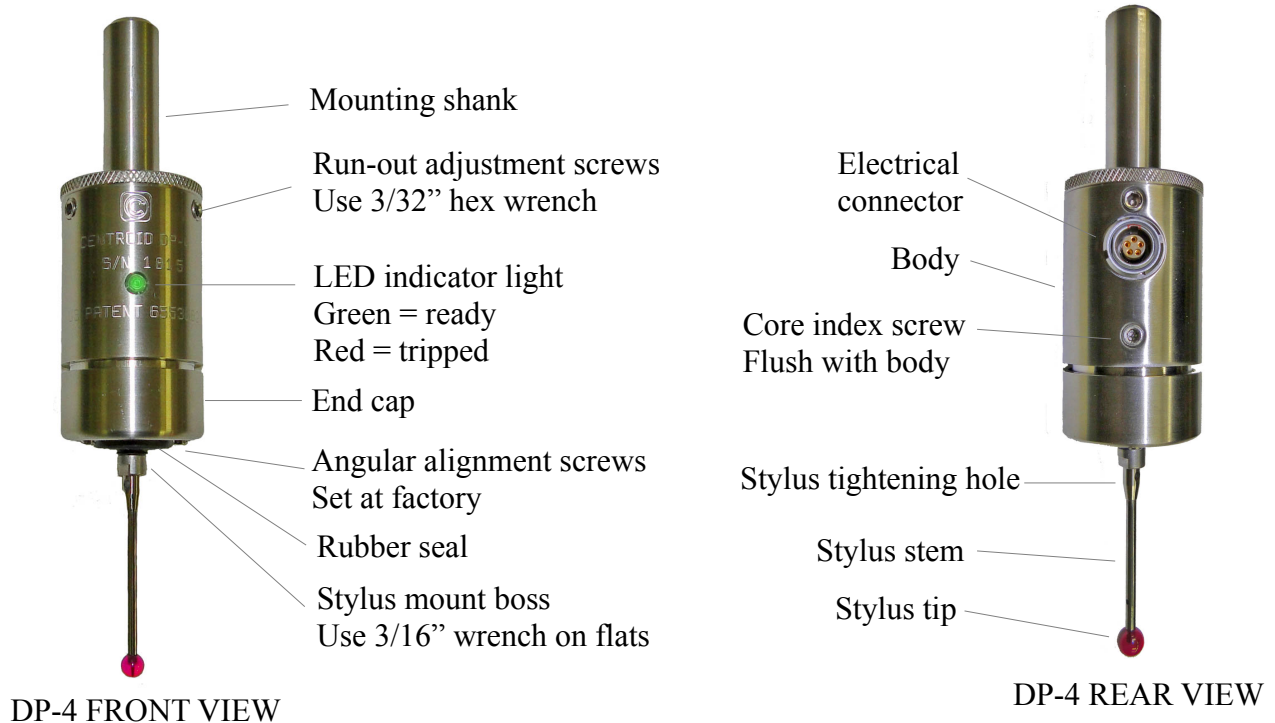# DP-4 Touch Probe

Operator's Manual

DP-4 Quick Start Guide

1. Install MPU11 Probe cable assembly #11085 if necessary. Refer to Common Cables picture on page 11, connection diagram on page 12 and appropriate appendix data.
2. Connect coil cord to DP-4 and to bulkhead connector on probe cable assembly #11085. See probe features and general description page 1. LED indicating light should be green when connection is made then turn red when stylus mount boss is touched.
3. Set system control parameters. See "Table of Contents" to locate application specific appendix. See "Output Switch Logic Selection" page 5 if application requires a normally closed probe output connection.
4. Confirm machine is responding to DP-4 input by running an automatic cycle without the probe in the spindle and manually touching the DP-4 stylus mount boss. Refer to control operator's manual for automatic probing cycles.
5. Install the DP-4 and tool holder in the spindle then install the stylus in the DP-4. See Stylus installation procedures on page 3 and perform run-out adjustment as shown on page 3 and 4.
6. Review stylus travel limits on page 2 and follow the detailed initial setup on page 6 to perform an automatic probing cycle at reduced speed.
7. Calibrate stylus tip size. See procedures on page 6.
8. Review "Performance Characteristics" page 8 to ensure good results.
9. Review Adjustments page 3,4 and 5 and Maintenance and Care page 9 to keep DP-4 in good operational condition.
10. Probe is now ready to use.

TABLE OF CONTENTS

DP-4 PROBE GENERAL DESCRIPTION AND SPECIFICATIONS

Mounting shank

Run-out adjustment screws
Use 3/32" hex wrench

LED indicator light
Green = ready
Red = tripped

End cap

Angular alignment screws
Set at factory

Rubber seal

Stylus mount boss
Use 3/16" wrench on flats

DP-4 FRONT VIEW

Electrical
connector

Body

Core index screw
Flush with body

Stylus tightening hole

Stylus stem

Stylus tip

DP-4 REAR VIEW

DP-4 front and rear views shown with optional stylus attached.

GENERAL DESCRIPTION:

The DP-4 is a "touch probe" intended for probing to find part zero's, reference positions, locate bores, bases, corners etc., and digitizing which allows for the copying of surfaces and shaped objects. The user should first become familiar with the various parts and features of the probe as shown above to facilitate assembly, installation and calibration. Read the stylus installation and alignment procedures section before attempting assembly. Review the over-travel limits shown in the specifications. Exceeding the limits will damage the probe and stylus.

MOUNTING FEATURES:

The mounting shank design allows installation in the spindle of most machines. Other mounting options are easily installed by loosening the run-out adjustment screws and removing the shank from the body. These options include smaller diameter shank or magnet or custom made forms.

OUTPUT FEATURES:

The output is a virtual switch connected to ground that can be configured for normally open or closed logic. This choice can be specified when ordering or can be changed by the user via an internal jumper block that is accessed by loosening the run-out adjustment screws and removing the mounting shank. The state of the switch changes when the stylus physically touches a surface. The DP-4 can be easily interfaced to any CNC control which accepts this common type of switch input signal. A high quality 5 pin connector through the probe body provides a convenient disconnect point for the stock 6 foot retractile cord. A positive lock/unlock sliding sleeve on the cord connector facilitate fast reliable set-up and removal.

DP-4 SPECIFICATIONS:

0.50"Ø
(12.7mm)

1.47"
(37.2mm)

DP-4
S/N 300

1.25"Ø
(31.8mm)

2.22"
(56.4mm)

0.15"
(3.8mm)

10°   10°
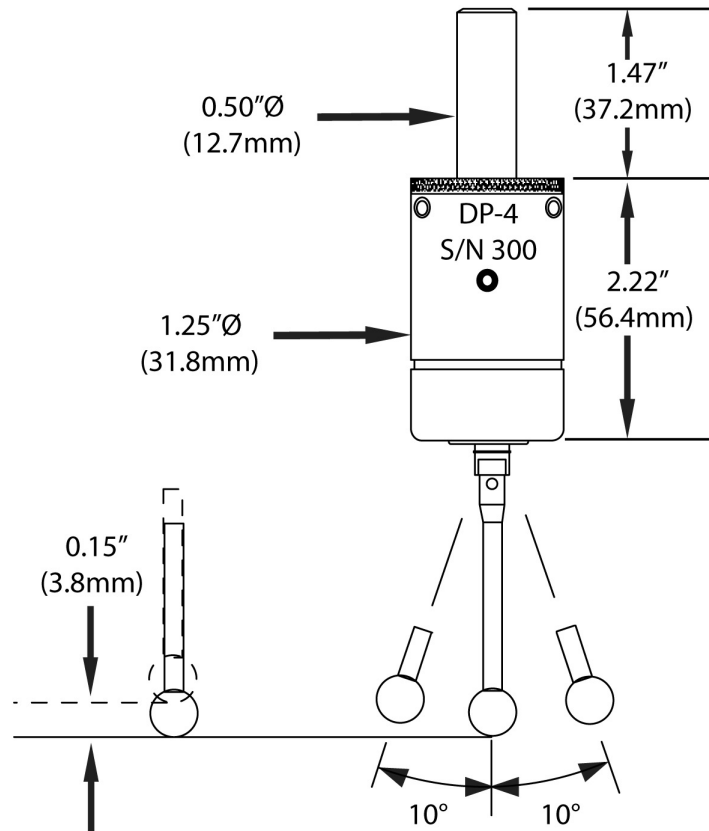
Body Dimensions and Travel Limits

Probing directions	X+/-, Y+/-, Z-
Unidirectional repeatability (2 sigma)	0.00004" (1 micron)
Probe deflection force (X,Y)	3 ounce minimum with 40mm stylus
Pre-travel variation X-Y plane	0.001" with 40 mm stylus
Probe deflection force (Z)	9 ounce minimum
Probe body diameter and length	D= 1.25" (31.8mm) L= 2.2" (56.4mm)
Mounting shank diameter and length	D= 0.5" (12.7mm) L= 1.47" (37.2mm)
Stylus mount thread	M3
Output signal	Switch (FET open drain) 30V 50mA
Output logic	Selectable normally open or closed
Power supply required	10 – 30 VDC 50mA
LED status indicator	green = ready, red = tripped
Weight of probe and ½"shank	0.45 lb
Over travel limit angle (X,Y)	+/- 10 degrees from vertical
Over travel limit (Z-)	0.15" (3.8mm)
Environmental	IP54, Dust Proof

STYLUS INSTALLATION AND ALIGNMENT PROCEEDURES

Important: Read the complete alignment procedure before starting.

The run-out adjustment procedure, also called "Dialing-in" is necessary to ensure that the center of the probe tip is aligned with the center of the spindle rotation axis. This eliminates any undesired off-sets between the probe and the cutting tool centers when digitizing or doing automated part set-up.

Required Tools:

3/16" open end wrench
3/32" hex wrench
0.001" or better Dial Indicator with Magnetic Base
0.500" Dedicated Tool Holder

STEP 1: Install the DP-4 Probe into the dedicated 0.500" tool holder.

STEP 2: Install the complete assembly into the milling machine spindle without the retractile cord.

STEP 3: Install the 2.5 or 5mm stylus in your DP-4 probe. Thread the stylus into the probe stylus mount boss until finger tight. Insert the stylus tightening pin, from your tool kit, into the hole located at the base of the stylus stem and place the 3/16" wrench, from your tool kit, on the flats of the stylus mount boss. Refer to the picture below. Do not apply any twisting force with the 3/16" wrench; use the wrench to counter the twisting force being applied to the stylus by the tightening pin. Excessive twisting force applied to the probe could damage the sensor assembly!
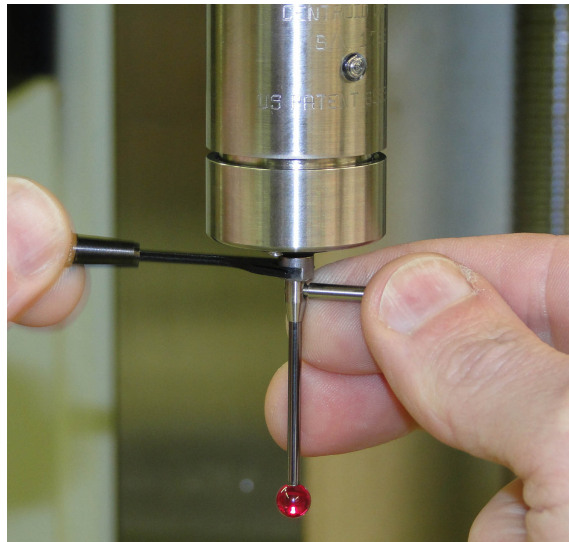
Tightening stylus with wrench and pin

RUN-OUT ADJUSTMENT:

STEP 4:   Position the dial indicator, as shown in the photo below, with the finger of the dial indicator on the front and center of the stylus ball. Insert the 3/32" hex wrench in the run-out adjustment set screw directly above the finger of the dial indicator. Loosen the set screw by turning the hex wrench counter clockwise while watching the dial indicator reading decrease. Turn the hex wrench clockwise and watch the dial indicator reading increase.
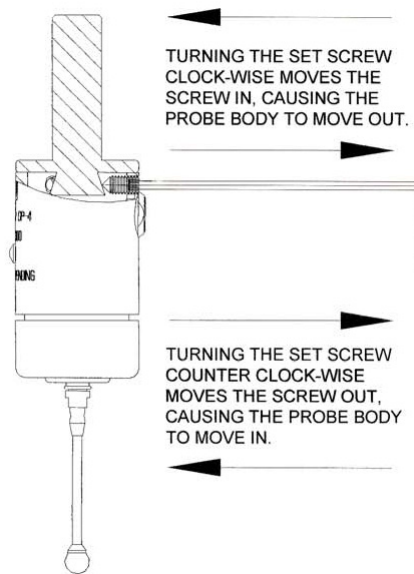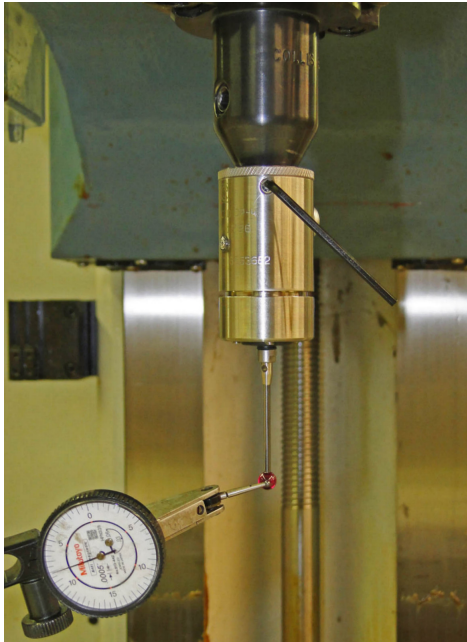
Run-out Adjustment set-up and effect of Set Screw Movement

STEP 5:   Rotate the spindle by hand (without touching the probe) so that the probe spins through a full 360 degrees and watch the dial indicator to locate the high and low run-out rotation positions of the stylus. Adjust the dial indicator so that the entire run-out of the tip can be seen on the dial. If the run-out exceeds the range of the dial then begin at the highest point of the run-out and set the dial indicator so it is at the limit of its range at this point.

STEP 6:   Rotate the probe so that the nearest run-out adjustment set screw is above the finger tip of the indicator. Using the 3/32" hex wrench slowly turn the setscrew directly above the indicator finger, in the counter clock-wise direction, the dial indicator will show the reduction in the run-out. Stop loosening this set screw and tighten the set screw that was nearest the low run-out position. Do not allow the probe to become loose on the mounting shank.

STEP 7:   Repeat steps 5 and 6 until no run-out of the tip is visible on the dial indicator needle. If the screws become too tight before you have finished the adjustment, **do not force them**, instead loosen the setscrew that corresponds with the highest reading on the dial indicator, (refer to figure 3.2) and tighten the set screw at the lowest reading. Only adjust a set screw when it is directly above the indicator finger. This way you can see the full effect of the adjustment you are making.

WHEN TO CHECK RUN-OUT:

Any time the probe is removed from its holder, the stylus is changed or the probe is used in a different machine, the alignment procedure should be repeated to ensure accuracy. The user should also repeat the alignment procedure if the unit is dropped or receives any sudden external shock. It is good practice to periodically check alignment for quality control and to establish a base line maintenance schedule.

ANGULAR ALIGNMENT:

Angular alignment is the relation of the spindle center line to the stylus stem center line. This adjustment provides for equal clearance all around the stylus stem. This adjustment is rarely needed except when extremely small or long stylus is used. When the stylus tip and stem are nearly the same diameter this adjustment is critical to keep the stem from contacting a vertical surface before the tip. This adjustment is also convenient to adjust parallelism when flat disc or block stylus types are used. The range of adjustment is very small as it is only intended to correct the stylus and spindle center line continuity. If this adjustment must be performed use the run-out adjustment set-up shown above to monitor the effect of the adjustment. The angular alignment and run-out adjustments are interdependent. It will be necessary to repeat each several times to achieve significant results. When completed, the run-out at the stylus mount end of the stylus stem should be nearly the same as the run-out at the tip. Adjust the stylus tip run-out last.

To check the angular alignment begin by completing the "Dialing-in" procedures for the probe tip. Measure the run-out at the base of the stylus stem (the end away from the tip) with the dial indicator. If the run-out is greater than the difference between the tip diameter and stem diameter then it will be possible for the stem to contact a vertical surface before the tip (also called "shanking out").

The angular alignment is accomplished by first performing a "Dialing-in" procedure on the stem base using the run-out adjustment set screws. Next, the tip is dialed-in using the angular adjustment set screws in the end cap of the probe. These two steps are repeated until the difference in run-out between the tip and stem base is acceptable. Be sure all set screws are equally tight when finished.

OUTPUT SWITCH LOGIC SELECTION:

The DP-4 output is a solid state switch that can be configured for normally open or closed logic. This choice can be specified when ordering (recommended) or can be changed in the field. The standard configuration for the stock DP-4 is normally open. A jumper block located under the mounting shank inside the probe sets the logic. To access the jumper block unplug the probe, remove the stylus, loosen the run-out adjustment screws and remove the mounting shank. Be careful not do damage any wires or allow any dirt or debris inside the probe. Move the jumper from its present position to the opposite end of the three pin header to invert the logic. Use tweezers or small pliers to slide the jumper block up off the pins and then slide it down on the pins at the opposite end of the three pin header. Install the mounting shank and snug the run out adjustment screws. The run out adjustment must be performed any time the mounting shank is removed.

INITIAL CONTROL/PROBE SETUP PROCEDURE

STEP 1: Confirm that control parameters are setup correctly for your system. The automatic probing cycles will not work if the parameters are not correctly set. See appendix to check the default parameter settings for the appropriate control system. Check the control operation manual if compatible parameter settings are not found in the appendix.

STEP 2: Plug the 6' retractile cord into the DP-4 probe and into the digitizing port on the control. The cord ends are keyed to prevent incorrect connection. At the probe end line-up the red dot with the red painted slot on the probe connector, push the plug in until it clicks. At the opposite cord end insert the large black connector and rotate until it drops into the digitizing port connector then finger tighten the securing ring to seat the connector. The LED indicating light on the front of the probe should be illuminated bright green. Touch the probe tip and the LED should turn red.

STEP 3: Press <Alt+I> to open the centroid PLC I/O diagnostic screen. Locate the inputs entered in parameters 11 and 18. Verify that they change correctly when the probe is triggered (parameter 11) and plugged in (parameter 18).

STEP 4:
Review the probe overtravel limits in the specifications on page 2. Perform an automatic probe cycle test with the feedrate over ride reduced to 20% and the stylus 10 inches away from any object to verify everything is working together. Be prepared to manually stop the machine to prevent overtravel damage to the probe. From the main screen, press <F1-Setup>, then <F1-part>, then <F5-Probing>, then <F7-Single Axis>, and finally <Cycle Start>. The control will jog the stylus in the direction of the single axis move selected. Touch the stylus once and the control will stop and reverse travel the probe clearance amount then stop and then resume motion in the single axis direction at the slow probe rate. Touch the stylus once and the control will stop and display a position window. Repeat this step and adjust parameters as needed to gain confidence using the automated cycles.

STYLUS TIP DIAMETER CALIBRATION:

The final procedure is to calibrate your probe stylus diameter for the tool library. Although the ruby ball (tip) diameter of the furnished styli is either 2.5mm or 5mm, entering these values in the tool library will not produce accurate results unless they are corrected for stylus pre-travel.

Pre-travel is the amount of deflection of the stylus tip before the probe detects the surface. This value varies depending on the length of the stylus and the speed and direction that the stylus tip is moving when it makes contact with the surface being probed or digitized. Pre-travel variation amount should be stated in probe specifications relative to stylus length and direction of travel limitations. A probe that has small pre-travel variation with no restriction on stylus length and direction of travel will be quite expensive. Machine characteristics including lash and input latency also contribute to the need to calibrate the stylus diameter.

In order to achieve optimal results when probing or digitizing you must calibrate the tip size to compensate for the sum of the effects previously mentioned. The following procedure is the quickest way to determine the calibrated diameter. This procedure uses Centroid (TM) automatic probing cycles. Consult your operation manual for similar probing cycles for your machine.

STYLUS DIAMETER CALIBRATION PROCEDURE:

STEP 1:   On the mill table, fixture the precision ring gauge from the probe tool kit. The ring must lie flat with the center line of the bore aligned with the center line of the probe stylus. Note the diameter of the gauge.

STEP 2:   Jog the probe over the center (roughly) of the ring gauge, and then slowly jog the Z-axis down until the tip of the probe is inside the bore and not touching anything.

STEP 3:   From the main screen, press <F1-Setup>, then <F1-part>, then <F4-Probing>, Set your probe diameter to 0.000 in the field provided and press enter, then <F1-Bore>,and finally <Cycle Start>. The control will jog the stylus to and probe each quadrant of the bore. It will then return to the center of the bore. A message box will appear on the screen that will display the measured diameter of the bore. Subtract this number from the known diameter of the gauge bore. The resulting number will be the calibrated diameter of the probe stylus tip.

STEP 4:   Test the result. press <F4-Probing>, Enter the calibrated probe diameter in the field provided and press enter, then <F1-Bore>,and finally <Cycle Start>.   The control will jog the stylus to and probe each quadrant of the bore. The message box will appear on the screen and will display the measured bore diameter within +/- 0.0002" if the calibrated tip diameter is correct and the machine is in good condition. Adjust tip calibration diameter and repeat as needed.

STEP 5:   Go to the Tool Library and enter the calibrated diameter for the probe stylus in the tool# you assigned to the probe in Parameter 12.

The Probe Stylus Calibration is now complete. Your DP-4 probe is ready for probing and digitizing!

PERFORMANCE CHARACTERISTICS

PRE-TRAVEL VARIATION:

Pre-travel is the amount of deflection of the stylus tip before the probe output switches. This value varies depending on the length of the stylus, speed and direction that the stylus tip is moving relative to the target surface when it makes contact. Pre-travel variation amount should be stated in probe specifications relative to stylus length and direction of travel limitations. A probe that has small pre-travel variation with no restriction on stylus length and direction of travel will be quite expensive. Machine characteristics including lash and input latency also contribute to pre-travel variation. Pre-travel variation errors can be easily avoided by always taking data in the same directions and speed. The pre-travel then becomes a constant and can be accounted for in the calibration procedures then accuracy becomes dependent on repeatability.
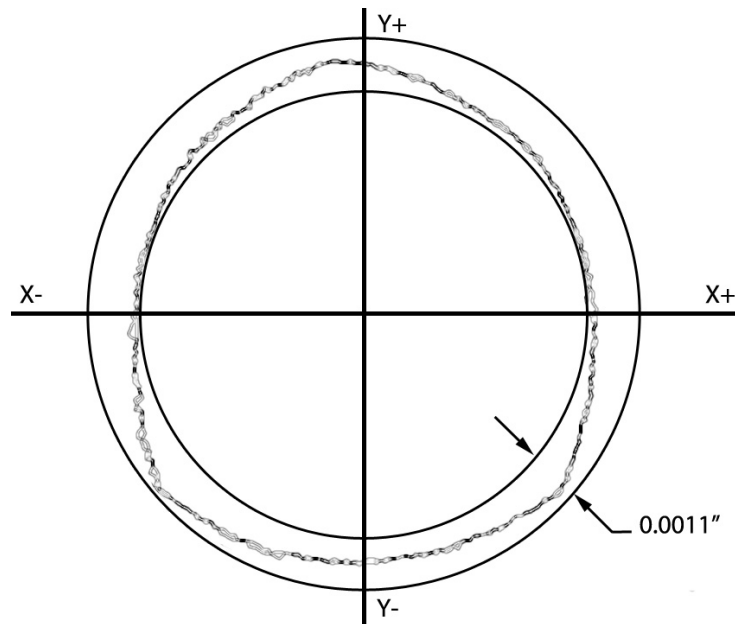
PRE-TRAVEL VARIATION, RADIAL DIGITIZING PRECISION BORE
Typical pre-travel variation for DP-4 probe showing variation over 720 degrees of radial digitizing routine of precision bore. Inside circle represents the minimum value and the outside circle the maximum. Data was collected probing at 1 inch per minute with a 43mm long stylus.

UNIDIRECTIONAL REPEATABILITY:

This specification indicates a 95% confidence level that repeated measurements will not vary more than +/- the stated amount (standard deviation at 2 sigma level). The stated amount only applies to repeated measurements in the same direction and speed. Machine characteristics can drastically reduce the confidence level in this specification. A probe installed on a CMM has a much better chance of producing the stated tolerance than one installed on a mill since the machine errors add to the probe error. That said, mill installations can still produce results well within the tolerances allowed for machining if the mill is kept in good operating condition.

MAINTENANCE AND CARE

Do not submerge or expose the DP-4 to liquids. Wipe off any liquids immediately to prevent internal contamination or degradation of the rubber seal and indicator lens. The probe body is stainless steel and should only be wiped clean with compatible cleaners.

Storage. When not in use, store the probe in a vertical or inverted vertical position, not on its side. This minimizes stress on internal mechanical parts and distributes lubrication more evenly. Do not ship or store the probe with the stylus mount boss pushed into the probe body as this will negatively affect internal lubrication.

User repairs. The DP-4 has no internal user serviceable parts or adjustments and should only be serviced by Centroid.

Alignment adjustments. Regularly check alignment. Any time the probe is removed from its holder, the stylus is changed or the probe is used in a different machine, the alignment procedure should be repeated to ensure accuracy. The user should also repeat the alignment procedure if the unit is dropped or receives any sudden external shock. It is good practice to periodically check alignment for quality control and to establish a base line maintenance schedule. See "Stylus Installation and Alignment Procedures" section. If the probe stylus can not be dialed-in or aligned then the probe should be sent in for evaluation and repair.

The DP-4 has no internal user serviceable parts or adjustments and should only be serviced by Centroid. If your probe should require repair please

SHIPPING INSTURCTIONS

Contact Centroid Technical Support at 1-814-353-9290 for a description of the return policy and assistance in determining if return is necessary, before sending your probe back.

If the probe must be shipped it should be removed from the tool holder and the stylus must be removed from the probe. Use the original plastic shipping tube and insert the probe in the tube with the stylus mount boss located inside the foam ring in the tube. The foam should prevent the stylus mount boss from touching the end of the plastic tube if jarred during shipping. Do not ship or store the probe with the stylus mount boss pushed into the probe body as this will negatively affect internal lubrication.

DP-4 PROBE KIT CONTENTS

3/16" wrench p/n: 2902

3/32" hex wrench p/n: 2898

Stylus tightening pin p/n: 2903

2.5mm Ruby tip stylus
M3 thread 40mmlength p/n: 3357

5mm Ruby tip stylus
M3 thread 40mmlength p/n: 3360

Precision ring gauge p/n: 3193
Size and type may vary

DP-4 Probe complete kit with protective case
and accessories. Inset shows outside of case.
Kit contains the accessories shown above
plus the retractile coil cord p/n: 10394.
Complete kit p/n: 10395

COMMON CABLES:

The photo below shows the DP-4 connected to the primary cable assemblies common to all installations. Note the bulkhead connector to provide physical support for the coil cord. No additional adapters are needed for new Centroid (TM) systems. See the appropriate appendix in the DP-4 manual for additional required adapters, connection diagrams and parameter settings for your installation.
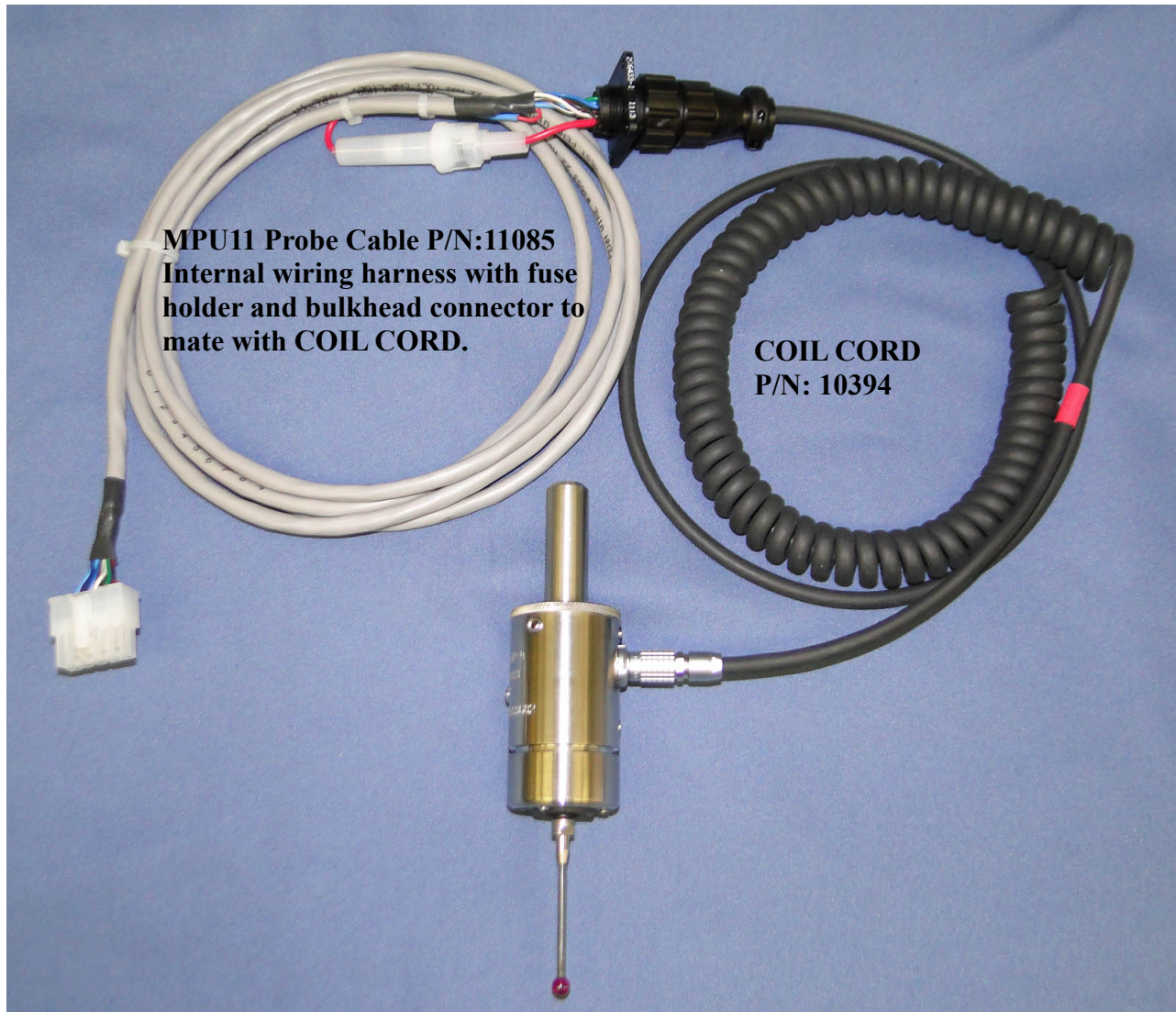
DP-4 Probe shown connected to retractile coil cord and internal wiring harness with bulkhead connector and fuse holder.

CONNECTION DIAGRAM UNIVERSAL

DP-4 PROBE INTERNAL WIRING

SUPPLY +10 TO +30 VDC 1/8A — PIN 2

PROBE OUTPUT SIGNAL — PIN 3

DETECT CIRCUIT — PIN 4

PIN 5

PROBE INTERNAL
CIRCUIT BOARD

JUMPER
N/O N/C

VIRTUAL
SWITCH

SUPPLY COMMON

COIL CORD
P/N: 10394

RED	2
GREEN	5
BROWN	6
BLACK	3
SHIELD	7

PROBE CABLE
P/N: 11085

RED	
WHITE	
GREEN	
BLUE	
SHIELD	

SHRINK TUBE

MACHINE CONTROL

+VDC

SWITCH INPUT

SWITCH INPUT

SUPPLY COMMON

SHIELD

POWER SUPPLY
+10 TO +30 VDC

WHITE CONNECTOR MAY BE PLUGGED IN
DIRECT OR TO AN ADAPTER OR REMOVED
DEPENDING ON TYPE OF CONTROL

+DC SUPPLY

R1

CONTROL INPUT
OPTO ISOLATOR

PROBE OUTPUT SIGNAL

TYPICAL OPTO ISOLATED INPUT
USE N/O N/C JUMPER TO INVERT LOGIC
THIS CIRCUIT PROVIDED BY END USER

+DC SUPPLY

R1

CONTROL INPUT

PROBE OUTPUT SIGNAL

TYPICAL INPUT WITH PULL-UP RESISTOR
USE N/O N/C JUMPER TO INVERT LOGIC
THIS CIRCUIT PROVIDED BY END USER

NOTES:

PROBE BODY NOT CONNECTED TO SHIELD OR SUPPLY
COMMON AT PROBE

PROBE STYLUS MOUNT BOSS IS CONNECTED TO SUPPLY
AND SIGNAL COMMON

PROBE OUTPUT ABSOLUTE LIMITS: 60 VDC, 200MA

QET
9/07/2012

svn://software/hardware/DP4/DOCS/WIRING_DIAG

Title				
DP-4 PROBE CONNECTION DIAGRAM				
Size A	Document Number			Rev
Date:	Monday, January 21, 2013	Sheet	1	of 1

GRID DIGITIZING TIPS

Digitizing is, by its nature, a slow, precise process. The time it takes to digitize a part is effected by four factors: feedrate, step size, detail density and over-all shape of the object.

The feedrate settings in parameters 14 and 15, (the fast and slow probing rates). As a general rule of thumb parameter 14 should be set to 20 or 30ipm for digitizing and probing. This setting will not affect the accuracy of the digitizing data, but will speed up the approach cycles during the digitizing run and there by reduce the time the run takes. Parameter 15 however does have a direct effect on the accuracy of the digitizing data and should be adjusted to match the tolerances you are calling out for the finished part. Typically setting this parameter slower will yield more accuracy and faster less accuracy.

The accuracy achieved on vertical surfaces is also dependent on stylus length and related PTV (pre-travel variation) for the probe being used. If vertical surface accuracy greater than the PTV value is needed then a probe with appropriate PTV is required such as the DP-7.

If your part does not require very close tolerances then adjusting these probing rates could save you a significant amount of time, but if you set the feedrate too high the results you get may not meet your requirements and you will just be wasting time. So start off cautiously, it is better to take a little longer when you are first starting out. Once you have several digitizing runs under your belt, you will have a much better feel for where these parameters need to be set to achieve the results to meet your job requirements.

The X, Y, and Z stepover – The smaller the stepover distance, the longer the digitizing run. For instance the typical time it takes to digitize a 1" by 1" grid with a step over of .010" in X, and .010" in Y, (with parameters 14 and 15 set to 30ipm and 5ipm respectively), is 45 minutes with 10,000 data points being recorded. By changing the X stepover to 0.005" and the Y stepover to 0.005" the time increases to 3 hours with the number of data points recorded increasing to 40,000. The trade off with time, is surface finish and detail. The finer the stepover amount in the digitizing run the better the surface finish is going to be in the final part and the more fine detail you will be able to capture. As the end user, it is up to you to find the settings that give you the finish, and detail level you are looking for in the final part.

Remember, the Centroid control can digitize unattended, 24 hours a day, 7 days a week, if you really need the detail and finish, (just remember to fill the automatic oiler tank!).

The third factor that affects the time it takes to digitize a part is the density and height of the surface detail. The more vertical walls the probe stylus must climb, up and down over, the longer the digitizing will take. This is not a factor you have much control over, except for adjusting your Z stepup distance, but in general this will have little effect.

Finally, if the piece is odd shaped, you may want to patch several small digitizing runs together and there by eliminate the wasted time that would be spent moving over areas that are not pertinent to the data you want to collect.

CUTTING COPY OF DIGITIZED PART TIPS:

The following are some tips on using the data from your completed grid digitizing run. The nomenclature, procedures and programs used are consistent with the Centroid(TM) operators manual. Consult your operator's manual for equivalent.

When you are ready to cut a copy of the part you have digitized, set your part up using the same X, Y, and Z coordinate you used to digitize the part. The digitizing program does not put in the M codes and spindle speed setting. You must either turn the spindle on manually or edit the G-code file and insert this information. Simply insert a line at the beginning of the program that contains M3 (spindle clockwise) or M4 (spindle counter clockwise) followed by an S with the speed you want to turn the spindle at.

The following is an example: M3 S4000

This will turn the spindle on going clockwise at 4000 RPM. To turn the spindle off when the program finishes put a M5 at the end of the program.

You can also use the text editor to turn coolant on and off by adding, M7 (MIST), or M8 (FLOOD) at the beginning of the program, and M9 (COOLANT OFF) at the end. Remember you can have only one-M code per line in the program.

To enlarge, shrink or mirror your part, you can use the G51 (turns on scaling) and G50 (turns off scaling) commands, (refer to your user manual for the complete description and definition of these G code commands). When enlarging or shrinking your part using the G51 command remember you must scale the size of the cutter you are going to use to cut the part by the same factor that you use to scale your part. For instance if you digitized a part with a 0.25" stylus and scale the part up by 2 then the cutter needed to cut the part would be a 0.5" diameter cutter. Conversely if you scale the part by ½ then the cutter diameter needed would be 0.125".

You can also import your digitized data into an online CAM program on your Centroid control or export it to an offline CAM system. The "Dig to CAD" menu in the Digitizing screen is used to convert the digitized data to a format that can be used by the CAM programs.

APPENDIX A

CENTROID CONTROL SAE PROBE PARAMETERS

(see control manual for additional information)

CNC10 systems (recommended basic SAE inch):

Parameter	Setting	Description
3	0	Modal Tool and Height Offset Control
10	0	Enables decel on probe contact
11	14	Probe / TT PLC probe input number
12	10	Tool library number for probe
13	0.020	Clearance amount nominal
14	30	Fast Probing Rate
15	3	Slow Probing Rate
16	5	Maximum Search Distance
18	15	PLC input, Probe Detect, Spindle Inhibit
120	0.020	Probe stuck clearance amount
121	0.020	Grid digitizing minimum Z pullback
122	0.0002	Grid digitizing dead band distance
123	0	Radial clearance move
151	0	Repeatability tolerance
155	0	Probe type enable
186	0	Probe stuck retry disable
366	1	Probe Deceleration Multiplier

CNC11 systems (recommended basic SAE inch):

Parameter	Setting	Description
3	0	Modal Tool and Height Offset Control
10	0	Enables decel on probe contact
11	50769	PLC probe input number
12	10	Tool library number for probe
13	0.020	Clearance amount nominal
14	30	Fast Probing Rate
15	3	Slow Probing Rate
16	5	Maximum Search Distance
18	50771	PLC input, Probe Detect, Spindle Inhibit
120	0.020	Probe stuck clearance amount
121	0.020	Grid digitizing minimum Z pullback
122	0.0002	Grid digitizing dead band distance
123	0	Radial clearance move
151	0	Repeatability tolerance
155	0	Probe type enable
186	0	Probe stuck retry disable
366	1	Probe Deceleration Multiplier

CNC10 systems (recommended basic METRIC mm):

Parameter	Setting	Description
3	0	Modal Tool and Height Offset Control
10	0	Enables decel on probe contact
11	14	PLC probe input number
12	10	Tool library number for probe
13	0.508	Clearance amount nominal
14	**762**	Fast Probing Rate
15	76.2	Slow Probing Rate
16	127	Maximum Search Distance
18	15	PLC input, Probe Detect, Spindle Inhibit
120	0.508	Probe stuck clearance amount
121	0.508	Grid digitizing minimum Z pullback
122	0.005	Grid digitizing dead band distance
123	0	Radial clearance move
151	0	Repeatability tolerance
155	0	Probe type enable
186	0	Probe stuck retry disable
366	1	Probe Deceleration Multiplier

CNC11 systems (recommended basic METRIC mm):

Parameter	Setting	Description
3	0	Modal Tool and Height Offset Control
10	0	Enables decel on probe contact
11	50769	PLC probe input number
12	10	Tool library number for probe
13	0.508	Clearance amount nominal
14	**762**	Fast Probing Rate
15	76.2	Slow Probing Rate
16	127	Maximum Search Distance
18	50771	PLC input, Probe Detect, Spindle Inhibit
120	0.508	Probe stuck clearance amount
121	0.508	Grid digitizing minimum Z pullback
122	0.005	Grid digitizing dead band distance
123	0	Radial clearance move
151	0	Repeatability tolerance
155	0	Probe type enable
186	0	Probe stuck retry disable
366	1	Probe Deceleration Multiplier

PROBE CONNECTION TO CENTROID CONTROL

DP-4 PROBE INTERNAL WIRING

SUPPLY +10 TO +30 VDC 1/8A — PIN 2

PROBE OUTPUT SIGNAL — PIN 3

DETECT CIRCUIT — PIN 4

PIN 5

PROBE INTERNAL
CIRCUIT BOARD

JUMPER
N/O N/C

VIRTUAL
SWITCH

SUPPLY COMMON

COIL CORD
P/N: 10394

RED	
GREEN	
BROWN	
BLACK	
SHIELD	

PROBE CABLE
P/N: 11085

2	RED
5	WHITE
6	GREEN
3	BLUE
7	SHIELD
	SHRINK TUBE

Machine Controls

MPU11 or ALLIN1DC

White connector
plugs into
connector marked "PROBE"

WIRING DIAGRAM SHOWING CONNECTOR PIN
NUMBERS WIRE COLORS AND WIRE FUNCTION.

For MPU11, ALLIN1DC CNC11 Machine
Controls:

Plug white connector into connector
marked "PROBE"
For CNC 7 THRU CNC10 Machine Controls:

Use existing probe cable or remove white
connector on new cable and wire bulkhed
connector as shown at right

Various PLC hardware is used. Consult
control manual for PLC input termination
and function label.

CNC 7 THRU CNC10 Machine Controls:

PROBE CABLE BULKHEAD CONNECTOR WIRING

1 2
3 5
6 8
7

PIN 2 — +VDC POWER SUPPLY

PIN 5 — PLC PROBE INPUT

PIN 6 — PLC SPINDLE INHIBIT INPUT

PIN 3 — SUPPLY AND SIGNAL COMMON

PIN 7 — SHIELD

SHRINK TUBE

BULKHEAD CONNECTOR

NOTES:

PROBE BODY NOT CONNECTED TO SHIELD OR SUPPLY
COMMON AT PROBE

PROBE STYLUS MOUNT BOSS IS CONNECTED TO SUPPLY
AND SIGNAL COMMON

PROBE OUTPUT ABSOLUTE LIMITS: 30 VDC, 50MA

svn://software/hardware/DP4/DOCS/WIRING_DIAG

QET
2/20/2013

Title
DP-4 PROBE CONNECTION TO CENTROID

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