worm gear on the bottom of the motor shaft is turning.
14. Route all wires neatly inside of the servo box. Use the wire ways provided.

Network Connection Installation

To install the network connection, plug the standard CAT5, 8-pin, RJ-45 connector into the RJ-45 plug located on the back of the console. The CNC provides access to network drives via Ethernet.

Procedure:

1. Use a standard CAT5, RJ-45 cable for the network connection. Refer to **Figure 3-8**.

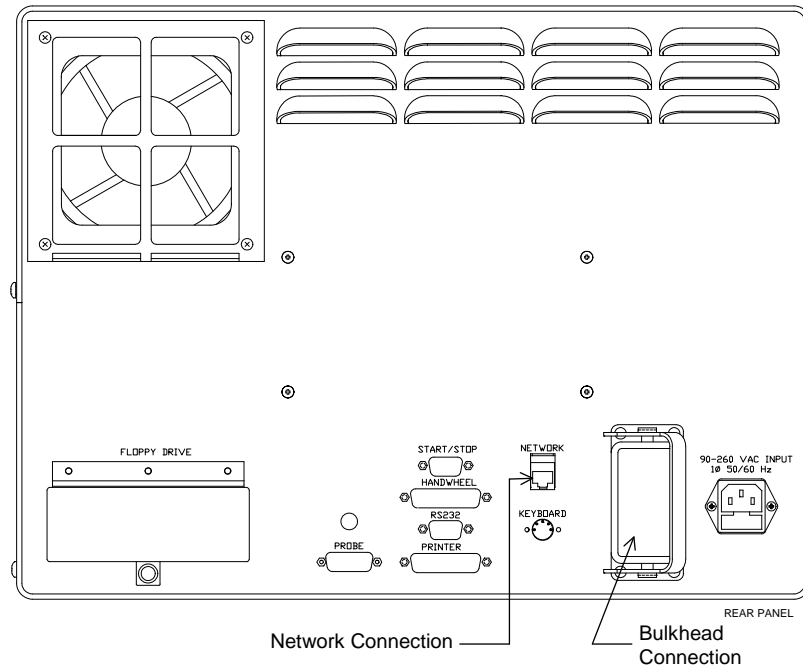


Figure 3-8, Console Rear Panel

Refer to *CNC Network Setup*, P/N 70000483, for an overview of network setup.

NOTE: A qualified networking engineer must set up the networking software. Software varies based on the type of network operating system used.

Remote Start/Stop (Option) Installation

Objective:

- To install a remote start/stop pushbutton station on the console.

Tools: Small Flat Screwdriver**Kit:**

Part Number	Description
33000122	Remote start/stop kit, including preassembled pushbutton station and a 10-32, 3/8" shoulder bolt, P/N 86100853.

Procedure:

NOTE: You must complete changes to **Setup Utility** parameters before you can operate the Remote Start/Stop.

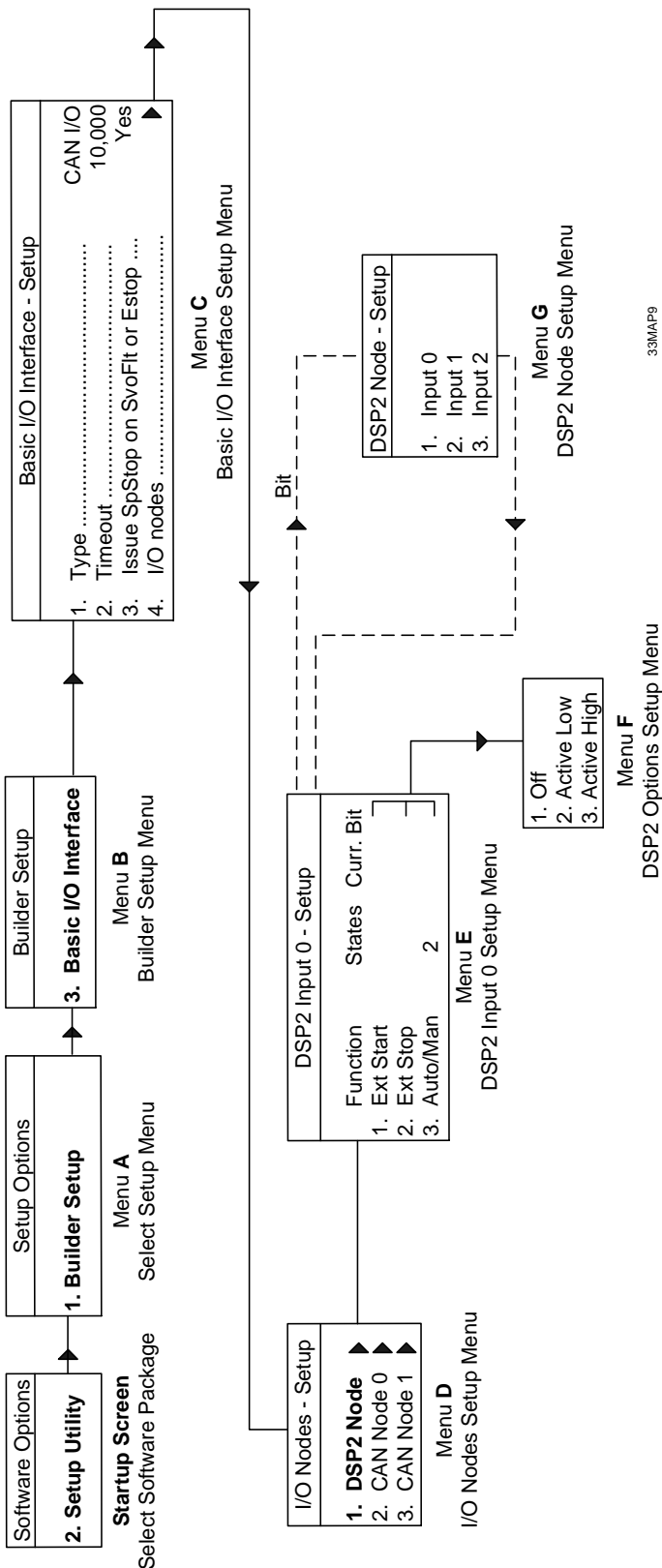
To install the Remote Start/Stop (Option):

1. Locate the Start/Stop pushbutton station and the shoulder bolt, P/N 86100853.
2. Remove one of the 10-32, black Phillips-head screws on the right side of the console and replace it with the shoulder bolt.
3. Plug the remote Start/Stop cable into the back of the console at the START/STOP connector. Refer to **Figure 3-8, Console Rear Panel**.
4. Hand-tighten both screws on the connector.
5. Mount the pushbutton station on the shoulder bolt.

Remote Start/Stop Configuration

1. Refer to **Figure 3-9, Remote Start/Stop Setup Map**. In Manual Mode and with the control turned on, press the red **Emergency Stop** button; then, press **EXIT (F10)** to display the **Software Options Menu**.
2. In the **Software Options Menu**, highlight **Setup Utility**, and press **ENTER**.
3. The **Setup Options Menu, Menu A**, activates.
4. Select **Builder Setup**, and press **ENTER**.
5. The **Builder Setup Menu, Menu B**, activates. Select **Basic I/O Interface**, and press **ENTER**.
6. The **Basic I/O Interface Setup Menu, Menu C**, activates. Select **I/O Nodes**, and press **ENTER**.
7. The **I/O Nodes Setup Menu, Menu D**, activates. Select **DSP2 Node**, and press **ENTER**. Refer to **Figure 3-10, DSP² Node Setup Menu**.
8. The **DSP2 Input 0 Setup Menu, Menu E**, activates. Select **Ext Start**, and press **ENTER**. (The CNC may prompt for a password. If necessary, enter the service level password, and press **ENTER**. Refer to *4200T CNC Setup Utility Manual*, P/N 70000414, "Section 1, Password Restricted Parameters," for more information.)
9. The **Options Setup Menu, Menu F**, activates. Select **Active High**, and press **ENTER**.
10. The **DSP2 Input 0 Setup Menu, Menu G**, activates. Select **BIT (F1)**, and press **ENTER**.
11. The **DSP2 Node Setup Menu, Menu H**, activates. Select **Input 1**, and press **ENTER**.
12. The **DSP2 Input 1 Setup Menu, Menu I**, activates. Select **Ext Stop**, and press **ENTER**.
13. The **Options Setup Menu, Menu J**, activates. Select **Active Low**.
14. Press **EXIT (F10)** successively until the **Save Changes?** prompt appears in the middle of the screen.
15. Select **Yes (F1)** to save the changes made.
16. Enter control software and verify that the Start and Stop button on the push button station function the same way as the green and red **START** and **STOP** keys on the keyboard.

NOTE: The Start/Stop device must be plugged in. If it is not, the inputs activated above must be set to off.



33MAP9

Figure 3-9, Remote Start/Stop Setup Map

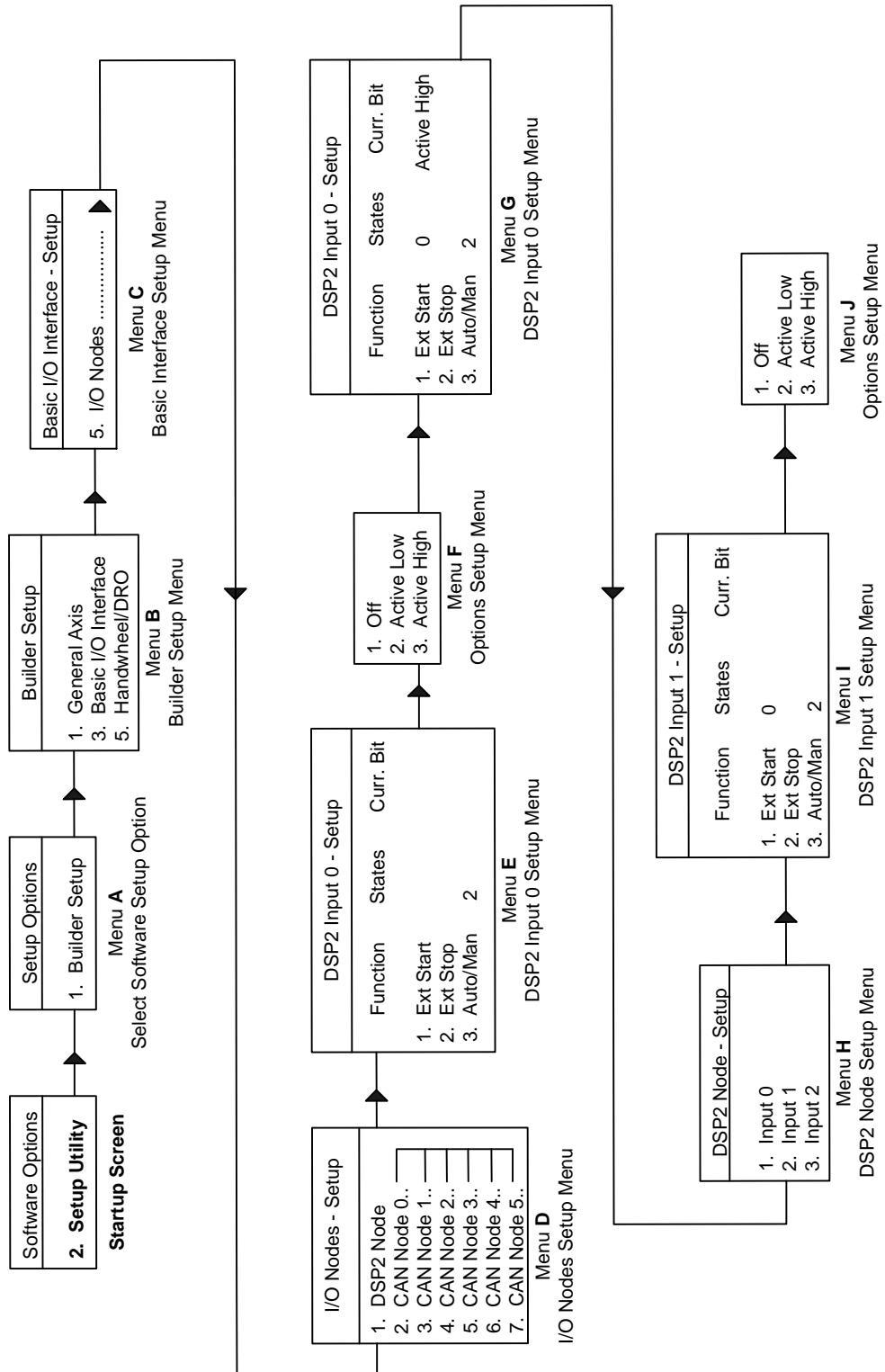


Figure 3-10, DSP² Node Setup Menu

Handy Pulser (Option) Installation

The Handy Pulser (Option) combines the functionality of axis selection, jog resolution, and a handwheel in a remote device. Refer to the programming manual for operating instructions on these features.

Installation Procedure

The following procedure describes how to install the Handy Pulser Kit, P/N 33000907, on 4200T lathe systems.

Kit:

Part Number	Description
33000907 for 2-axes systems	Handy Pulser Kit, including preassembled Handy Pulser, one 10-32 x 3/8-inch shoulder bolt, P/N 86100853, and mounting bracket, P/N 23000178.

Required Tools:

Small, flat screwdriver

To install the Handy Pulser:

1. Locate the preassembled Handy Pulser and the shoulder bolt. Refer to **Figure 3-11**.

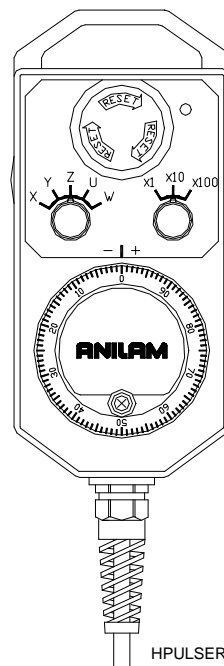


Figure 3-11, Handy Pulser Assembly

2. Facing the console, use the small, flat screwdriver to remove the 10-32, black, Phillips-head screw on the right side of the console.

3. Take the shoulder bolt, P/N 86100853, and place it through the mounting bracket, P/N 23000178, and the washer, P/N 86300090.
4. Screw the shoulder bolt into the hole on the right side of the console and hand-tighten.
5. Hang the Handy Pulser on the bracket.
6. Plug the Handy Pulser cable into the back of the console at the Handwheel connector. Refer to **Figure 3-8, Console Rear Panel**. **Figure 3-12** illustrates the harness handwheel connector. **Table 3-4** shows the Handy Pulser connector pin assignment
7. Hand-tighten both screws on the connector.

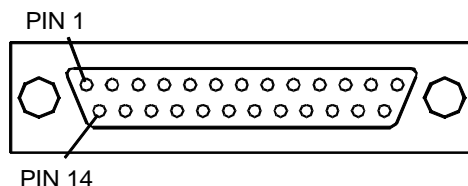


Figure 3-12, Harness Handwheel Connector

Table 3-4, Handy Pulser Connector Pin Assignment

Pin	Signal	Pin	Signal
1	Phase A	14	Jog100-8
2	Phase B	15	n.c.
3	+5 VDC	16	Hold In
4	Ground	17	Cool Out
5	+24 VDC	18	E-STOP 1
6	X Select-0	19	E-STOP 2
7	Y Select-1	20	E-STOP 3
8	Z Select-2	21	E-STOP 4
9	U Select-3	22	Hold Out
10	n.c.	23	Cool Out
11	W Select-5	24	+24 VDC
12	Jog1-6	25	Shield
13	Jog10-7		

Setup Utility Navigation

NOTE: If you purchased your Handy Pulser separately from the CNC, you must configure **Setup Utility** parameters before operating the Handy Pulser. If you purchased your Handy Pulser with the CNC, **Setup Utility** parameters are already configured and you only need to mount the Handy Pulser.

The **Setup Utility** provides access to all CNC settings through a layered organization of menus. Each menu contains a list and provides access to configuration settings or another menu. To select a listed choice, highlight the selection. Press **ENTER** to activate the highlighted selection.

For some settings, press **ENTER** to toggle the setting **On** or **Off**. Other settings require you to enter a specific value. To automatically save a highlighted setting, press **ENTER** or press **Exit (F10)**. To return to a previous menu, close the current menu by pressing **F10**.

Handy Pulser Setup

NOTE: Some steps in these procedures may require you to enter a service-level password. Refer to [4200T CNC Setup Utility Manual](#), P/N 70000414, "Section 1, Password Restricted Parameters."

To configure the handwheel in the Handy Pulser:

1. Refer to **Figure 3-13, 4200T Handy Pulser Setup Menus**. In Manual Mode or Power-Up Mode, press **EXIT (F10)** to display the **Software Options Menu**.
2. In the **Software Options Menu**, highlight **Setup Utility**, and press **ENTER**. The **Setup Options Menu, Menu A**, is displayed.
3. Highlight **Builder Setup**, and press **ENTER**.
4. In the **Builder Setup Menu**, highlight **Handwheel**, and press **ENTER**. The **Handwheel Setup Menu, Menu C**, is displayed.
5. Highlight **Handwheel/DRO #1**, and press **ENTER**. The **Handwheel DRO #1 Setup Menu, Menu D**, is displayed.
6. Verify that **Type** is set to **Handwheel**. If necessary, press **ENTER** to display the **Options** popup menu, and select **Handwheel**.
7. Highlight **Handwheel** in the **Handwheel #1 Setup Menu**, and press **ENTER**. The **Handwheel #1 Setup Menu, Menu F**, is displayed.
8. Highlight **Scaling Factor**, and press **ENTER**.
9. Type the **Scaling Factor** (usually 1.00, range 0.10–1.00), and press **ENTER**.
10. Press **EXIT (F10)** successively until the **Save Changes?** prompt is displayed in the middle of the screen.
11. Select **Yes (F1)** to save the changes.

The handwheel is now ready for use.

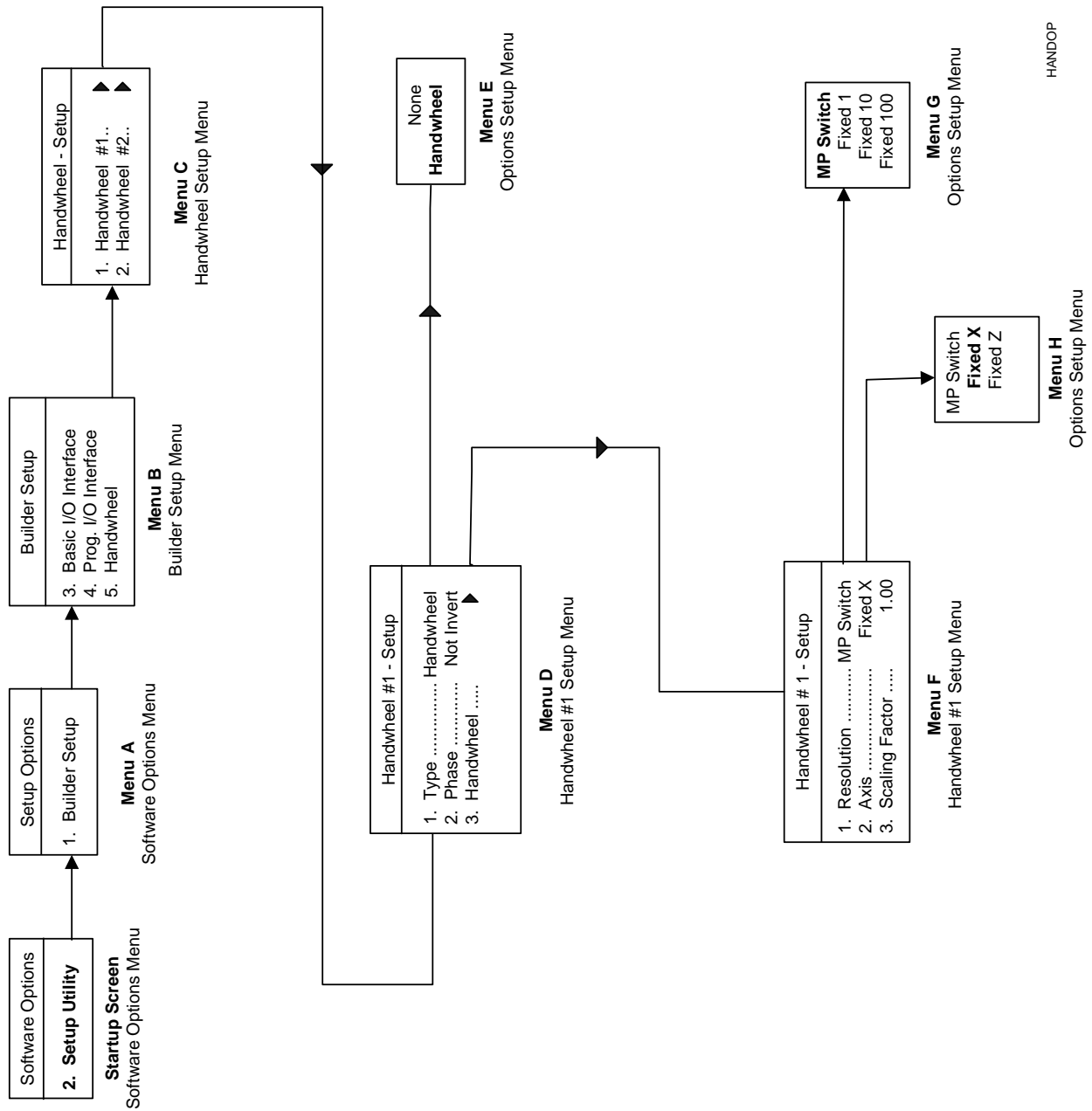


Figure 3-13, 4200T Handy Pulser Setup Menus

Alternative Handwheel Connection (Option)

Objective:

- To connect a Handwheel (Manual Pulse Generator [MPG] only), at the Handy Pulsar port. (Option)

Procedure:

- If the Handy Pulsar Option is not desired, and instead a Handwheel MPG is desired, it can be connected at the console's Handy pulsar port.
- Connection is via a standard DB25 male connector.
- The system does NOT support both dual pulse generator AND Handy Pulsar.
- Connection (Refer to **Figure 3-12, Harness Handwheel Connector** and **Table 3-4, Handy Pulsar Connector Pin Assignment**):

A Phase: pin 1

B Phase: pin 2

+5 VDC: pin 3

COM: pin 4

Jumper across pins 18 and 19

Jumper across pins 20 and 21

See the *4200T CNC Setup Utility Manual*, P/N 70000414, for information on how to configure R/O for handwheel use.

Second Handwheel Connection (Option)

Objective:

- To connect the second handwheel (option).

Parts:

Part Number	Description
33000266	Harness

Procedure:

The control can support two handwheels, one dedicated to each motion axis. The first handwheel is connected at the console; the second handwheel is connected inside the servo cabinet.

Harness 33000266 provides the optional handwheel readout connections for 4200T systems. Refer to **Figure 3-15**.

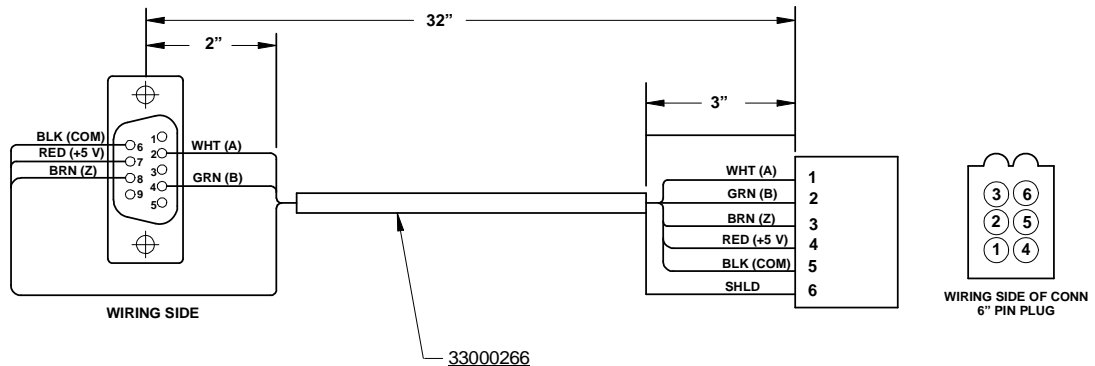


Figure 3-15, Harness, Drawing P/N 33000266

1. Connect the Molex connector to the axis labeled **R/O 2** (Readout 2).
2. Mount the DE9 connector through the right cabinet side.
3. Install and route the harness through the provided wireways:
 - Route the harness through the long center wireway.
 - Route the harness from the long center wireway to the wireway above the servo modules.
 - Route the harness from the wireway above the servo modules to the wireway on the right side of servo modules.

See the *4200T CNC Setup Utility Manual*, P/N 70000414, for information on how to configure R/O for handwheel use.

Peripherals Installation

Printer Installation

Plug the printer cable into the DB-25 connector on the back of the console. Refer to **Figure 3-8, Console Rear Panel**.

Keyboard Installation

Plug any standard PC keyboard into the 5-pin mini-DIN socket on the back of the console. Refer to **Figure 3-8, Console Rear Panel**. (Use a size adapter, if required.) Installing a keyboard deactivates the console keypad. To reactivate the keypad, unplug the keyboard.

The operator cannot activate the **E-STOP** function or reset the servos using an external keyboard. These functions require the corresponding keys on the console keypad.

NOTE: ANILAM recommends industrial grade keyboards.

Maintenance Procedures

Objectives:

- To replace the servo cabinet fan filter.
- To replace the servo cabinet vent filter.
- To replace the console fan filter.

Tools: Phillips Screwdriver

Parts:

The following table lists the parts needed to replace the servo cabinet fan filter and vent filters.

Part Numbers	Description
P/N 85300008 or NAPA P/N 2133	10" x 5" Paper Filter
P/N 85300009	5" x 5" Polyurethane Filter

Procedure:

Perform the procedure for the appropriate filters you need to replace.

NOTE: ANILAM provides replacement filters P/N 85300009, P/N 85300012, P/N 85300013, and P/N 85300010 with each 3000M and 5000M Kit style CNCs.

Table 3-5, Console Rear Panel Parts, lists the parts needed to replace the console fan filter.

Replace the Servo Cabinet Fan Filter, P/N 85300008

NOTE: The paper servo cabinet fan filter, P/N 85300008, is the same filter as NAPA P/N 2133. It replaces AC Delco, P/N A751C, Fram, P/N CA3441, Motorcraft, P/N FA752, WIX, P/N 42136, and Volkswagen, P/N 049-139-848.

Refer to **Figure 3-16, Servo Cabinet – Front and Side View.**

To replace the servo cabinet fan filter, P/N 85300008:

1. Remove the four wing nuts that secure the paper air filter frame to the bottom of the servo cabinet.
2. Replace the air filter, P/N 85300008.
3. Reattach the frame and hand-tighten the four wing nuts.

Replace the air filter annually.

Replace the Servo Cabinet Vent Filter, P/N 85300009

Refer to **Figure 3-16, Servo Cabinet – Front and Side View.**

To replace the servo cabinet vent filter, P/N 85300009:

1. Remove the four Phillips screws that secure the vent panel to the side of the servo cabinet.
2. Remove the vent panel, and replace the filter, P/N 85300009.
3. Reattach the vent panel.

Replace the vent filter every three months.

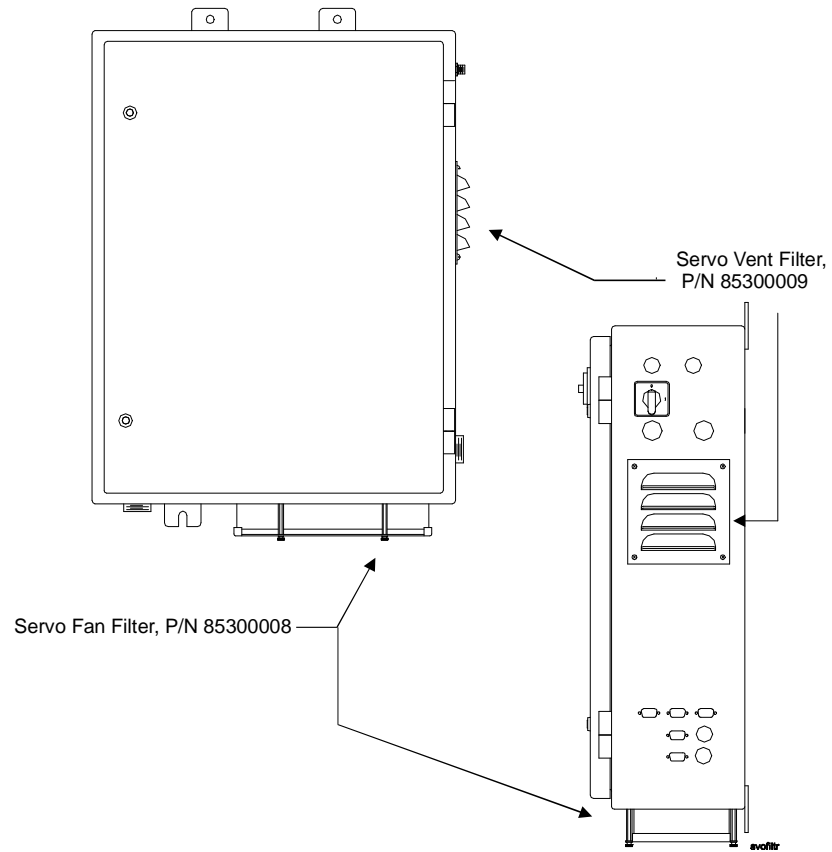


Figure 3-16, Servo Cabinet - Front and Side View

Replace the Console Rear Panel Filter, P/N 85300009

Refer to **Figure 3-17** and **Figure 3-14, Servo Cabinet – Front and Side View**. **Table 3-5, Console Rear Panel Parts**, lists the parts shown in **Figure 3-18, Console Rear Panel – Inside View**.

To replace the console fan filter:

1. Remove the screws that hold the frame to the rear panel of the console.
2. Replace the console filter, and reattach the frame.

Inspect rear panel filter and verify the fan's airflow monthly. Anilam recommends that you replace the console filter every three months. However, under some adverse environmental conditions, such as oil vapor contamination and/or high levels of particulate, more frequent filter changes may be required. The suggested interval, in such cases, is once a month.

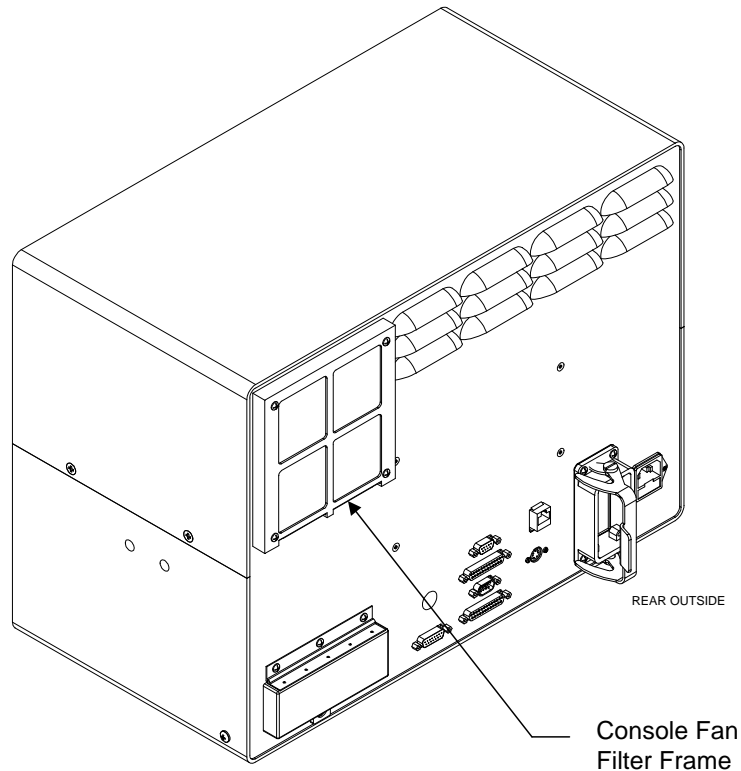


Figure 3-17, Console Rear Panel – Outside View

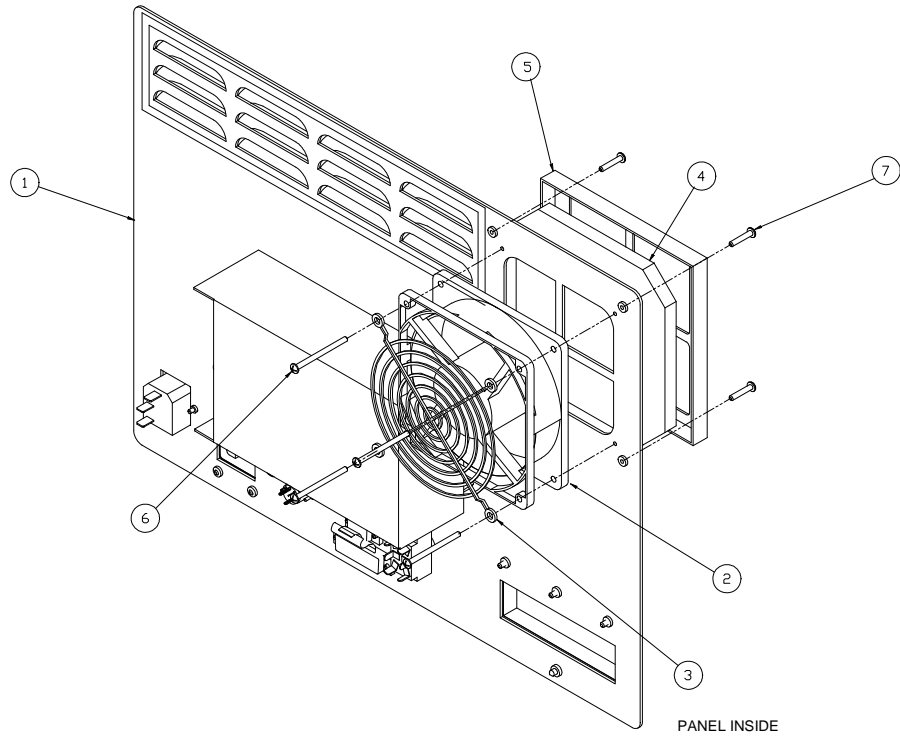


Figure 3-18, Console Rear Panel – Inside View

Table 3-5, Console Rear Panel Parts

Item	Part Number	Description	Qty.
1	23000182	Console, Rear Panel, 5000M	1
2	85400011	Fan, 12VDC, 0.72 A, 105 CFM	1
3	85400013	Fan Finger Guard	1
4	85300009	Filter, POLY-U	1
5	21900112	Bracket, Fan Filter, Console	1
6	86100238	Screw, #6-32 x 1-7/8" LG PHL PAN HD	4
7	86100166	Screw, #6-32 x 5/8" LG PHL PAN HD, BLK	4

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