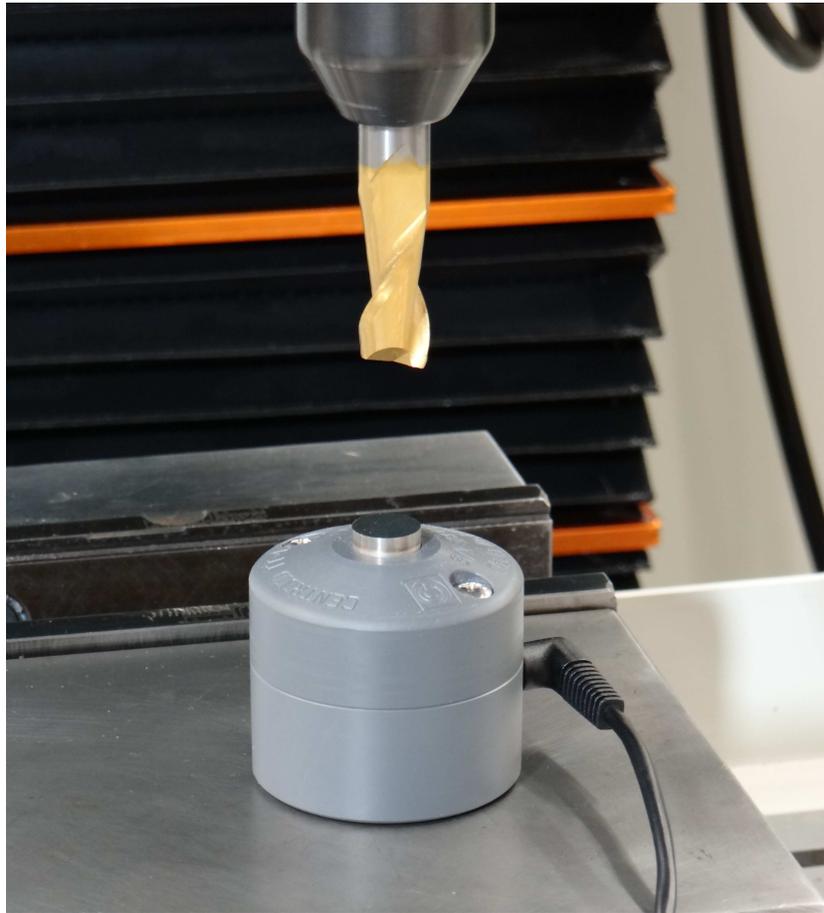




## **TT-1B Tool Touch Off**



## **Operator's Manual**

**U.S Patent #6553682**

**Rev 2014-04-28**

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Howard, PA 16841**

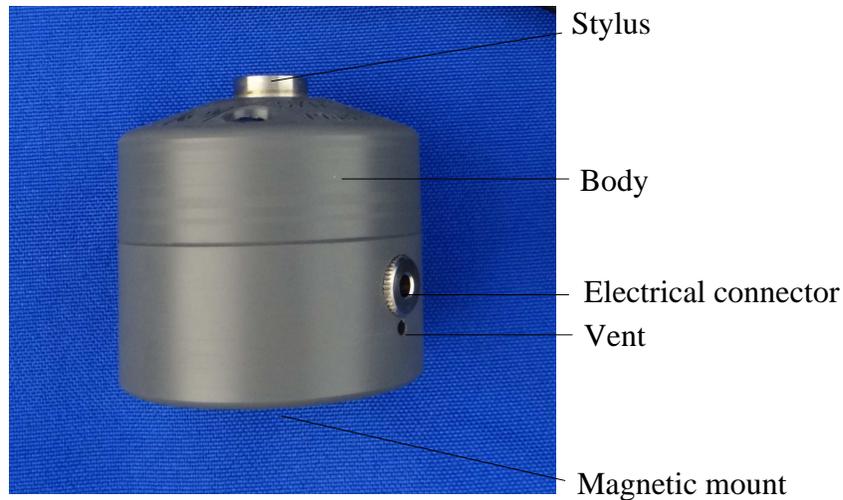
## TT-1B Quick Start Guide

1. Install MPU11 Probe cable assembly #11085 if necessary. Refer to TT-1B typical hardware and connection diagram on page 6 and appropriate appendix data.
2. Connect TT-1B cable to TT-1B and to bulkhead connector on MPU11 probe cable assembly #11085. See general description page 1.
3. Set system control parameters. See "Table of Contents" to locate application specific appendix.
4. Confirm machine is responding to the TT-1B inputs by running an automatic cycle without a tool in the spindle and manually touching the TT-1B stylus to the machine spindle. Refer to control operator's manual for automatic probing cycles. See TT-1B setup procedures page 2 and 3.
5. Confirm the connection detect feature is working (if necessary) by trying to run an automatic cycle with the TT-1B disconnected. Refer to control operator's manual for automatic probing cycles. See TT-1B setup procedures page 2 and 3.
6. Review stylus travel limit on page 2, install a tool in the spindle and perform an automatic probing cycle at reduced speed. See procedures on page 2 and 3.
7. Install non stock mount option if applicable see page 5. See procedures on page 3.
8. Review "Performance Characteristics" page 4 to ensure good results.
9. Review Maintenance and Care page 7 to keep TT-1B in good operational condition.
10. TT-1B is now ready to use.

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## TT-1B GENERAL DESCRIPTION



### GENERAL DESCRIPTION:

The TT-1B is a tool touch off device designed to implement automatic and manual tool height offset measurements and determine tool breakage and wear. A simple electrical circuit through the touch off surface (stylus), tool, spindle, machine frame and then to signal common is used to signal the control when the tool has touched the stylus. Therefore, the TT-1B is only appropriate for applications where the tools are conductive and an electrical path through the machine to signal common can be established. The TT-1B is suitable for use with any CNC control or Digital Read Out (DRO) that can be configured to utilize this simple electrical circuit.

Deflection travel allowance in the Z direction avoids tool damage as the axis decelerates to a stop after the tool is measured. Mounting options include the standard magnetic base or T- nut.

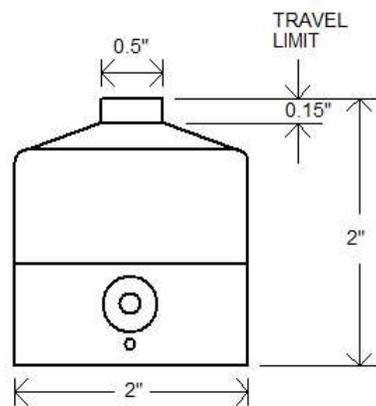
The TT-1B connects to the control with a supplied cable that incorporates a connection detect circuit. An additional cable with bulkhead connector P/N 11085 is available to complete installation where needed.

The TT-1B has added features that improve on the original TT-1 design. Connection detect and user replaceable parts have increased the value of this product. See the parts view on page 8 to order replacement parts.

Contact Centroid Technical Support at 1-814-353-9290 for a description of the return policy and assistance in determining if return is necessary. See the "Maintenance and Care" section page 9 for precautions when shipping the TT-1B.

## SPECIFICATIONS:

Mounting orientation	Any
Deflection directions	Z-
Unidirectional repeatability (2 sigma)	1 micro meter (2sigma at 1 ipm feedrate )
Deflection spring preload force Z*	5.75 lb +/-20%
Measuring feedrate (nominal)	1 inches per minute
Mounting Options	Magnetic (stock) or T nut
Deflection travel limit -Z	0.15 inch (3.8mm)
Stylus diameter	0.5 inch (12.72mm)
Body diameter	2 inch (50.9mm)
Height*	2 inch (50.9mm)*
Weight*	0.35 lb (158.8g)*



Dimensions and travel limit

\*Some variation can be expected

## TT-1B SETUP PROCEDURE

**STEP 1:** If probe cable P/N 11085 has already been installed for probe use and the TT-1B is to share the same input, this step may be skipped. If the TT-1B cable detect feature is not present in the existing cable (older systems) then install cable P/N 11085 and connect to the desired inputs. See drawing titled "TT-1B Wiring Diagram" on page 6 and the appropriate appendix. Follow the wire colors to match-up the TT-1B outputs with the correct control inputs. Double check that supply power is not being applied to the TT-1B output.

**STEP 2:** Connect the TT-1B using the supplied 6' cord. Insert the 3.5mm plug in the TT-1B 3.5mm receptacle. The opposite cord end is keyed to prevent incorrect connection to MPU11 probe cable P/N 11085 bulkhead connector. Rotate the connector until it drops into the mating receptacle then finger tighten the securing ring to seat the connector.

**STEP 3:** Confirm that control parameters are setup correctly for your system. The automatic tool height measuring cycles will not work and the TT-1B may be damaged if the parameters are not correctly set. See the appropriate appendix of this manual for control specific default settings. Check the operation manual for your control for compatible parameter settings. For Centroid systems press <Alt+I> to open the Centroid PLC I/O diagnostic screen. Locate the inputs entered in parameters 44 and 257. Verify that they change correctly when the TT-1B is plugged in and triggered. Trigger the TT-1B by touching the stylus to bare metal on the machine. See illustration below. Touch the stylus to a tool in the spindle and confirm the input changes.



**Illustration 1: Testing input trigger with metallic wrench.**

**STEP 4:** Do a slow dry run without a tool in the spindle and manually touching the TT-1B stylus to the machine frame. Confirm that the machine will respond correctly before attempting an actual automated touch off. Confirm the control is detecting the TT-1B connection by unplugging it and trying an automated touch off. No motion should occur and an error message should appear on the control screen.

**STEP 5:** Thoroughly clean the area where the TT-1B will be mounted. Mount the TT-1B in the desired location and confirm the magnetic mount is firmly attached to the mounting surface and no wobble, deflection or rocking is possible. If another mounting option is used, be sure it is solid and will not deflect when the tool is forced against the disc. The mounting surface must be perpendicular to the measurement direction. Check this by measuring tool lengths on different areas of the stylus. All measurements will be the same if the mounting surface is perpendicular.

**STEP 6:** Review the TT-1B travel limit in the specifications. Perform an automatic tool measurement cycle test with the feedrate override reduced to 20% to verify everything is functioning correctly. Be prepared to manually stop the machine to prevent over travel damage.

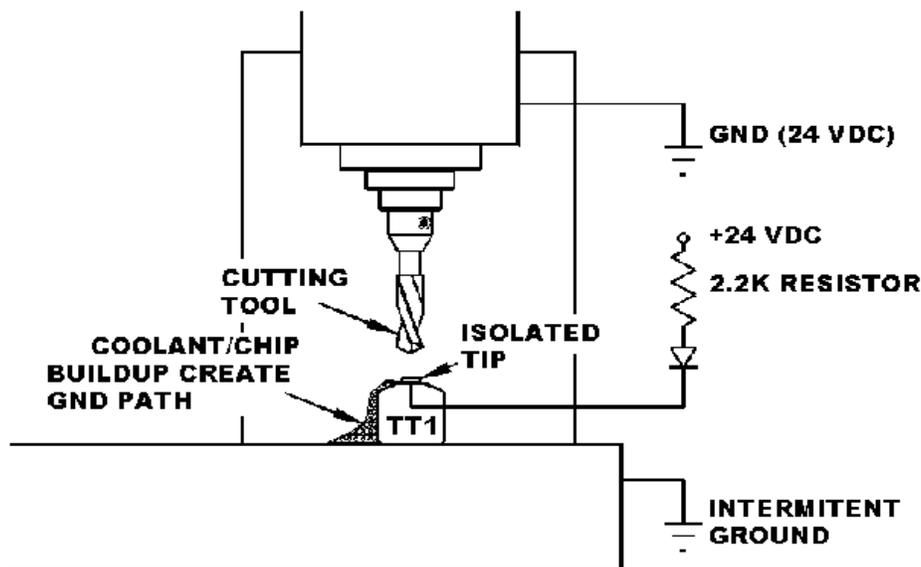
**STEP 7:** Direct spray or splash of fluids should be avoided. If the TT-1B is permanently mounted and the 3.5mm connector is not regularly unplugged then the connector should be sealed to prevent coolant entering the electrical connector. Apply sealant around the plug while inserted in the electrical connector. Do not allow sealant in the connector or the vent. See the general description on page 1 to locate the vent.

## PERFORMANCE TIPS

The time it takes to measure a tool and the resultant accuracy are primarily affected by the feedrates. Typically a faster feedrate is used to approach or find the touch-off surface to save time. Care must be exercised selecting this speed, too slow wastes time and too fast may exceed the over-travel limit and damage the TT-1B. The axis must be capable of decelerating to a stop well within the over-travel limit. Any delay in processing the TT-1B signal will add error to the position recorded and will increase over-travel. Once the touch-off surface has been found the tool should be retracted a clearance amount allowing the TT-1B to return to the measuring position. A second approach to the surface at a slow speed provides very accurate position data in a small amount of time. This two step process is the basis of most probing and measurement cycles. Typical values are 30 inches per minute for the fast approach and 3 inches per minute for the slow.

Designating a reference tool for the sole purpose of calibrating the TT-1B can save a lot of set-up time and money in ruined parts. After the TT-1B is calibrated using the reference tool all other tool heights can be set up to the same standard quickly and easily using the TT-1B. See your control manual to set up automated tool measurement.

The stock TT-1B is equipped with a heavy spring to ensure that accurate and repeatable results are obtained when a touch probe is used as the reference tool. The probe is used to set the height of the TT-1B so it is important that the TT-1B not deflect while being probed.



To prevent false reading and errors keep chips clear of the isolated tip of the TT-1B stylus.

## MOUNTING OPTION INSTALLATION AND REMOVAL

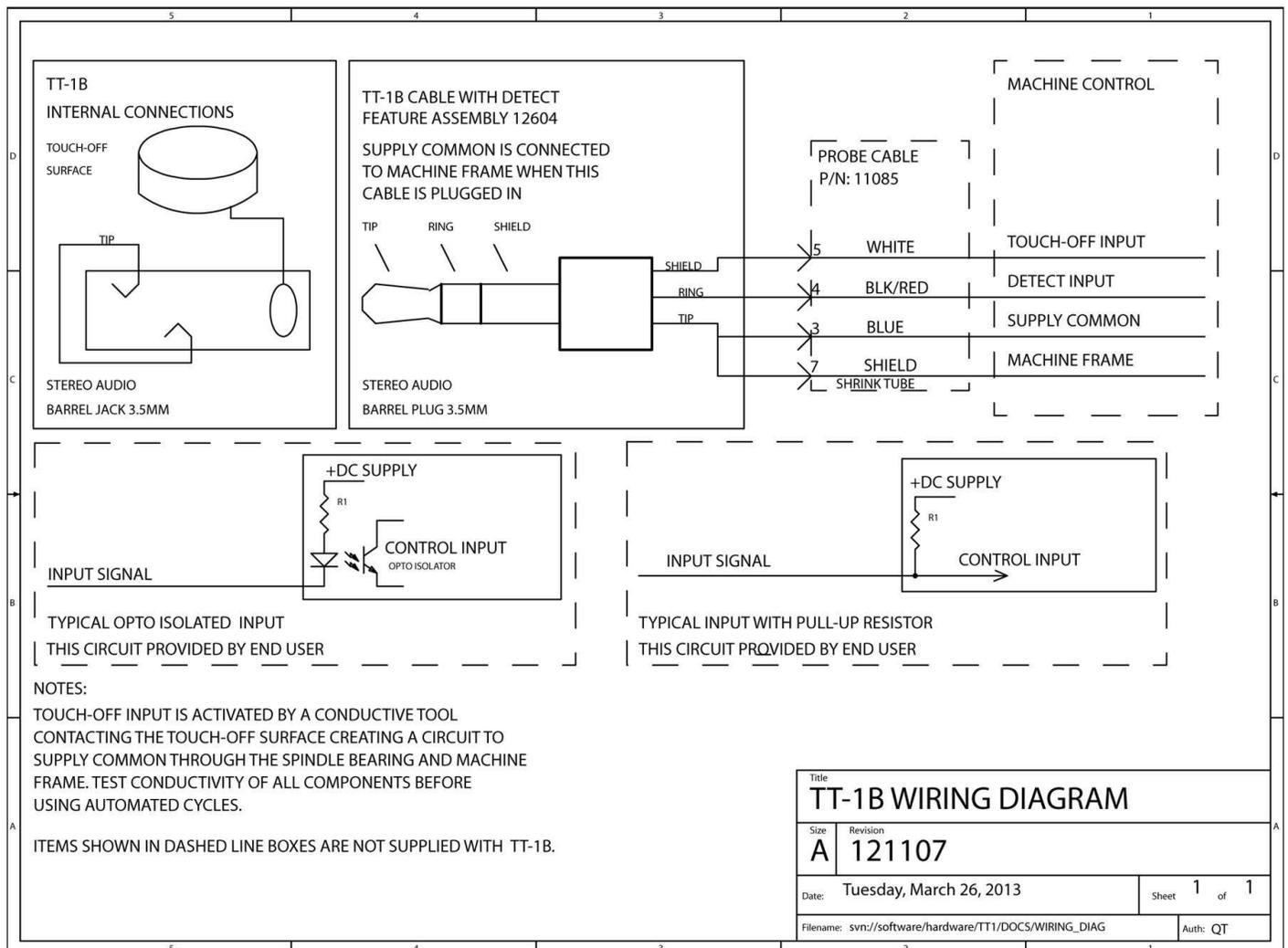
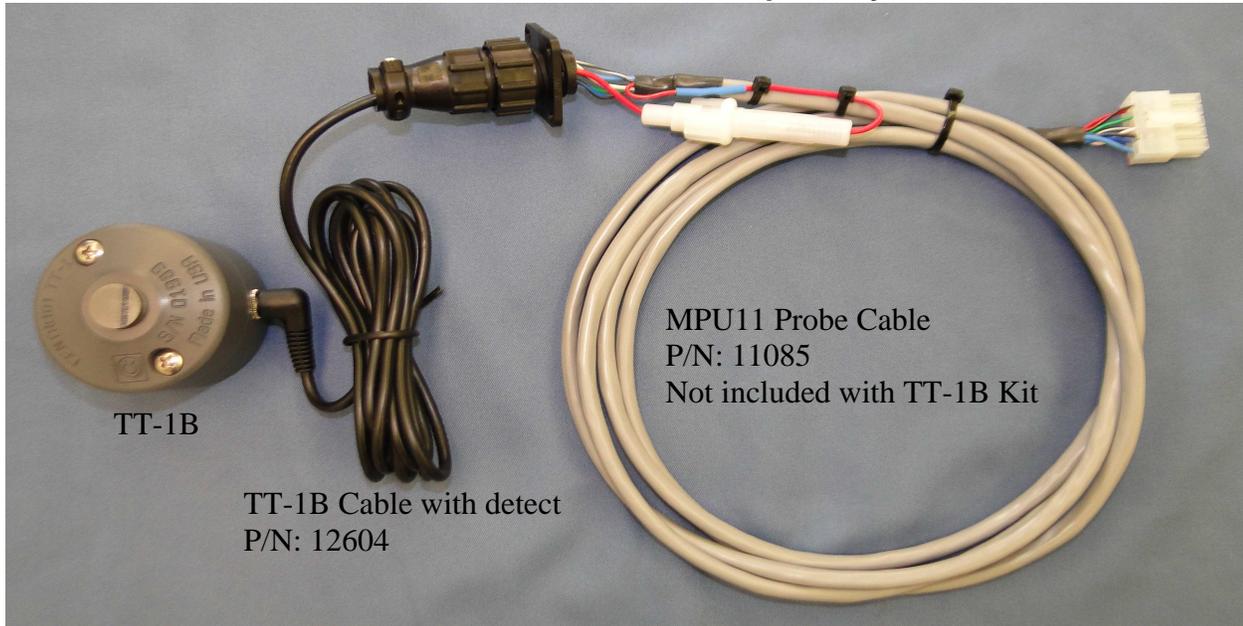
To change the mount remove the screw in the center of the magnetic mount. Remove the magnet and any shims behind it. Thread the 8-32 end of the T-nut bolt adapter all the way into the hole that held the magnet. Thread the 1/2-13 end into a T-nut in the table slot. Be careful not to over-tighten which will pull out the 8-32 threads.



### TT-1B Mounting Options

Comparison of Stock Magnetic Mount and Bolt Mount option  
T-nut adapter thread is 1/2-13. T-nut is included in option.

**TT-1B typical hardware connection.**  
**MPU11 Probe Cable P/N: 11085 must be ordered separately.**



## MAINTENANCE AND CARE

**Do not submerge** the TT-1B. Avoid direct flow of coolant at the electrical connector. Wipe off excess liquids to prevent accumulation inside and outside the TT-1B. Do not use compressed air to clean the TT-1B as this may force contaminants into the electrical connector and inside the body. If the TT-1B is permanently mounted and the 3.5mm connector is not regularly unplugged then the connector should be sealed to prevent coolant entering the electrical connector. Apply sealant around the plug while inserted in the electrical connector. Do not allow sealant in the connector or the vent.

**Storage.** Do not store or ship the TT-1B with the stylus pushed into the body as this will negatively effect performance.

**User repairs.** TT-1B replacement parts are available from Centroid. Contact Centroid Technical Support at 1-814-353-9290 to locate the nearest dealer.

**Performance.** Regularly check reference measurements to confirm that the TT-1B will repeat measurements consistently. If the TT-1B becomes unrepeatably service will be necessary. Contact Centroid Technical Support at 1-814-353-9290 to locate the nearest dealer. The user should also repeat reference measurements if the unit is dropped or receives any sudden external shock. It is good practice to periodically check measurement repeatability for quality control and to establish a base line maintenance schedule.

## SHIPPING INSTRUCTIONS

Contact Centroid Technical Support at 1-814-353-9290 for a description of the return policy and assistance in determining if return is necessary. If the TT-1B must be shipped use the original shipping materials or the equivalent. Do not ship or store the TT-1B with the stylus pushed into the body as this will negatively affect performance.

## TT-1B KIT CONTENTS

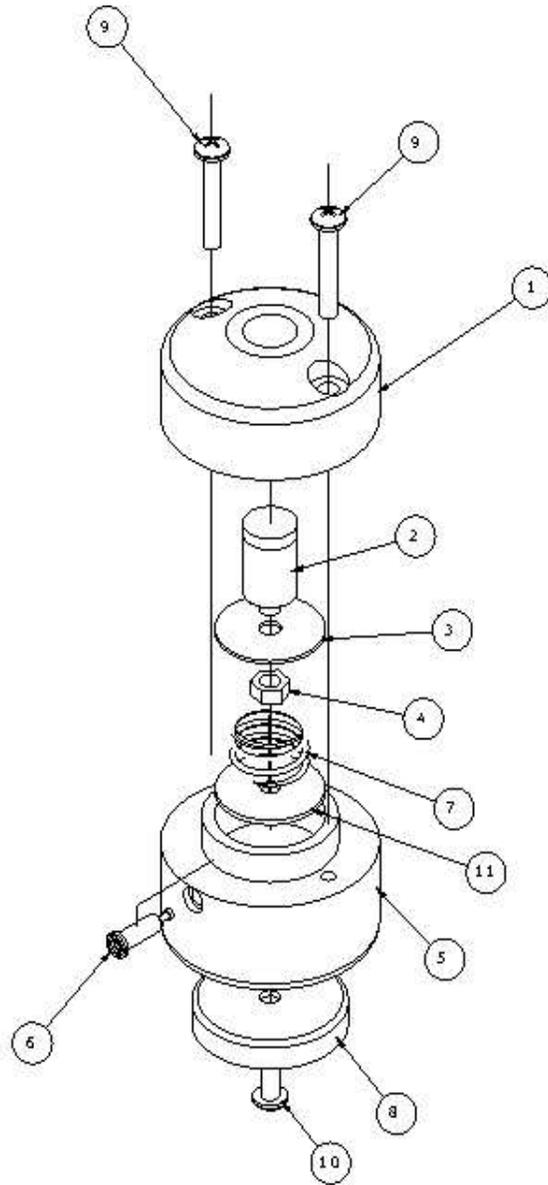
TT-1B TOOL TOUCH OFF (ASSEMBLY 10220)

TT-1B CABLE WITH DETECT P/N: 12604

TT-1B CARRY CASE



## TT-1B PARTS VIEW



PARTS LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	SUB-ASSEMBLY#
1	1	08-4997	TT1 BODY TOP	11055
2	1	2535	STYLUS, TT-1 .500/.750	10220
3	1	2537	WASHER SS, TOOL TOUCHOFF	10220
4	1	2538	HEX NUT SS M5, TOOL TOUCHOFF, TT-1	10220
5	1	08-12568	TT1 BODY BOTTOM W/DETECTION	12568
6	1	7039	CONNECTOR, 3.5mm STEREO JACK	10220
7	1	2536	SPRING, TOOL TOUCHOFF, DP4 HEAVY	10220
8	1	2539	MAGNET, TOOL TOUCHOFF	10220
9	2	7297	SCREW, SS 8-32 1.0" LONG	10220
10	1	1965	SCREW, SS 8-32 5/8" LONG	10220
11	1	7062	FLAT WASHER, ZINC-PLATED STEEL LARGE DIAMETER #8 SCREW SIZE, 1" OD, .03"-.07" THICK	10220

## APPENDIX A: CENTROID CONTROL PARAMETERS

Default parameters are given for CNC10 and CNC11 systems in SAE and Metric units. Many useful features are available that are not configured by these default values. See: “Automatic Tool Measurement” and “Configuration” chapters in the control system manual for description and definition of the parameters listed below and available features.

### CNC10 systems (recommended basic SAE inch):

Parameter	Setting	Description
3	0	Modal Tool and Height Offset Control
13	0.020	Clearance amount nominal
14	30	Fast Probing Rate
15	3	Slow Probing Rate
17	0	Detector location return point
43	0	Automatic tool measurement options
44	14	TT PLC input number
71	0	Part setup detector height
257	N/A	TT connection detection PLC input
367	1	TT Deceleration Multiplier

### CNC11 systems (recommended basic SAE inch):

Parameter	Setting	Description
3	0	Modal Tool and Height Offset Control
13	0.020	Clearance amount nominal
14	30	Fast Probing Rate
15	3	Slow Probing Rate
17	0	Detector location return point
43	0	Automatic tool measurement options
44	50769	TT PLC input number
71	0	Part setup detector height
257	50772	TT connection detection PLC input
367	1	TT Deceleration Multiplier

### CNC10 systems (recommended basic METRIC mm):

Parameter	Setting	Description
3	0	Modal Tool and Height Offset Control
13	0.508	Clearance amount nominal
14	762	Fast Probing Rate
15	76.2	Slow Probing Rate
17	0	Detector location return point
43	0	Automatic tool measurement options
44	14	TT PLC input number
71	0	Part setup detector height
257	N/A	TT connection detection PLC input
367	1	TT Deceleration Multiplier

## CNC11 systems (recommended basic METRIC mm):

Parameter	Setting	Description
3	0	Modal Tool and Height Offset Control
13	0.508	Clearance amount nominal
14	762	Fast Probing Rate
15	76.2	Slow Probing Rate
16	127	Maximum Search Distance
17	0	Detector location return point
43	0	Automatic tool measurement options
44	50769	TT PLC input number
71	0	Part setup detector height
257	50772	TT connection detection PLC input
367	1	TT Deceleration Multiplier

