

Number: 0022

Title: Emergency Stop Systems

Date: February 4, 2008

Product Identification: PCNC 1100 Milling Machine and accessories

Background:

The PCNC 1100 is offered as a base machine with a single Estop (emergency stop) button. The addition of enclosures or other hardware can reduce accessibility of the Estop button. An additional remote Estop can be added, but this can have implications for integrated Estop systems. The Tormach Duality Lathe shares an integrated Estop system with the PCNC 1100 mill. This service bulletin is educational in nature and explains the operation, integration, and extension of emergency stop wiring.

Theory of Operation:

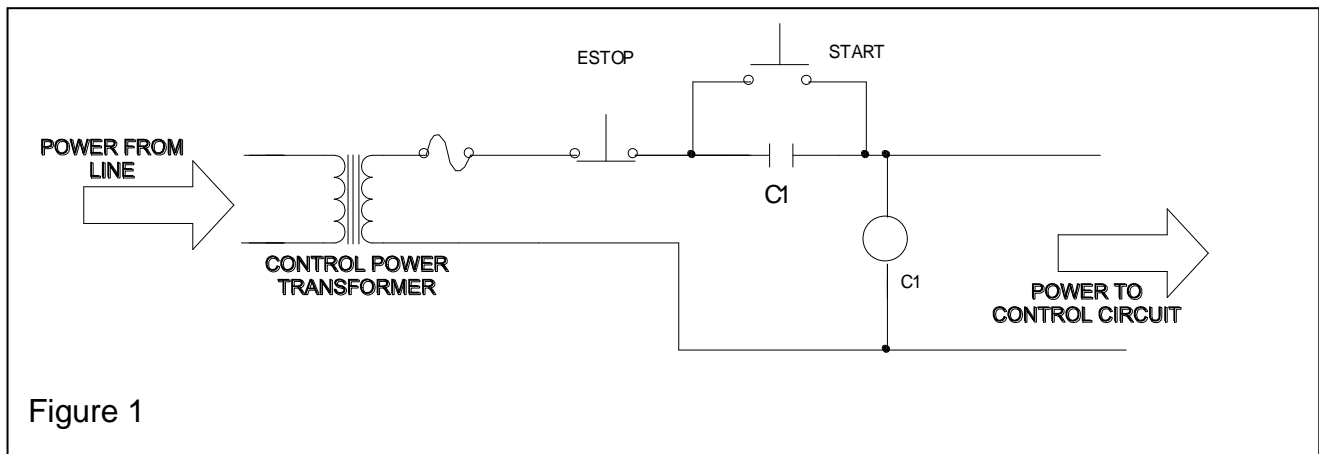


Figure 1 shows a conventional control circuit system. Power comes in from the left and is reduced through a control power transformer. The Estop button is normally closed, the start button is normally open. Once the start button is pressed, the coil C1 energizes to close contact C1, thus holding the power to the remainder of the control circuit live.

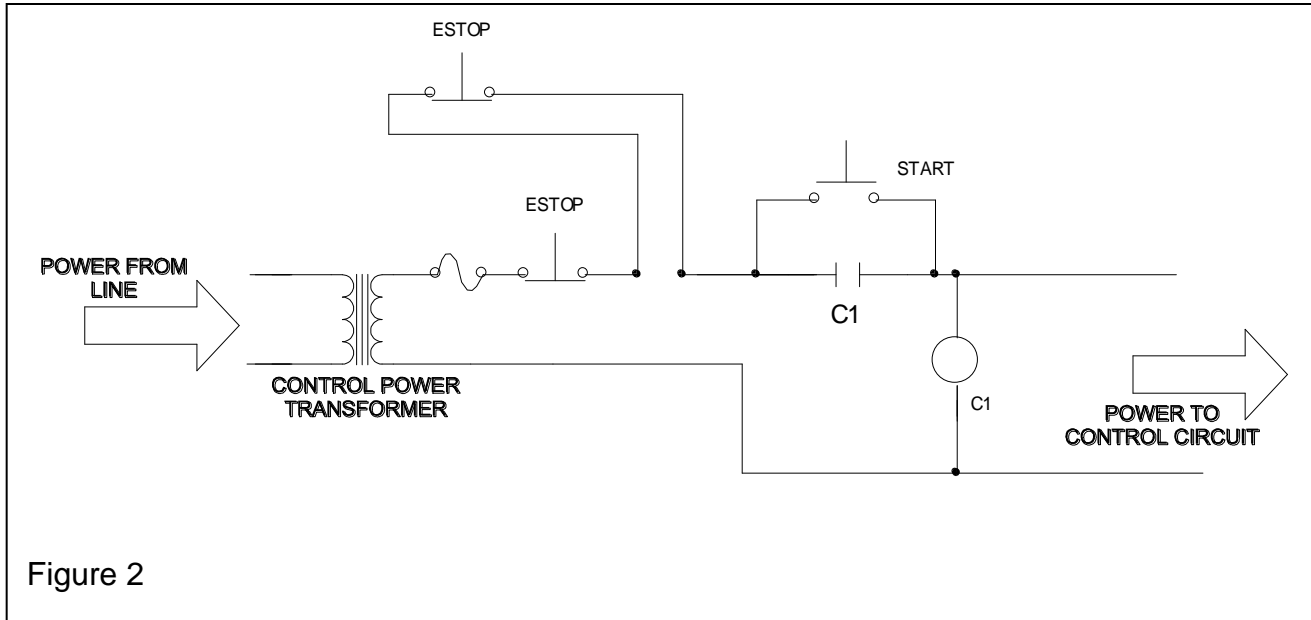


Figure 2

Figure 2 shows a simple extension with a remote Estop button. This type of system can be built with standard parts. Components for DIY (do it yourself) Estop extensions are available from Tormach. Consult Tormach for current pricing. Wire and conduit are priced per foot.

Components for Estop Extensions	
PN	Description
30789	Box, 22 mm button mount box (gray plastic 70mm x 70mm x 72 mm)
30462	22 mm twist lock Estop with single NC contact.
30784	Wire, 16 AWG Red MTW (machine tool wire)
30627	Flex Conduit - 16 mm OD
30628	Connector, end connection for 16 mm flex conduit
30775	2 terminal inline wire connector

The Two Machine Integrated Estop System

When two autonomous machines, each with their own Estop systems, are combined to form one integrated machine system, the Estop systems must also be integrated. The result of an integrated Estop system is that when the Estop button on either of the two machines is pressed, both machines will stop. Either button affects both machines.

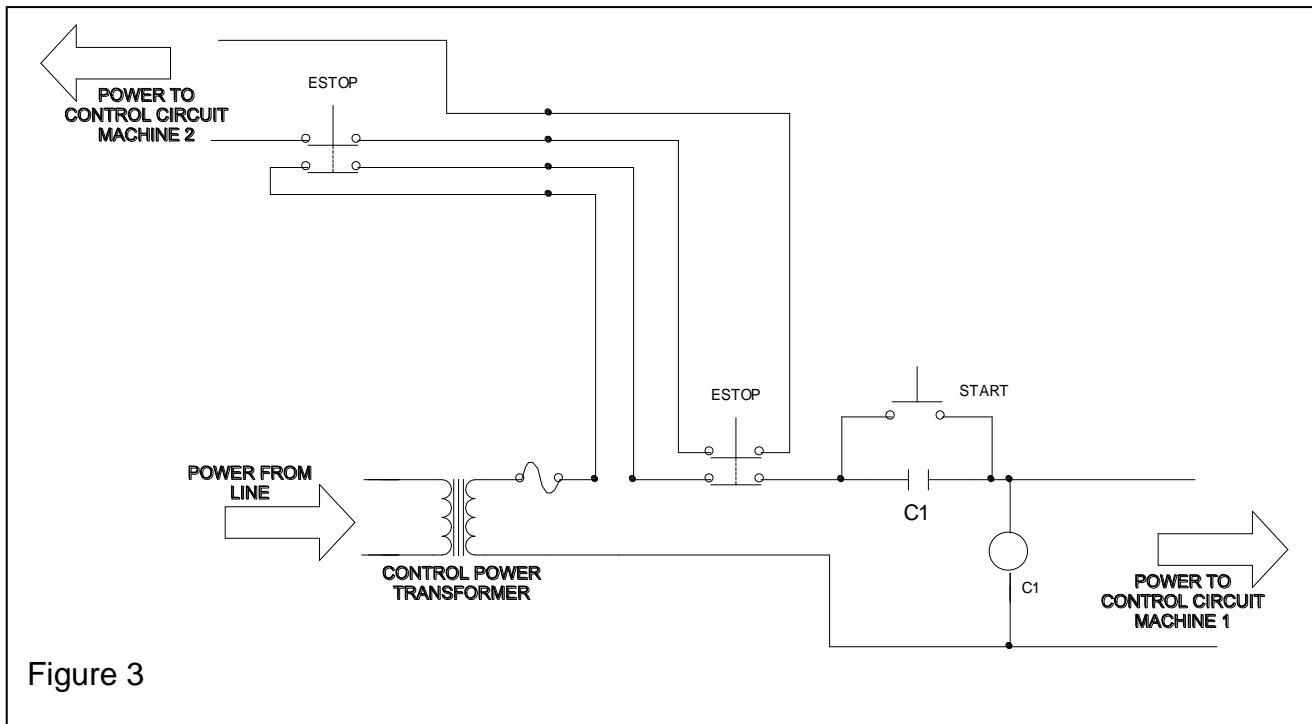


Figure 3 shows an integrated Estop system. It requires that each Estop button have two NC (normally closed) contacts, one for each machine. The power supply for each control system is not shared. Machine 1 has a different power supply than machine 2.

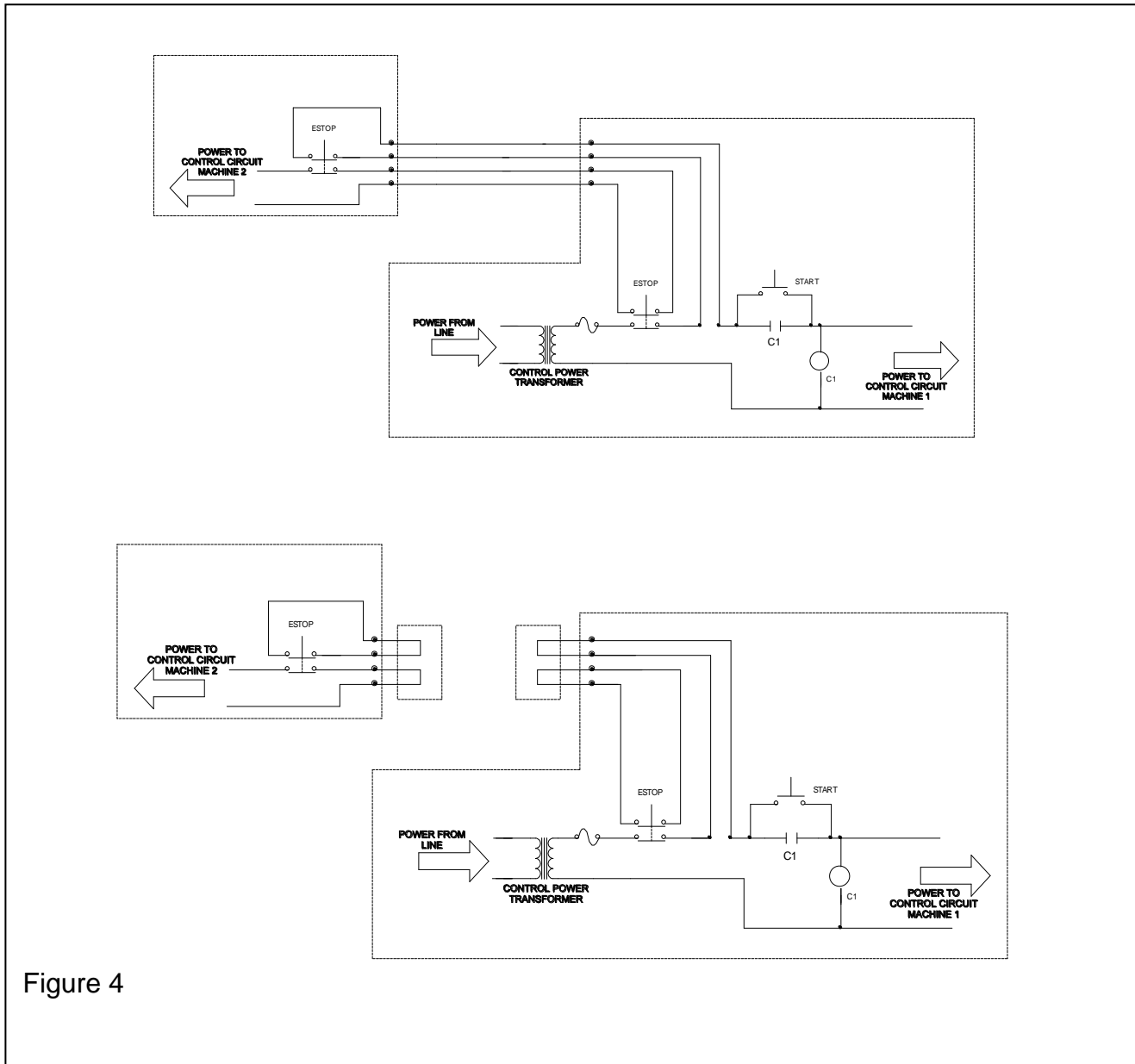


Figure 4

The upper portion of Figure 4 shows how an integrated Estop system is used between the Tormach PCNC 1100 mill (machine 1) and Tormach's Duality Lathe (machine 2). The lower portion of Figure 4 shows how the machines are operated independently of one another. The connecting cable is replaced with two Estop feedback blocks. Neither machine will operate without a feedback block in place. The Estop feedback blocks are simply caps that are installed in lieu of the integrated Estop cable used when the machines are connected.

Using a Remote Estop with an Integrated Estop System

Figure 5 below shows how a remote Estop is added while preserving the capability of an integrated Estop system. The remote Estop is placed between the two machines.

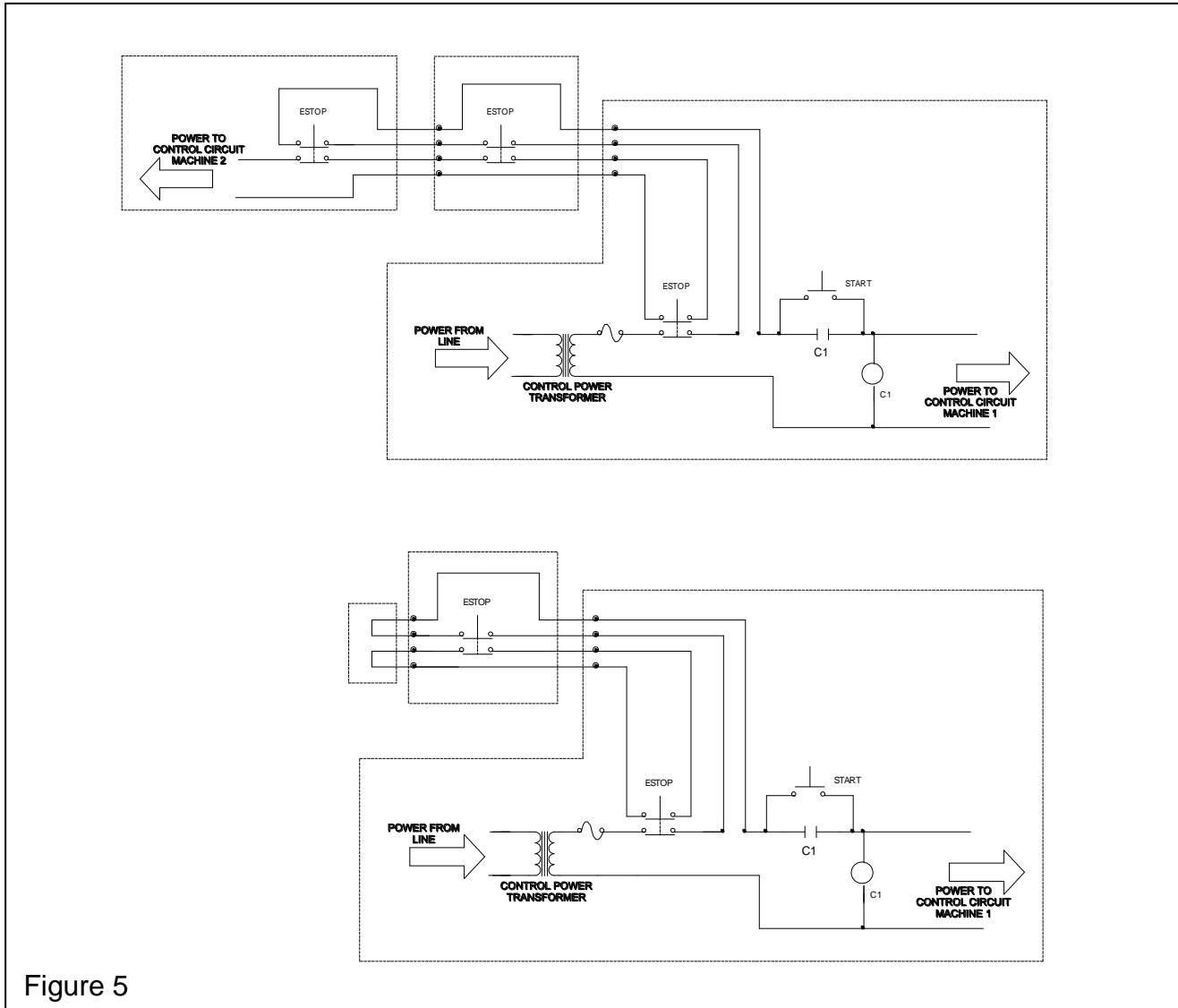


Figure 5

When machine 2 (Duality Lathe) is added or removed, it is connected or disconnected from the remote Estop, not from machine 1 (PCNC mill). When the Duality Lathe is removed, an Estop feedback block must be put in place when the integrated Estop cable is removed. If additional remote Estops are needed, they can simply be added in series.



Enabling Your Ideas

Service Bulletin

The theory of operation noted here applies to the following Tormach items:

Part Number	Name	Description
30204	PCNC 1100 CNC Mill	3 axis CNC mill
30689	Duality Lathe	Lathe for combination manual and CNC. The Duality Lathed includes Estop Integration Cable, Integrated Estop Installation Kit, and Estop Feedback block.
30785	Integrated Estop Installation Kit	This kit includes all parts contained within the PCNC 1100 that are necessary to convert a conventional PCNC 1100 Estop to an integrated system. The kit adds an integrated Estop receptacle to the mill. One Estop Feedback Block (30786) is included. The kit is included with the Duality Lathe but is necessary for installation of an Integrated Remote Estop (30790) if installed without the Duality Lathe.
30790	Integrated Remote Estop	An integrated Estop button with a 3 meter cable. The remote Estop is plugged into the receptacle provided by the Integrated Estop Installation Kit (30785).
30786	Estop Feedback Block	This block is inserted in an integrated Estop receptacle when the integrated machine is not present. The feedback blocks are normally included with other kits. It is offered individually as a replacement component if the original is lost.
30787	Estop Integration Cable	This cable connects the integrated Estop receptacles between two machines. The cable is normally included with the Duality Lathe. It is offered individually as a replacement component if the original is lost.