TB 9-5120-212-35

CHANGE 2

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR TORQUE WRENCHES, POWERDYNE, MODELS PD 1220, PD 1220B. PD 1201, AND PD 2501; CONSOLIDATED DEVICES, MODELS DPT-1200, DPT-1200R, DPT-2500, AND DPT-2500R; AND TORQUE APPLICATOR, POWERDYNE, MODEL PD12003

Headquarters, Department of the Army, Washington, DC
23 October 2000

TB 9-5120-212-35, dated 1 October 1990, is changed as follows:

1. Remove old pages and insert new pages as indicated below. New or changed material is indicated by a vertical bar in the margin of the page.

Remove pages	***Insert pages***
1 and 2	1 and 2
3 and 4	3 and 4
5 and 6	5 and 6

2. File this change sheet in front of the publication for reference purposes.

TB 9-5120-212-35
C2

By Order of the Secretary of the Army:

Official:

ERIC K. SHINSEKI
General, United States Army
Chief of Staff

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Administrative Assistant to the
Secretary of the Army
0028401

DISTRIBUTION:
To be distributed in accordance with IDN 343740, requirements for calibration procedure TB 9-5120-212-35 .

TB 9-5120-212-35

CHANGE 1

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR TORQUE WRENCHES, POWERDYNE, MODELS PD1220, PD1220B, PD1201, AND PD2501; CONSOLIDATED DEVICES, MODELS DPT-1200, DPT-1200R, DPT-2500, AND DPT-2500R; AND TORQUE APPLICATOR, POWERDYNE, MODEL PD12003

Headquarters, Department of the Army, Washington, DC
12 July 1992

TB 9-5120-212-35, 1 October 1990, is changed as follows:

1. Remove old pages and insert new pages as indicated below. New or changed material is indicated by a vertical bar in the margin of the page.

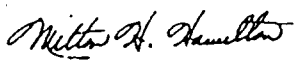
Remove pages	Insert pages
5 and 6	5 and 6
11 through 14	11 through 14

2. File this change sheet in front of the publication for reference purposes. **This change incorporates DA Form(s) 2028 dated 10 May 91.**

By Order of the Secretary of the Army:

Official:

GORDON R. SULLIVAN
General, United States Army
Chief of Staff



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Distribution:

To be distributed in accordance with DA Form 12-34-C, Block No. 0319, and 34-E, Block No. 3740, requirements for calibration procedure TB 9-5120-212-35.

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THIS DOCUMENT INCLUDES CHANGES 1 AND 2

*TB 9-5120-212-35

SUPERSEDED COPY DATED 20 JUNE 1988

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR TORQUE WRENCHES, POWERDYNE, MODELS PD 1220, PD 1220B. PD 1201, AND PD 2501; CONSOLIDATED DEVICES, MODELS DPT-1200, DPT-1200R, DPT-2500, AND DPT-2500R; AND TORQUE APPLICATOR, POWERDYNE, MODEL PD12003

Headquarters, Department of the Army, Washington, DC
1 October 1990

Approved for public release, distribution is unlimited.

REPORTING OF ERRORS

You can help improve this publication. If you find any mistkes or if you know of a way to improve the procedure, please let us know. Mail your letter of DA Form 2028 to: Redstone Arsenal, AL 35898-5230. A reply will be furnished to you. You may also send in your comments electronically to our e-mail address: ls-lp@redstone.army.mil or by FAX (256) 842-6546/DSN 788-6546.

			Paragraph	Page
SECTION	I.	IDENTIFICATION AND DESCRIPTION		
		Test instrument identification	1	2
		Forms, records, and reports	2	2
		Calibration description	3	2
	II.	EQUIPMENT REQUIREMENT		
		Equipment required	4	3
		Accessories required	5	3
	III.	CALIBRATION PROCESS FOR POWERDYNE MODELS PD 1201 AND PD 2501		
		Preliminary instructions	6	4
		Equipment setup	7	4
		Torque	8	6
		Final procedure	9	8
SECTION	IV.	CALIBRATION PROCESS FOR POWERDYNE, MODELS PD1220 AND PD1220B		
		Preliminary instructions	10	8
		Equipment setup	11	9
		Torque	12	10
		Final procedure	13	12

*This bulletin supersedes TB 9-5120-212-35, 20 June 1988.

		Paragraph	Page
V.	CALIBRATION PROCESS FOR CONSOLIDATED DEVICES, MODELS DPT-1200, DPT-1200R, DPT-2500, AND DPT-2500R		
	Preliminary instructions	14	13
	Equipment setup	15	13
	Torque	16	15
	Final procedure	17	17
VI.	CALIBRATION PROCESS FOR POWERDYNE, MODEL PD12003		
	Preliminary instructions	18	17
	Equipment setup	19	18
	Torque	20	19
	Final procedure	21	20

SECTION I
IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This procedure provides instructions for the calibration of Torque Wrenches, Powerdyne, Models PD1220, PD1220B, PD1201, and PD2501; Consolidated Devices, Models DPT-1200, DPT-1200R, DPT-2500, and DPT-2500R; and Torque Applicator, Powerdyne, Model PD12003. The manufacturers' manuals were used as the prime data sources in compiling these instructions. The equipment being calibrated will be referred to as the TI (test instrument) throughout this bulletin.

a. Model Variations. Variations among models are explained in text.

b. Time and Technique. The time required for this calibration is approximately 2 hours, using the physical technique.

2. Forms, Records, and Reports

a. Forms, records, and reports required for calibration personnel at all levels are prescribed by TB 750-25.

b. Adjustments to be reported are designated (R) at the end of the sentence in which they appear. When adjustments are in tables, the (R) follows the designated adjustment. Report only those adjustments made and designated with (R).

3. Calibration Description. TI parameters and performance specifications which pertain to this calibration are listed in table 1.

Table 1. Calibration Description

Test instrument parameters	Performance specifications
Torque:	
Powerdyne, Model PD1201	Range: 0 to 1200 ft-lbs Accuracy: ±2% FS
Powerdyne, Model PD2501	Range: 0 to 2500 ft-lbs Accuracy: ±2% FS
Powerdyne, Model PD12003	Range: 0 to 12,000 ft-lbs[1] Accuracy: ±3% of reading from 4000 to 7000 ft-lbs ±6% of reading throughout remainder of range
Powerdyne, Model PD1220	Range: 200 to 1200 ft-lbs Accuracy: ±3% of reading
Powerdyne, Model PD1220B	Range: 200 to 1200 ft-lbs Accuracy: ±2% of reading
Consolidated Devices,	
Models DPT-1200 and DPT-1200R	Range: 0 to 1200 ft-lbs Accuracy: ±2% of reading from 240 to 1200 ft-lbs
Models DPT-2500 and DPT-2500R	Range: 0 to 2500 ft-lbs Accuracy: ±2% of reading from 500 to 2500 ft-lbs

[1]Checked at 5500 and 6000 ft-lbs only.

SECTION II
EQUIPMENT REQUIREMENTS

4. Equipment Required. Table 2 identifies the specific equipment to be used in this calibration procedure. This equipment is issued with Secondary Transfer Calibration Standards Set AN/GSM-287. Alternate items may be used by the calibrating activity when the equipment listed in table 2 is not available. The items selected must be verified to perform satisfactorily prior to use and must bear evidence of current calibration. The equipment must meet or exceed the minimum use specifications listed in table 2. The accuracies listed in table 2 provide a four-to-one ratio between the standard and TI.

5. Accessories Required. The accessories listed in table 3 are issued as indicated in paragraph **4** above and are used in this calibration procedure. When necessary, these items may be substituted by equivalent items, unless specifically prohibited.

Table 2. Minimum Specifications of Equipment Required

Common name	Minimum use specifications	Manufacturer and model (part number)
TORQUE CELL W/ INDICATOR	Range: 0 to 2500 ft-lbs Accuracy: ±0.5% of applied torque	Lebow, Model 2351-102 Type II (MIS-26485) with Load Cell Indicator, BLH, Model 8200B (MIS-23155)
TORQUE CELL W/ INDICATOR[1]	Range: 0 to 12,000 ft-lbs Accuracy: ±0.5% of applied torque	Lebow, Model 2351-103 Type 2, Class 2 (MIS-26485) with Load Cell Indicator BLH, Model 8200B (MIS-23155)

[1]Part of High Capacity Torque System, 7916833.

Table 3. Accessories Required

Common name	Description (part number)
DRIVE BAR	3/4-in. drive (7916679)
DRIVE BAR	1-in. drive (7916680-1)
MOUNTING PLATE	(7915876)
SEALANT	Silicone rubber sealer (8040-00-877-9872)
SOCKET WRENCH ADAPTER	1-in. male x 3/4-in. female (GGG-W-660, Type III)
TORQUE BAR	20,000 ft-lbs capacity (7916810-1)
TORQUE FIXTURE[1]	(13335421)
TORQUE PLATE	20,000 ft-lbs capacity (7916811)
TORQUE WRENCH[2]	Dial type, 0 to 175 lbs

[1]Limited deployed item.

[2]Additional equipment required. Used to check friction device setting on Powerdyne, Models PD1220 and PD1220B.

SECTION III
CALIBRATION PROCESS FOR
POWERDYNE, MODELS PD1201 AND PD2501

6. Preliminary Instructions

a. The instructions outlined in paragraphs **6** and **7** are preparatory to the calibration process. Personnel should become familiar with the entire bulletin before beginning the calibration.

b. Items of equipment used in this procedure are referenced within the text by common name as listed in tables 2 and 3.

c. Unless otherwise specified, verify the result of each test and, whenever the test requirement is not met, take corrective action before continuing with the calibration. Adjustments required to calibrate the TI are included in this procedure. Additional maintenance information is contained in the manufacturer's manual for this TI.

d. Unless otherwise specified, all controls and control settings refer to the TI.

7. Equipment Setup

a. Verify that TI is clean and free from defects that would impair its operation.

b. Ensure that the equipment has been allowed to stabilize at the ambient temperature.

c. Position mounting plate on a stable and rigid work surface and secure with bolts or clamps.

d. Assemble TI and 2500 ft-lb torque cell on mounting plate using appropriate drive bar and socket wrench adapter. Ensure that locating pins and drive bar are engaged in their respective mounting holes. Install TI crank handle in socket.

e. Connect torque cell to load cell indicator using cable supplied with load cell indicator. Connect load cell indicator to appropriate power source. Turn power switch to **ON** and allow the units to warm up for 15 minutes.

f. Position controls on load cell indicator as listed in (1) through (4) below:

(1) **MULTIPLIER** switch to **3**.

(2) **SIG-REV** switch to **+** (positive).

(3) **INPUT MV/V** pushbutton to value listed on torque cell report.

(4) **NORMAL-PEAK** switch to **NORMAL**.

NOTE

For the purpose of setting cal factor, **MULTIPLIER** switch may be set to **3** or whatever is appropriate (based on calibration report). During this procedure the switch may be changed as necessary to obtain proper indication on load cell indicator.

g. Refer to cal factor and lin number settings and position load cell indicator controls as listed in (1) through (4) below:

(1) Set **MODE** switch to **ZERO** and adjust **BRIDGE ZERO** to **00000**.

(2) Set **MODE** switch to **CAL** and adjust **AMPL SPAN** to read proper cal factor.

(2.1) Set **MODE** switch to **LIN** and adjust **LINEARITY** control to read proper lin number.

(3) Set **MODE** switch to **OPR** and adjust **BRIDGE ZERO** for a 00000 indication on load cell indicator.

NOTE

The load cell indicator will indicate - (negative) for cw torque and + (positive) for ccw torque.

NOTE

Set cal factor and lin number (note algebraic sign) with the decimal point in place. If the decimal point is not in the proper place during operation, it may be removed with a switch in the back.

8. Torque

a. Performance Check

(1) Set TI indicator to 0 with no torque applied.

(2) Exercise TI as follows:

(a) Turn crank handle cw to obtain an approximate full-scale indication on TI indicator. The load cell indicator will indicate ccw reaction torque.

(b) After 30 seconds, turn crank handle ccw to obtain a 0 indication on TI indicator.

(c) Repeat (a) and (b) above two times, and check 0 adjustment of load cell indicator.

(3) Operate TI cw to obtain indications listed in table 4. If load cell indicator indications are not within limits specified, perform **b** below.

NOTE

The calibration points must be approached in the direction of increasing torque. If calibration point is passed, reduce torque and approach calibration point again.

NOTE

On some models, it is necessary to lift pin on indexer ratchet drive on top of TI to change cw and ccw directions.

Table 4. Calibration Accuracy

Test instrument indications (ft-lbs)	Torque cell indications (ft-lbs)	
	Min	Max
Powerdyne, Model PD1201		
300	276	324
500	476	524
750	726	774
1000	976	1024
1200	1176	1224
Powerdyne, Model PD2501 (and Consolidated Devices, Models DPT-2500 and DPT-2500R)		
500	450 (490)	550 (510)
1000	950 (980)	1050 (1020)
1500	1450 (1470)	1550 (1530)
2000	1950 (1960)	2050 (2040)
2500	2450 (2450)	2550 (2550)

NOTE

Perform ccw calibration only when specifically requested by user.

(4) Repeat **a**(1) through (3) above, except turn crank handle ccw.

(5) Turn TI crank handle cw to obtain a 0 indication.

b. Adjustments

NOTE

Reaction arm must be free to move under retaining screws (fig. 1).

(1) If TI indication error is the same in both cw and ccw directions, adjust pointer of TI dial indicator.

(2) If TI indication error is not the same in both directions, perform (3) through (10) below.

(3) Remove sealant from the four adjustment screws A, B, C, and D (fig. 1) on the back of TI.

(4) Using appropriate size Allen wrench, back off screws A and B (fig. 1) at least three turns.

(5) Adjust screw C (fig. 1) until a pressure reading is shown on indicator; then back off screw until indication returns to 0.

(6) Check spacing between the reaction arm on sensing unit housing and reaction ears. If reaction arm is not centered between ears, adjust screws C and D (fig. 1) until sensor is centered.

(7) Turn screw A (fig. 1) inward until a pressure reading is shown on indicator and then back off to 0 plus one-quarter additional turn.

(8) Turn screw B (fig. 1) inward until a pressure reading is shown on indicator and back off to 0.

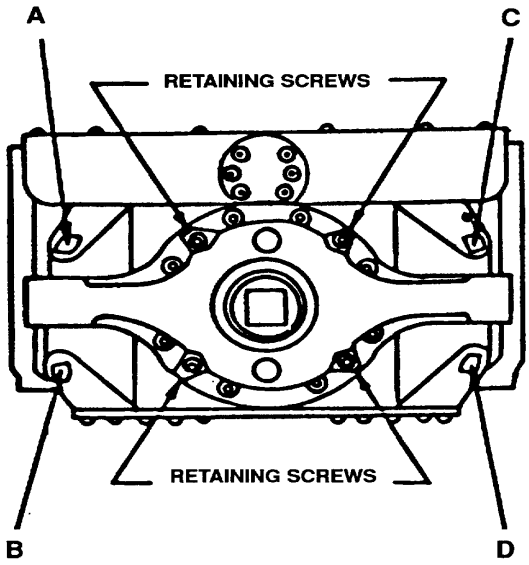

Figure 1. Torque wrench - adjustment locations.

(9) Repeat **a** above and adjust screws B and C (fig. 1) slightly to bring TI indications within tolerance (R).

(10) Reseal retaining screws with sealant.

9. Final Procedure

a. Deenergize and disconnect all equipment.

b. Annotate and affix DA label/form in accordance with TB 750-25.

SECTION IV
CALIBRATION PROCESS FOR
POWERDYNE, MODELS PD1220 AND PD1220B

10. Preliminary Instructions

a. The instructions outlined in paragraph **10** and **11** are preparatory to the calibration process. Personnel should become familiar with the applicable sections before beginning the calibration.

b. Items of equipment used in this procedure are referenced within the text by common name as listed in tables 2 and 3.

c. Unless otherwise specified, verify the result of each test and, whenever the test requirement is not met, take corrective action before continuing with the calibration. Adjustments required to calibrate the TI are included in this procedure. Additional maintenance information is contained in the manufacturer's manual for this TI.

d. Unless otherwise specified, all controls and control settings refer to the TI.

11. Equipment Setup

a. Verify that TI is clean and free from defects that would impair its operation.

b. Ensure that equipment has been allowed to stabilize at the ambient temperature.

c. Position torque fixture on a stable and rigid work surface and secure with bolts or clamps.

d. Place 2500 ft-lb torque cell inside fixture with dowel pins engaging holes in bottom of fixture.

e. Place plate (furnished with torque fixture) on top of torque cell.

f. Insert drive bar into square opening in plate.

g. Place TI on fixture, engaging drive bar and dowel pins.

h. Connect torque cell to load cell indicator, using cable supplied with load cell indicator. Connect load cell indicator to appropriate power source. Set power switch to **ON** and allow the units to warm up for 15 minutes.

i. Position controls on load cell indicator as listed in (1) through (4) below:

(1) **MULTIPLIER** switch to **3.**

(2) **SIG-REV** switch to **+** (positive).

(3) **INPUT MV/V** pushbutton to **2.4.**

(4) **NORMAL-PEAK** switch to **NORMAL.**

NOTE

For the purpose of setting cal factor, **MULTIPLIER** switch may be set to **3** or whatever is appropriate (based on calibration report). During this procedure the switch may be changed as necessary to obtain proper indication on load cell indicator.

j. Refer to cal factor and lin number settings and position load cell indicator controls as listed in (1) through (4) below:

(1) Set **MODE** switch to **ZERO** and adjust **BRIDGE ZERO** to **00000**.

(2) Set **MODE** switch to **CAL** and adjust **AMPL SPAN** to read proper cal factor.

(3) Set **MODE** switch to **LIN** and adjust **LINEARITY** control to read proper lin number.

(4) Set **MODE** switch to **OPR** and adjust **BRIDGE ZERO** for **00000** indication.

NOTE

The load cell indicator will indicate - (negative) for cw torque and + (positive) for ccw torque.

NOTE

Set the cal factor and lin number (note algebraic sign) with the decimal point in place. If the decimal point is not in the proper place during operation, it may be removed with a switch in the back.

12. Torque

a. Performance Check

WARNING

Friction brake must be adjusted to hold 1200 ft-lbs applied torque when pressure is released from T-handle.

(1) Check friction brake by carefully applying torque in small increments and ensuring that friction brake holds up to 1200 ft-lbs. If friction brake does not hold, tighten FRICTION ADJUSTMENT SCREW (fig. 2) to increase friction. Do not over-tighten because the friction brake must be overcome to back off torque that has been applied. Maximum torque needed to overcome brake should not exceed 75 ft-lbs.

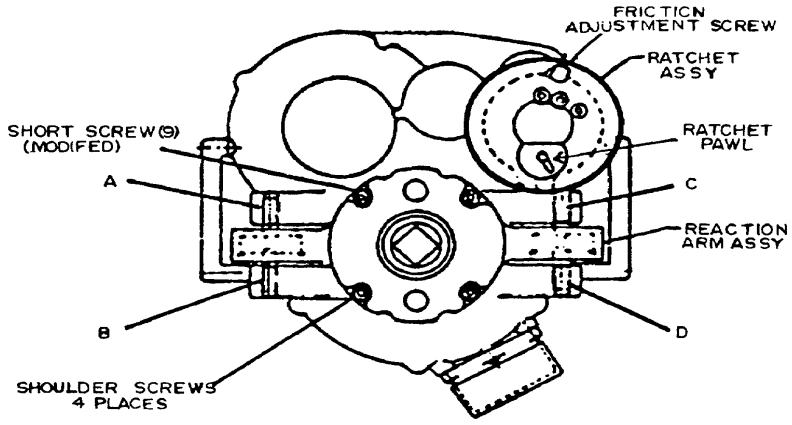

Figure 2. Torque wrench - adjustment locations.

NOTE

Two ratchets are used on this TI, one on the torque wrench and one on the T-handle. Operation of the T-handle ratchet is obvious. The torque wrench ratchet operates in conjunction with the friction brake. The RATCHET PAWL (fig. 2) is labeled nut-on for cw torque and nut-off for ccw torque.

CAUTION

Do not attempt to reverse the RATCHET PAWL (fig. 2) with torque applied. When torque is applied cw with RATCHET PAWL (fig. 2) in nut-on position, the T-handle must be turned ccw against resistance of the friction brake to release the applied torque.

(2) Exercise TI and load cell scale three times in cw direction.

(3) Check cw and ccw balance of TI as follows:

(a) Set RATCHET PAWI (fig. 2) to nut-on position.

(b) Turn T-handle cw to obtain a 500 ft-lb indication on TI indicator. Record indication of load cell indicator.

(c) Turn T-handle ccw to release applied torque.

(d) Turn T-handle ccw to obtain a 500 ft-lb indication on TI indicator. Record indication of load cell indicator. If indication is not within 5 ft-lbs of indication recorded in (b) above, perform **b**(1) through (3) below.

(4) Set TI for cw operation.

(5) Turn T-handle cw to obtain a 500 ft-lb indication on TI indicator. If load cell indicator does not indicate between 485 and 515 ft-lbs (490 and 510 ft-lbs for Powerdyne, Model PD1220B), perform **b**(4) through (10) below.

(6) Operate TI cw to obtain indications listed in table 5. If load cell indicator indications are not within limits specified, repeat (3) through (5) above.

Table 5. Calibration Accuracy - Powerdyne, Models PD1220 (and PD1220B)

Test instrument indications (ft-lbs)	Torque cell indications(ft-lbs)	
	Min	Max
200	194 (196)	206 (204)
300	291 (294)	309 (306)
750	727 (735)	773 (765)
1000	970 (980)	1030 (1020)
1175	1139 (1151)	1210 (1199)

(7) Repeat (4) through (6) above for ccw torque.

b. Adjustments

(1) Remove sealant from adjustment screws A and B (fig. 2). Screws C and D (fig .2) should not need adjustment unless TI is disassembled for repair or overhaul.

(2) Adjust screws A and B (fig. 2) slightly by backing one out and advancing the other one-quarter turn at a time.

(3) Repeat (2) above and continue adjustment in small increments until indications are within tolerance. When correctly adjusted, screws A, B, C, and D (fig. 2) should be just touching bellows assemblies (R).

(4) Remove rubber indicator protective cover.

(5) Remove lens retaining ring and lens from TI indicator.

(6) Turn T-handle to obtain a 500 ft-lb indication on load cell indicator. Slip dial face to aline pointer with 500 ft-lb graduation on dial face (R).

(7) Turn T-handle to relieve all applied torque from TI. Indicator must indicate within green band at 0.

(8) Install lens, retaining ring, and protective cover.

(9) Repeat **a**(3) through (5) above. If TI indications are not within tolerance, repeat **b**(2) through (8) above.

(10) Reseal adjustment screws with silicon rubber sealant.

13. Final Procedure

a. Deenergize and disconnect all equipment.

b. Annotate and affix DA label/form in accordance with TB 750-25.

SECTION V
CALIBRATION PROCESS FOR CONSOLIDATED DEVICES, MODELS DPT-1200, DPT-1200R, DPT-2500, AND DPT-2500R

14. Preliminary Instructions

a. The instructions outlined in paragraphs **14** and **15** are preparatory to the calibration process. Personnel should become familiar with the applicable sections before beginning the calibration.

b. Items of equipment used in this procedure are referenced within the text by common name as listed in tables 2 and 3.

c. Unless otherwise specified, verify the result of each test and, whenever the test requirement is not met, take corrective action before continuing with the calibration. Adjustments required to calibrate the TI are included in this procedure. Additional maintenance information is contained in the manufacturer's manual for this TI.

d. Unless otherwise specified, all controls and control settings refer to the TI.

15. Equipment Setup

a. Verify that TI is clean and free from defects that would impair its operation.

b. Ensure that the equipment has been allowed to stabilize at the ambient temperature.

c. Position torque plate on a stable and rigid work surface and secure with bolts or clamps.

d. Assemble TI and 2500 ft-lb torque cell on mounting plate, using appropriate drive bar and socket wrench adapter. Ensure that locating pins and drive bar are engaged in their respective mounting holes. Install TI crank handle in the socket.

e. Connect torque cell to load cell indicator, using cable supplied with load cell indicator. Connect load cell indicator to appropriate power source. Set power switch to **ON** and allow the units to warm up for 15 minutes.

f. Position controls on load cell indicator as listed in (1) through (4) below:

(1) **MULTIPLIER** switch to **3.**

(2) **SIG-REV** switch to **+** (positive).

(3) **INPUT MV/V** pushbutton to **2.4.**

(4) **NORMAL-PEAK** switch to **NORMAL.**

NOTE

For the purpose of setting cal factor, **MULTIPLIER** switch may be set to **3** or whatever is appropriate (based on calibration report). During this procedure the switch may be changed as necessary to obtain proper indication on load cell indicator.

g. Refer to cal factor and lin number settings and position load cell indicator controls as listed in (1) through (4) below:

(1) Set **MODE** switch to **ZERO** and adjust **BRIDGE ZERO** to **00000**.

(2) Set **MODE** switch to **CAL** and adjust **AMPL SPAN** to read proper cal factor.

(3) Set **MODE** switch to **LIN** and adjust **LINEARITY** control to read proper lin number.

(4) Set **MODE** switch to **OPR** and adjust **BRIDGE ZERO** for **00000** indication.

NOTE

The load cell indicator will indicate **-** (negative) for cw torque and **+** (positive) for ccw torque.

h. Set TI **ON/OFF** power switch to **ON.** If digital display does not indicate **000**, adjust **ZERO ADJUST** knob for an indication of **000**.

i. Set ratchet for cw torquing (Consolidated Devices, Models DPT-1200R or DPT-2500R).

j. Ensure that ratchet reversing ring is turned in the proper direction for cw torquing.

NOTE

Set the cal factor and lin number (note algebraic sign) with the decimal point in place. If the decimal point is not in the proper place during operation, it may be removed with a switch in the back.

16. Torque

a. Performance Check

NOTE

To prevent overshoot of desired torque, stop torquing approximately 30 ft-lbs before desired torque. Release crank momentarily and allow display to catch up. Continue cranking at slower speed and shorter increments.

NOTE

To reverse ratchet mechanism, crank handle from load (if any) to no load. Continue cranking while rotating the reversing ring until the ring freely snaps into proper position.

NOTE

It should not be necessary to adjust internal ZERO (fig. 3 and fig. 4) unless circuit board is repaired.

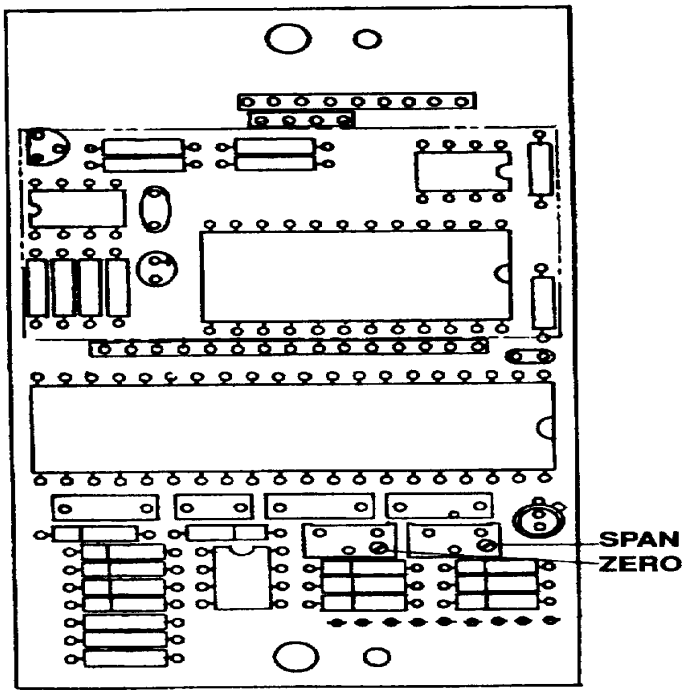

Figure 3. Consolidated Devices, Models DPT 1200 and DPT 1200R -adjustment locations.

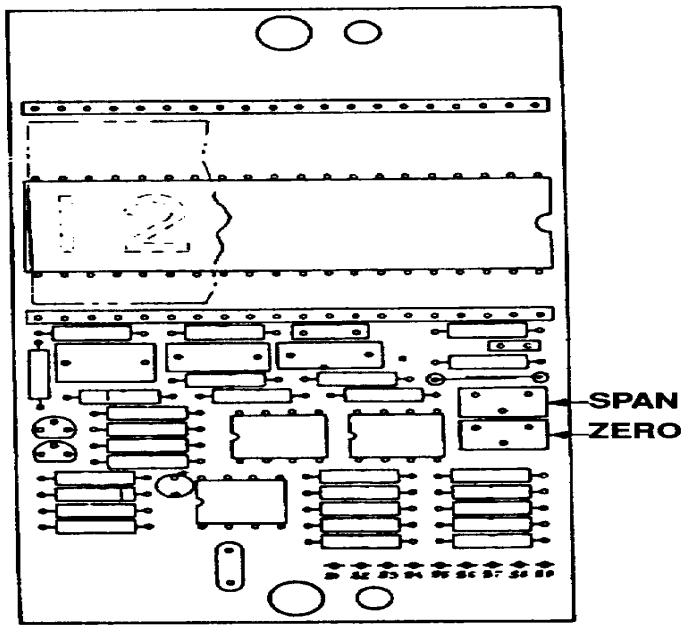

Figure 4. Consolidated Devices, Models DPT2500 and DPT-2500R - adjustment locations.

(1) Exercise TI as follows:

(a) Turn crank handle cw to obtain an approximate full-scale indication on TI indicator. The load cell indicator will indicate ccw reaction torque.

(b) After 30 seconds, turn crank handle ccw to obtain a 0 indication on TI indicator.

(c) Repeat (a) and (b) above two times, and check 0 adjustment of load cell indicator.

(d) Check TI for **000** display. Adjust **ZERO ADJUST** knob for **000** if necessary.

(2) Operate TI crank cw to obtain an indication on digital display of 240 ft-lbs (500 ft-lbs for Consolidated Devices, Models DPT-2500 and DPT-2500R). If load cell indicator does not indicate between 235.2 and 244.8 ft-lbs (490 and 510 ft-lbs for Consolidated Devices, Models DPT-2500 and DPT-2500R), perform **b** below.

(3) Repeat (2) above for TI digital display indications listed in table 6 (table 4 for Consolidated Devices, Models DPT-2500 and 2500R). Load cell indicator will indicate within limits specified.

Table 6. Calibration Accuracy - Consolidated Devices
Models DPT-1200 and DPT-1200R

Test instrument indications(ft-lbs)	Load cell indications (ft-lbs)	
	Min	Max
400	392	408
600	588	612
800	784	816
1000	980	1020
1200	1176	1224

NOTE

Perform ccw calibration only when specifically requested by the user.

(4) Repeat (2) and (3) above, except turn crank handle ccw.

b. Adjustments

(1) Operate crank cw to obtain an indication of 800 ft-lbs (1200 ft-lbs for Consolidated Devices, Models DPT-2500 and DPT-2500R) on load cell indicator.

(2) Adjust SPAN screw (fig. 3 and fig. 4) for an indication of 800 ft-lbs (1200 ft-lbs for Consolidated Devices, Models DPT-2500 and DPT-2500R) on digital display (R).

(3) Repeat (1) and (2) above two times and adjust, if necessary.

(4) Repeat **12a** above.

17. Final Procedure

a. Deenergize and disconnect all equipment.

b. Annotate and affix DA label/form in accordance with TB 750-25.

SECTION VI
CALIBRATION PROCESS FOR POWERDYNE, MODEL PD 12003

18. Preliminary Instructions

a. The instructions outlined in paragraphs **18** and **19** are preparatory to the calibration process. Personnel should become familiar with the applicable sections before beginning the calibration.

b. Items of equipment used in this procedure are referenced within the text by common name as listed in tables 2 and 3.

c. Unless otherwise specified, verify the result of each test and, whenever the test requirement is not met, take corrective action before continuing with the calibration. Adjustments required to calibrate the TI are included in this procedure. Additional maintenance information is contained in the manufacturer's manual for this TI.

d. Unless otherwise specified, all controls and control settings refer to the TI.

19. Equipment Setup

a. Verify that TI is clean and free from defects that would impair its operation.

b. Ensure that the equipment has been allowed to stabilize at the ambient temperature.

c. Position torque plate on a stable and rigid work surface and secure with bolts or clamps.

d. Assemble TI and 12,000 ft-lb torque cell on mounting plate, using appropriate drive bar and socket wrench adapter. Ensure that locating pins and drive bar are engaged in their respective mounting holes.

e. Connect torque cell to load cell indicator, using cable supplied with load cell indicator.

f. Connect load cell indicator to appropriate power source. Turn power switch to **ON** and allow the units to warm up for 15 minutes.

g. Position controls on load cell indicator as listed in (1) through (4) below:

(1) **MULTIPLIER** switch to 1.

(2) **SIG-REV** switch to **+** (positive).

(3) **INPUT MV/V** pushbutton to **2.4.**

(4) **NORMAL-PEAK** switch to **NORMAL.**

NOTE

For the purpose of setting cal factor, **MULTIPLIER** switch may be set to **1** or whatever is appropriate (based on calibration report). During this procedure, the switch may be changed as necessary to obtain proper indication on load cell indicator.

h. Refer to cal factor and lin number settings and position load cell indicator controls as listed in (1) through (4) below:

(1) Set **MODE** switch to **ZERO** and adjust **BRIDGE ZERO** to **00000**.

(2) Set **MODE** switch to **CAL** and adjust **AMPL SPAN** to read proper cal factor.

(3) Set **MODE** switch to **LIN** and adjust **LINEARITY** control to read proper lin number.

(4) Set **MODE** switch to **OPR** and adjust **BRIDGE ZERO** for **00000** indication.

NOTE

The load cell indicator will indicate **-** (negative) for cw torque and **+** (positive) for ccw torque.

NOTE

Set the cal factor and lin number (note algebraic sign) with the decimal point in place. If the decimal point is not in the proper place during operation, it may be removed with a switch in the back.

20. Torque

a. Performance Check

(1) Set TI indicator to **0** with no torque applied.

(2) Exercise TI as follows:

(a) Turn crank handle cw to obtain an approximate full-scale indication on TI indicator. The load cell indicator will indicate ccw reaction torque.

(b) After 30 seconds, turn crank handle ccw to obtain a 0 indication on TI indicator.

(c) Repeat (a) and (b) above two times, and check 0 adjustment of load cell indicator.

NOTE

The calibration points must be approached in the direction of increasing torque. If calibration point is passed, reduce torque and approach calibration point again.

NOTE

If indications are more than ±3%, prepare a test report (correction chart) showing actual values for nominal TI indications of 5500 and 6000 ft-lbs.

(3) Operate TI cw to obtain 5500 ft-lbs indication on load cell indicator.

(4) Turn TI crank handle cw to remove all torque (it is not necessary to obtain 0 indication).

(5) Repeat (3) and (4) three times then record TI indication on calibration report. Indications should be within 3 percent.

(6) Turn TI crank handle cw to remove all torque (it is not necessary to obtain 0 indication).

(7) Repeat (3) through (6) above at 6000 ft-lbs.

b. Adjustments. No adjustments can be made.

21. Final Procedure

a. Deenergize and disconnect all equipment.

b. Annotate and affix DA Label 80, with the test report number, in accordance with TB 750-25.

TB 9-5120-212-35

By Order of the Secretary of the Army:

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