

PROCESS SPECIFICATION 187

**Design Criteria and
Installation and Extraction Procedures
for Lee Hydraulic Inserts**



PROCESS SPECIFICATION 187

Revision M

Design Criteria and Installation and Extraction Procedures for Lee Hydraulic Inserts



Unlimited Distribution

**The Lee Company Technical Center
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INTRODUCTION

This process specification is a comprehensive design and procedural guide to the installation and extraction of Lee inserts. **Section I, entitled Design Information**, gives extensive information and recommendations to aid in safely designing housings for Lee insert installations. This section recommends installation hole parameters and discusses stress corrosion cracking and the prevention thereof.

Section II, entitled Inspection and Handling, discusses Lee Quality Control procedures, certifications, and important handling requirements.

Section III, entitled Installation and Extraction of Lee Inserts, describes the installation and extraction techniques for Lee Inserts. The tool set drawings pertaining to installation and extraction of Lee Inserts are included in **Appendix B**.

The information found here is more extensive than that found in the Lee Technical Hydraulic Handbook. Compliance with the more detailed procedures and recommendations provided in this report will ensure maximum performance.

SECTION I - Design Information

Proof, Burst, and Retention Pressure Ratings

Conventional hydrostatic proof and burst pressure testing applies equal pressure to all parts of a Lee restrictor or flow control insert. The Lee insert is therefore unaffected. Maximum hydrostatic pressure in this condition is limited only by the strength of the housing into which the Lee insert is installed.

With pressure applied in the flowing direction, conventional hydrostatic proof and burst pressure testing applies equal pressure to all parts of a check valve; in the case of a pressure relief valve, a pressure differential equal to the cracking pressure will result. The check or relief valve is therefore unaffected. The maximum hydrostatic pressure in this condition is also limited only by the strength of the housing into which the insert is installed.

A hydrostatic test for proof or burst pressure applied in the opposite direction (i.e. the checked direction) will stress the check or pressure relief valve.

Table I lists the proof and burst pressures for Lee inserts. These pressures are per MIL-H-5440 (H) and MIL-H-8891 (A).

TABLE I
Proof and Burst Pressures

NOMINAL SYSTEM PRESSURE	3,000 psid (21 MPa dif)	4,000 psid (28 MPa dif)	5,000 psid (34 MPa dif)	8,000 psid (55 MPa dif)
SYSTEM PEAK PRESSURE	4,050 psid (28 MPa dif)	5,400 psid (37 MPa dif)	6,750 psid (47 MPa dif)	9,600 psid (66 MPa dif)
PROOF PRESSURE	4,500 psid (31 MPa dif)	6,000 psid (41 MPa dif)	7,500 psid (52 MPa dif)	12,000 psid (83 MPa dif)
BURST PRESSURE	7,500 psid (52 MPa dif)	10,000 psid (69 MPa dif)	12,500 psid (86 MPa dif)	16,000 psid (110 MPa dif)

Retention Pressure

Each Lee insert has a specified maximum working pressure or nominal system pressure. This is stated in the Lee Technical Hydraulic Handbook and on all inspection drawings. Table II gives the locking end minimum retention pressure for every insert. This pressure will always be sufficient to withstand full burst pressure per MIL-H-5440 (H).

TABLE II
Retention Pressures

INSERT MAXIMUM WORKING/NOMINAL SYSTEM PRESSURE	3,000 psid (21 MPa dif)	4,000 psid (28 MPa dif)	5,000 psid (34 MPa dif)	8,000 psid (55 MPa dif)
RETENTION PRESSURE	7,500 psid (52 MPa dif)	10,000 psid (69 MPa dif)	12,500 psid (86 MPa dif)	16,000 psid (110 MPa dif)

Temperature Limits

Lee insert locking ends will show no degradation in retention pressure when exposed to temperatures in the range of -65°F (-54°C) to 275°F (135°C). If the temperatures are expected to be outside this range, more information on the housing material and the overall application would have to be considered by The Lee Company. Contact your **local sales office** for assistance.

Installation Hole Parameters

The Lee locking end is purposely designed to perform well under adverse conditions. Therefore, if the specifications outlined in this section are not followed precisely, the locking end may still perform adequately but the margin of safety will be reduced relative to the degree to which the installation hole is out of specification. Of real concern is an installation hole with many parameters not within the specifications, or when any one parameter is grossly out of specification.

Surface Finish

The installation hole should be clean and dry. Its finish should be between 16 and 63 microinches RMS (0,4 - 1,6 micrometers) circular lay with no longitudinal scratch marks. A smoother finish may result in a reduction in retention pressure capability while rougher finishes may not permit positive sealing.

Surface Treatment

Retention pressure data for Lee components is given for installations in holes that have not had special surface treatment. Passivating stainless steel installation holes per ASTM-A-967 or AMS 2700 has no effect on the performance of Lee components. Passivation per other specifications may be acceptable, but should be verified by The Lee Company or by performance testing. For aluminum we recommend untreated installation holes, however, anodized holes per MIL-A-8625 Type II are generally acceptable. Anodizing aluminum alloy installation holes per MIL-A-8625 Type III (hard coat anodizing) is not approved as it degrades retention pressure and can cause leakage. We do not approve the use of some proprietary surface treatments which include the deposition of solid lubricants such as Teflon*, since they drastically reduce the retention ability of Lee inserts.

Installation Hole Tolerance

The installation hole diametral tolerance for 0.500" (12,70 mm) diameter inserts is 0.001" (0,025 mm); for Lubrication Jets it is 0.0025" (0,064 mm); for the 5K Lee Jet and for 0.125" diameter High Pressure Check Valves it is 0.0015" (0,038 mm). All other Lee inserts have an installation hole diametral tolerance requirement of 0.0005" (0,013 mm).

Boss Size

The amount of material surrounding the passage has an effect upon the retention performance of the insert and therefore must be taken into account. To obtain the boss diameter (D), use the known housing material yield strength and the given insert diameter (d) in conjunction with [Figure 2 on page 11](#), and calculate D as shown in [Figure 1 on page 10](#).

* Teflon is a registered trademark of E.I. Dupont de Nemours Co., Inc.

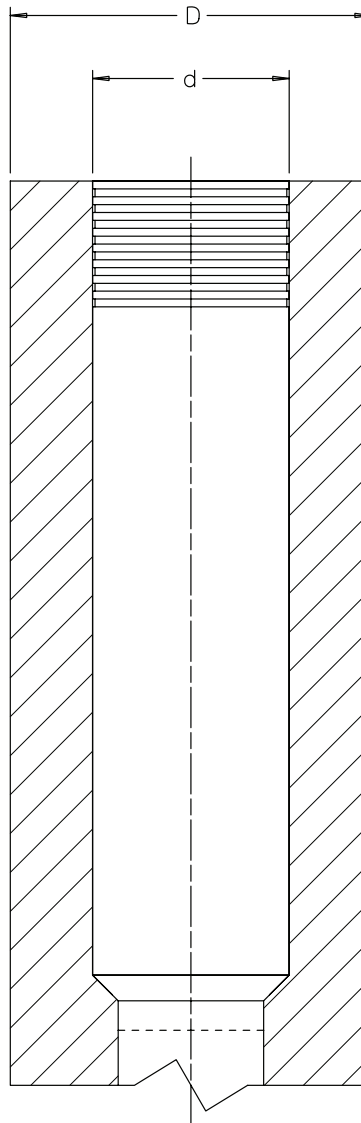
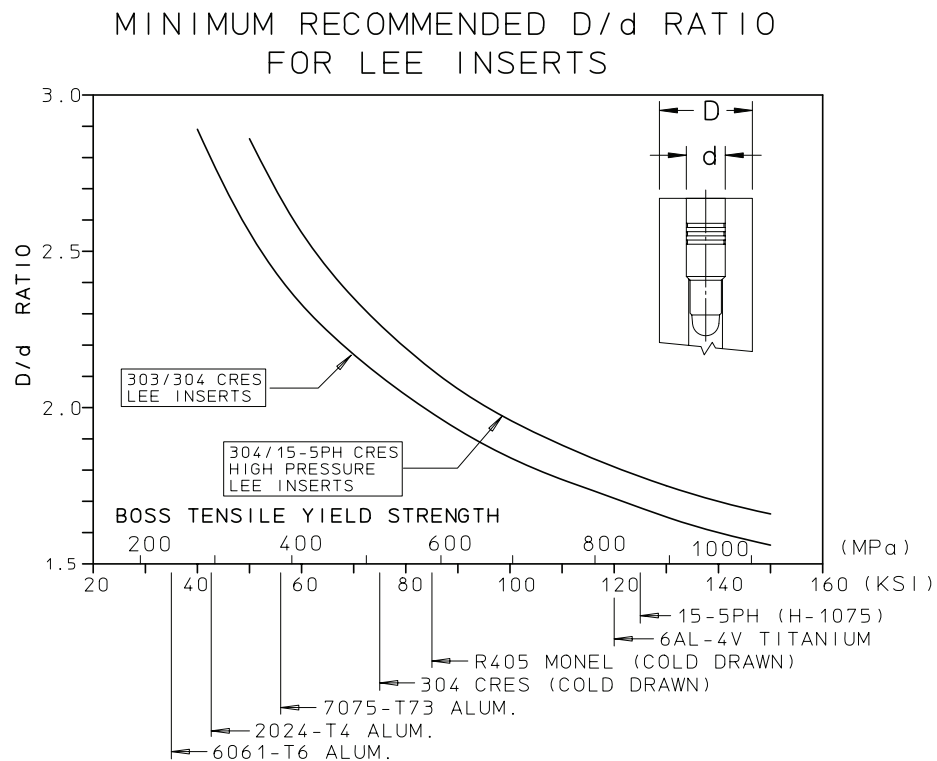


FIGURE 1
Housing Wall Thickness

Installation of Lee inserts into boss materials that have a D/d less than that recommended in Figure 2 should be substantiated by testing by the customer. During testing the expected conditions should be duplicated.

**Minimum Recommended D/d Ratios
for Lee Inserts used with Dissimilar Materials**



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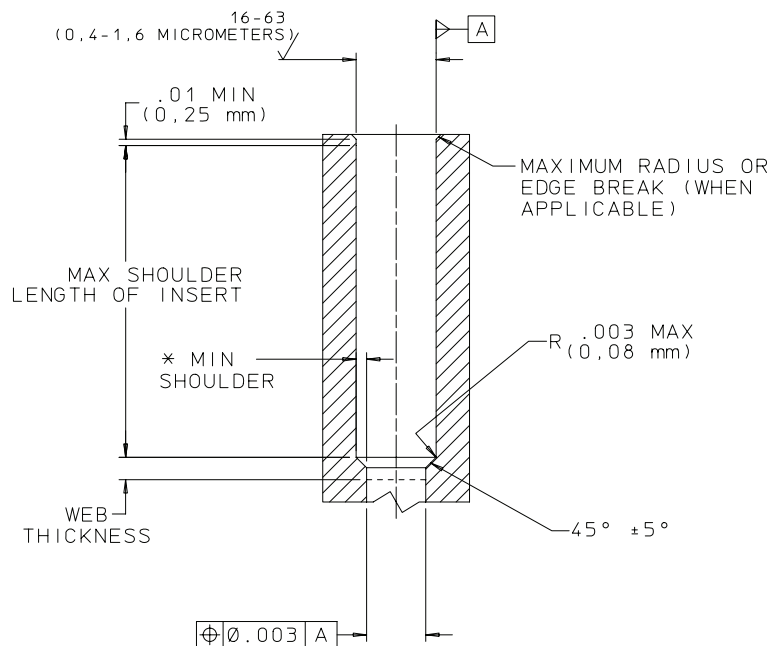
FIGURE 2
D/d for Dissimilar Material

Web Thickness

The web (the material directly below the 45 degree shoulder) should be capable of withstanding the force transmitted by driving the pin into the insert (See Figure 3 below). Generally, a minimum of 0.125" (3,2 mm) should be allowed for aluminum housings and a minimum of 0.063" (1,6 mm) for steel housings. Many inserts require significantly greater thickness due to their geometry or to protect protruding screens, which is shown on the inspection drawings for all inserts. Larger allowances should be made for weaker materials or special situations.

Support Shoulder

The support shoulder against which the insert is to be driven should be 45 degrees, otherwise the insert or nose seal may deform causing leakage. Insert movement during installation may result in low proof pressures and /or high installation forces. The minimum allowable width of the support shoulder is 0.011" (0,28 mm). This is necessary to resist the axial force transmitted while driving the pin (see Figure 3).



*SEE APPROPRIATE INSPECTION DRAWING FOR DIMENSION.

FIGURE 3
Installation Hole

Depth of Insert

The minimum depth of the installation hole should be such that the back of an insert having the maximum shoulder length will still be at least 0.010" (0,25 mm) below the surface of the boss material. This will allow the last land of the locking end to contribute to the holding capability. Some users may put a radius at the top of the installation hole as part of their machining process. If this is the case, the minimum hole depth should take this into account such that the insert is at least 0.010" (0,25 mm) below the maximum radius (See Figure 3 on Sheet 12).

Thin Walled Bosses

Lower installation forces occur when Lee Inserts are installed in thin walled bosses such as tubing, small diameter protruding bosses, or thin walled sections between adjacent passages. Low installation forces may be a sign that the boss is too thin and is deformed as a result of the expanded locking end after the pin has been installed. If this is the case, there may not have been positive sealing of the insert, and leakage or low retention pressures may result. In brittle housings, cracking may occur. Whenever possible, the D/d chart provided in Figure 2 should be used when determining wall thickness. This will help to avoid a thin wall condition.

Boss Stresses

The control of stresses at the I.D. of a Lee Insert boss is of little concern to the designer, provided that the housing material has an elongation of 3% or greater. Housings that fall into this category will not crack due to the installation of a Lee Insert. The control of boss stresses on the O.D. is important in those applications where Stress Corrosion Cracking (SCC) can be a problem. SCC is a failure caused by the combined action of a corrosive agent and a tensile stress. Although most alloys are susceptible to SCC, each material has a threshold stress value below which cracking does not occur. (The threshold value is a function of the material and the application.) Therefore, a control of boss stresses below this threshold value will eliminate SCC. (As a general rule, this value is 40% of the tensile yield strength of the boss material.)

The expansion of a Lee Insert in an installation hole causes an increase in the I.D. of the boss and thus induces a tensile tangential stress on the O.D. of the boss. The factors which influence the magnitude of the boss stresses are the amount of interference, the insert material, the boss material, and the O.D. of the boss.

When the pin is driven into the insert, the insert expands causing the I.D. of the boss to be plastically deformed. If the boss diameter (D) is relatively small compared to the insert diameter (d), the plastic region will extend to the O.D. of the boss. If the boss diameter is larger, the plastic region extends only partially through the boss and the remainder is elastically deformed.

Calculation of Boss Stresses

The boss stresses, both tangential tensile and the radial compressive, vary throughout the boss. The radial stress reaches a maximum at the hole I.D. and drops to zero at the O.D. of the boss. The tangential stress (assuming a plastic/elastic situation) is low at the I.D. of the boss, reaches its maximum at the plastic/elastic interface, and drops to some intermediate value at the O.D. of the boss. When a Lee insert is installed in a boss material of dissimilar mechanical properties, the stress on the O.D. of the boss will be below 40% of the tensile yield strength of the boss material by observing the D/d ratios shown in [Figure 2 on page 11](#). In most cases, the factor limiting the boss diameter will be the retention pressure requirements and not the stresses.

Stresses in Non-Uniform Bosses

The stress situation is different for bosses having a non-uniform wall thickness. Installing inserts in this type of boss results in a stress concentration adjacent to the minimum wall thickness. This is obtained because the thicker (and therefore stiffer) section of the boss resists deformation, thus concentrating the effects of insert expansion in the thinner section of the boss. Detailed testing at The Lee Company has determined the necessary T/d ratios for some non-uniform bosses ([see Figure 4 on Sheet 15](#)).

For wall thickness T and insert diameter d , the minimum recommended T/d ratios for several boss configurations are as shown in Figure 4.

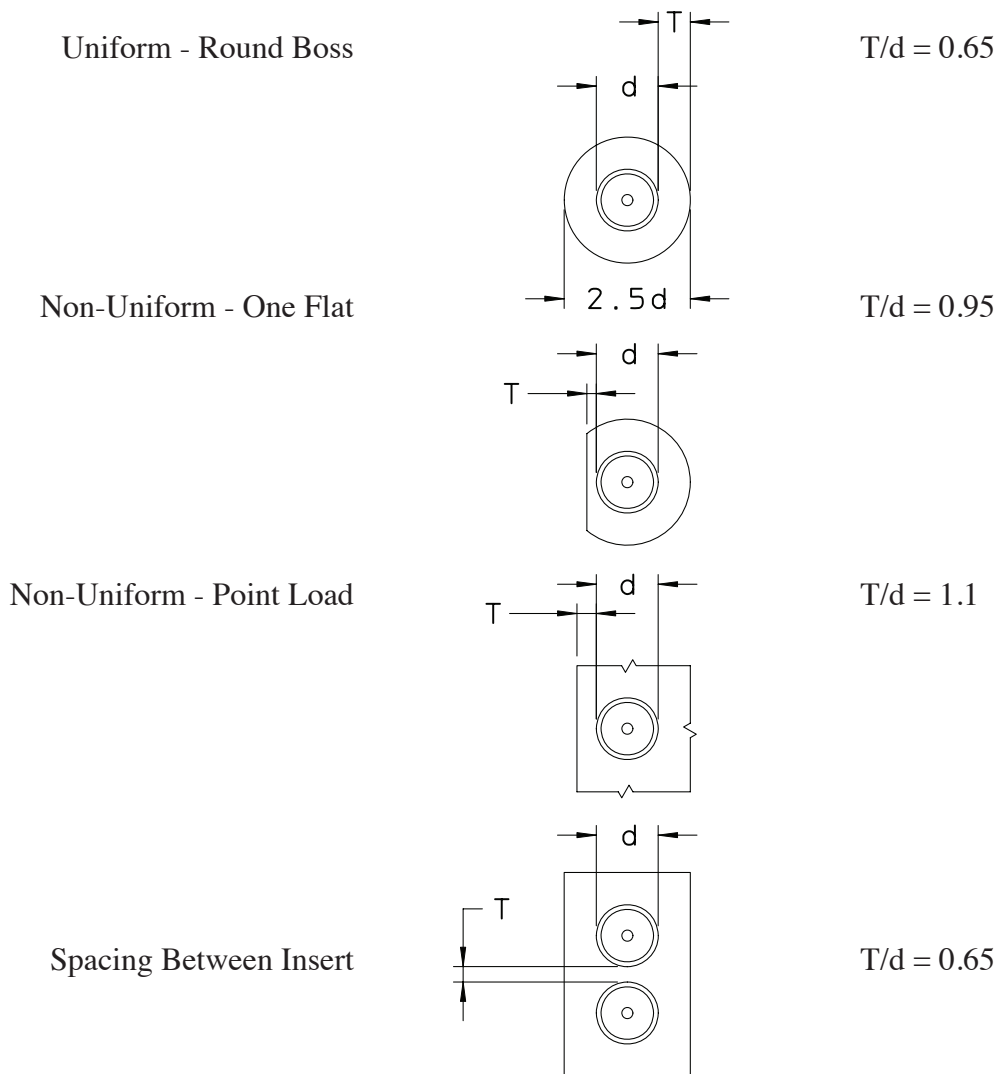


FIGURE 4
Non-Uniform Bosses

SECTION II - INSPECTION AND HANDLING

Lee Q.C. Procedures

The final inspection of inserts at The Lee Company is comprehensive and includes a 100% visual inspection for surface defects. All other dimensions are inspected per ANSI-ASQ Z1.4 LEVEL II.

Checking O.D.

All diametrical measurements of Lee Inserts should be made on the front or nose end of the insert to eliminate false readings due to permissible groove burrs.

Lot Control Certification

All Lee Pins and Inserts are manufactured and controlled by lots. These lot numbers are marked on the package so the insert body and pin can be traced back to the material certification from the mill. The material lot numbers and certificates of material certification are kept on file. (See example of certification in Appendix A.)

Wax Coating

Lee Insert Pins are coated with a wax that produces a thin solid lubricant film. This film has proven to reduce friction and prevent galling and seizing sufficiently to permit the pin to be driven flush with the back of the insert. The handling of pins should be kept to a minimum. In addition, Lee Insert Pins are not to be stored at temperatures exceeding 150°F (65°C). **Do not degrease the pins as this voids our warranty and may render the pin uninstallable.**

The Lee Company absolutely prohibits customers from rewaxing pins or using lubricants of any kind in assembling inserts and this action will also void our warranty. Although the taper angles of pins and inserts are small, the coefficient of friction can be reduced sufficiently by additional lubricants to cause properly installed pins to back out of the insert. Pin backout is a critical situation and must be avoided. Installation forces for pins are high by design.

SECTION III - Installation and Extraction of Lee Inserts

The performance of the Lee locking end is due to the independent seals and retaining rings created by the controlled expansion of the insert. Therefore, it is important that proper care is taken during installation. Of equal importance, the proper extraction procedure may allow the user to avoid the high cost of having housings reworked. [Table V on Sheet 25](#) lists some of the common problems and probable causes. When using threaded installation or extraction tools, it is important to ensure that the pin is threaded all the way onto the tool so that the pin bottoms on the shoulder of the tool, thus avoiding thread damage.

Lee Insert Installation

Pins may be driven into the insert using an arbor press, hydraulic press, or hammer. If a hydraulic or other type of press is used, adjust the stroke by setting a mechanical stop to press the pin to the flush position. For experimental or prototype work, The Lee Company recommends using a properly sized hammer.

The following procedure should be followed for most Lee Inserts ([see Figure 5 on Sheet 18](#)). Inserts with a 0.125" (3.17mm) diameter and all Lee Biased Type Shuttle Valves are the exceptions and the procedures for these products follow.

Standard Installation

1. Firmly support the item in which the insert is to be installed.
2. Slip the insert into the hole until it is firmly seated on the support shoulder in the mounting hole. If the groove burrs cause an interference fit, then thread the appropriate body extraction tool from the tool set listed in [Table IV on Sheets 22-24](#) into the insert and lightly press the insert until it is bottomed. Remove the extraction tool.
3. Thread the pin, larger end first, onto the appropriate pin installation tool from the tool set listed in [Table IV](#). Press or drive the installation tool, which must be held square to the insert, until the pin is driven flush (to within ± 0.005 " (0,13mm)) with the back of the insert.

Installation of 0.093 (0.23mm), 0.125 (3.17mm) and 0.156 (3.96mm) Diameter Inserts

1. Firmly support the item in which the insert is to be installed.
2. Slip the insert into the hole until it is firmly seated on the support shoulder in the mounting hole. If the groove burrs cause an interference fit, lightly press the insert against the shoulder. There are no extraction threads in the body, therefore, in order to get the insert flush it may be necessary to push lightly on the back skirt of the insert. **Care must be taken, as it is possible to overload and crush the skirt of the body.**
3. Start the pin, smaller end first, into the body. There are no extraction threads in the pin and therefore, the installation tool has only a smooth protrusion to help locate the center of the pin. With the installation tool from the appropriate tool set in **Table IV on Sheets 22-24** held against the pin and square to the back of the insert, drive or press the pin until it is flush (to within ± 0.005 " (0,13 mm)) with the back of the insert.

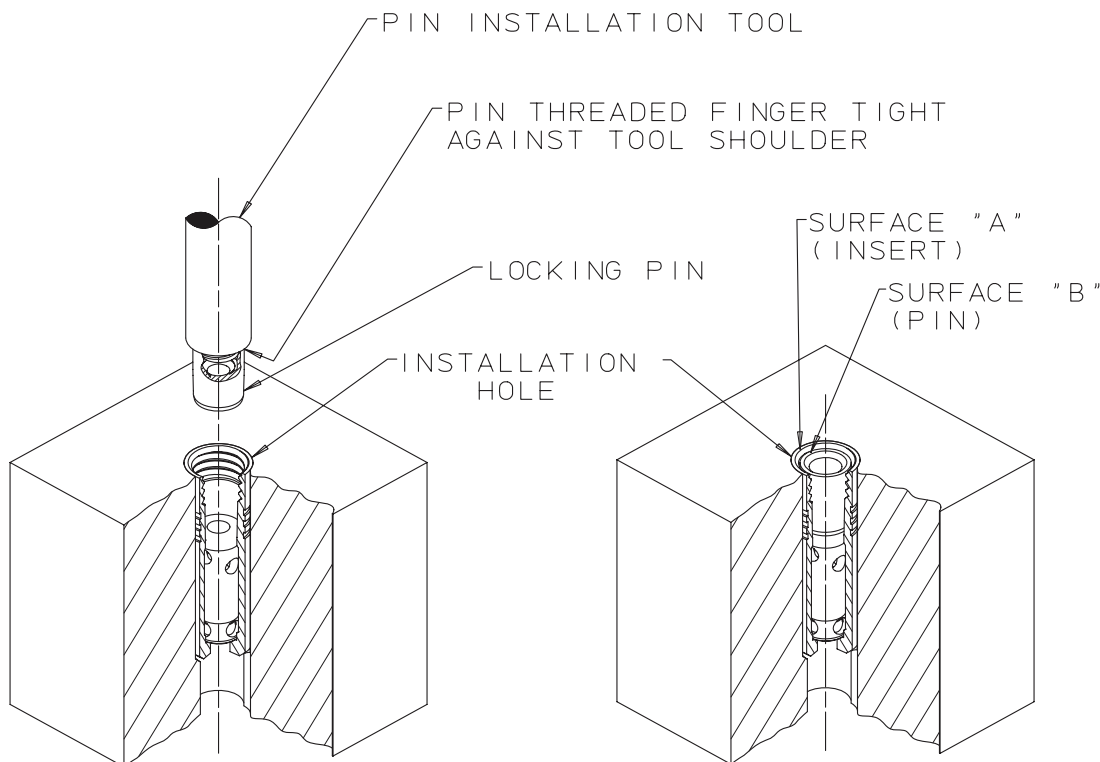


FIGURE 5
Installation of Lee Inserts

Notes:

1. Surface "A" to be .010" (0,25mm) minimum below surface of housing.
2. Surfaces "A" and "B" to be flush within $\pm .005$ " (0,13 mm).

Lee Multi-port Valves

Many Lee multi-port valves include a nose seal or compression seal that is required to isolate two ports from one another. When the valve is installed, the compression seal is forced up the taper, causing it to expand and seal on the ID of the installation hole. It is important that the seal be preset prior to the installation of the pin into the insert. Any movement of the insert during the pin installation can shear the grip that the insert had initiated thus greatly reducing the blowout pressure. The standard procedure for the installation of multi-port valves is provided in the following steps.

1. The tapered ID of the seal should already be placed over the tapered nose on the valve. The seal is installed onto the valve such that the outer dimension of the seal does not exceed the dimension found on the appropriate Lee inspection drawing.
2. Thread the insert onto the body installation tool from the appropriate tool set found on the Lee inspection drawing or in **Table IV on Sheets 22–24**. Gently push the insert until it is against the shoulder
3. Apply an axial force per the appropriate Lee inspection drawing. This force will expand the nose seal employing the locking end principle to provide an effective seal.
4. Thread the pin, larger end first, onto the appropriate pin installation tool from the tool set listed in the appropriate inspection drawing or **Table IV on Sheets 22–24**. Press or drive the installation tool, which must be held in line with the insert, until the pin is driven flush (to within $\pm 0.005"$ (0,13 mm) with the back of the insert.

Lee Shuttle Valves

1. Thread the insert onto the body installation tool from the appropriate tool set in **Table IV on Sheets 22–24** or listed on the appropriate Lee Inspection Drawing. Gently push the insert until it is against the shoulder.
2. Apply axial force as provided in the notes of the appropriate Lee Inspection Drawing. The forces in **Table III (below)** are for Lee Standard Shuttle Valves and are provided for reference. This force will expand the nose or compression seal, employing the locking end principle to effectively seal the nose. It is typically preferred to use a press and load cell to accurately apply the pre-load.

TABLE III
Nose/Compression Seal Preloads

Insert Diameter (inches)	Seal Design	Force (lbf)	Force (N)
0.187 (4,75 mm)	Aluminum Nose Seal	200 - 250	900 - 1100
0.281 (7,14 mm)	Aluminum Nose Seal	400 - 500	1800 - 2200
0.500 (12,70 mm)	Aluminum Nose Seal	800 - 900	3600 - 4000
0.281 (7,14 mm) 0.375 (9,53 mm) 0.500 (12,70 mm)	Polymer Compression Seal	500 - 700	2200 - 3100

3. Thread the pin, larger end first, onto the appropriate pin installation tool from the tool set listed in **Table IV on Sheets 22-24** or listed on the appropriate Lee Inspection Drawing. Press or drive the installation tool, which must be held squared with the

insert, until the pin is driven flush (to within ± 0.005 " (0,13 mm) with the back of the insert.

Dual Insert Adapters

It is possible to stack two Lee inserts of the same diameter in series with the use of the Lee Dual Insert Adapter. The adapter eliminates the need to machine an additional shoulder, which normally would be required to place a second insert behind the first. The second insert is no longer required to be a larger diameter than the first, allowing for a smaller boss. Machining is simplified and space and weight are reduced.

Dual insert adapters are available for 0.187 inch and 0.281 inch diameter Lee inserts, and are offered in two versions: one with crossport flow capability and the other without. They are not to be used in conjunction with Lee plugs.

TYPICAL INSTALLATION

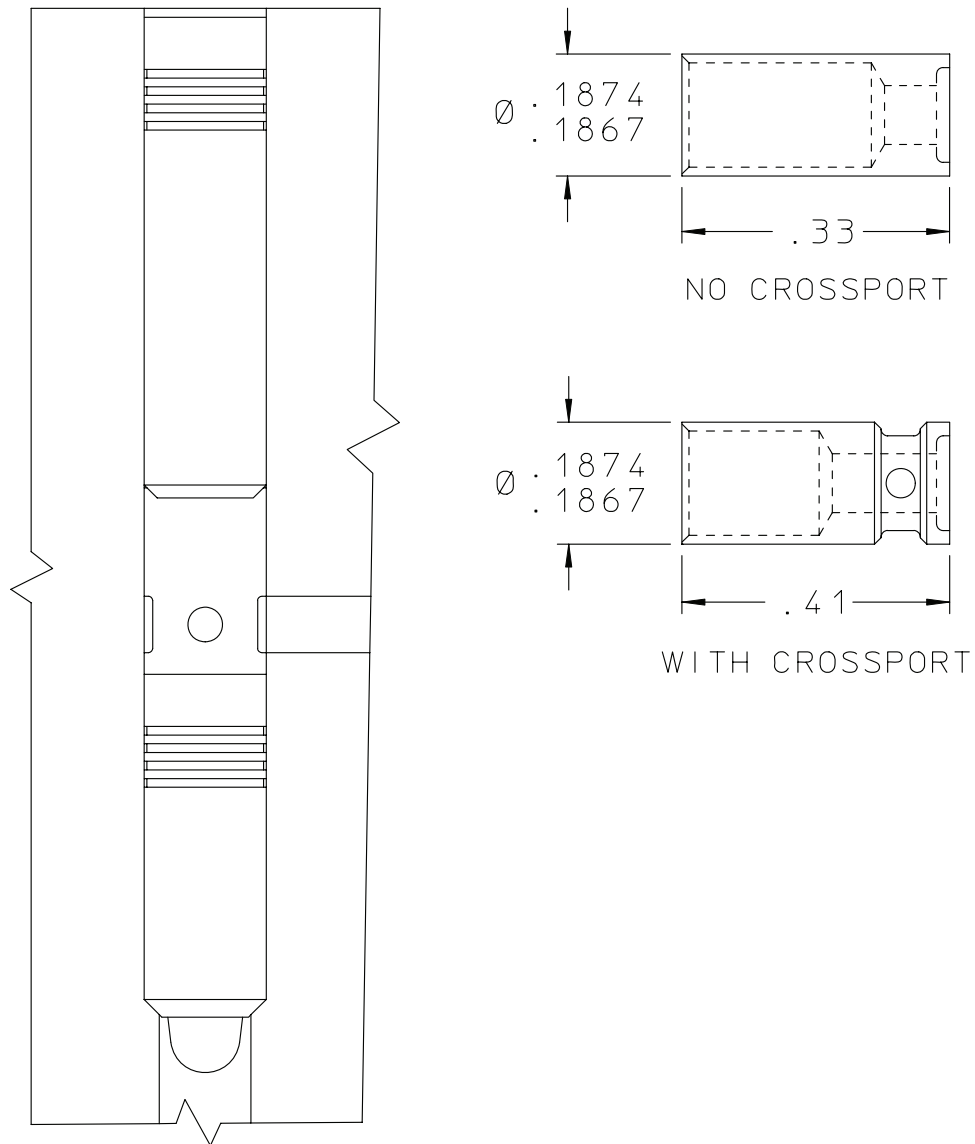


FIGURE 6
Lee Dual Insert Adapter

TABLE IV
Tool Set Part Numbers for Lee Inserts

	Installation/ Extraction Tool Sets	T-Handle Type Pin Jacking Tools	Rivet Tool Type Pin Jacking Tools
Lee Restrictors			
156 Jet	CUTA1560104C	-	-
187 Jet	CUTA1870104C	CUTA1870204B	CUTA1870404B
187 High Watt Jet	CUTA1870110C	CUTA1870204B	CUTA1870404B
187 High Watt Jet (8000 psi, 55 MPa rated)	CUTA1870210C	-	-
156 Bender Jet	CUTA1560104C		
187 Bender Jet	CUTA1870104C	CUTA1870204B	CUTA1870404B
187 Bender Jet (8000 psi, 55 MPa rated)	CUTA1870109C	-	-
250 H Bender Jet	CUTA2500406C	-	-
375 Bender Jet	CUTA3750306C	-	-
187 5K Jet	CUTA1870904C	CUTA1871604B	-
Axial Visco Jet (2502 short)	CUTA2500106C	CUTA2500206B	CUTA2500313B
Axial Visco Jet (2500 short)	CUTA2000113C	CUTA2000213B	CUTA2500706B
Axial Visco Jet (2503 long)	CUTA2500106C	CUTA2500206B	CUTA2500313B
Axial Visco Jet (2501 long)	CUTA2000113C	CUTA2000213B	CUTA2500706B
JEVA	CUTA1870104C	CUTA1870204B	CUTA1870404B
Visco Jet (18 series)	CUTA1870104C	CUTA1870204B	CUTA1870404B
125 Visco Jet (8000 psi, 55 MPa rated)	CUTA1250306C	-	-
187 Visco Jet (8000 psi, 55 MPa rated)	CUTA1870109C	-	-
Deflector Jet	CUTA1870104C	CUTA1870204B	CUTA1870404B
281 Kilowatt Jet	CUTA2810104C	-	-
Micro Jets	CUTA2711004C	-	-
Lee Flow Controls			
Restrictor Chek	CUTA1870104C	CUTA1870204B	CUTA1870404B
187 Flow Control	CUTA1870104C	CUTA1870204B	CUTA1870404B
281 Flow Control	CUTA2810114C	CUTA2810214B	-
375 Flow Control	CUTA3750106C	CUTA3750206B	-
500 Flow Control	CUTA5000106C	CUTA5000216B	-
281 Flosert	CUTA2810114C	CUTA2810214B	-
500 Flosert	CUTA5000116C	CUTA5000216B	-
500 Flosert (5000 psi, 34 MPa rated)	CUTA5000716C	-	-
187 Flow Control (5000 psi, 34 MPa rated)	CUTA1870904C	CUTA1871604B	-
281 Flow Control (5000 psi, 34 MPa rated)	CUTA2810114C	CUTA2810214B	CUTA2810314B
375 Flow Control (8000 psi, 55 MPa rated)	CUTA3750106C	CUTA3750206B	-
500 Flow Control (8000 psi, 55 MPa rated)	CUTA5000206C	CUTA5000416B	-

TABLE IV -CONTINUED
Tool Set Part Numbers for Lee Inserts

	Installation/ Extraction Tool Sets	T-Handle Type Pin Jacking Tools	Rivet Tool Type Pin Jacking Tools
Lee Nozzles			
Spin Jet	CUTA1870104C	CUTA1870204B	CUTA1870404B
187 Lubrication Jet (Screened)	CUTA1870104C	CUTA1870204B	CUTA1870404B
125 Lubrication Jet	CUTA1250801C	-	-
187 Lubrication Jet (Unscreened)	CUTA1870801C	-	-
250 Lubrication Jet	CUTA2500801C	-	-
343 Lubrication Jet	CUTA3430801C	-	-
Lee Check Valves			
187 Zero Leak Chek	CUTA1870110C	CUTA1870204B	CUTA1870404B
250 Zero Leak Chek	CUTA2500506C	CUTA2500206B	CUTA2500313B
187 Lee Chek (Axial Flow)	CUTA1870104C	CUTA1870204B	CUTA1870404B
250 Lee Chek (Axial Flow)	CUTA2500106C	CUTA2500206B	CUTA2500313B
187 Lee Chek (Side Exit)	CUTA1870306C	CUTA1870204B	CUTA1870404B
187 Lo-Lohm Chek	CUTA1870110C	CUTA1870204B	CUTA1870404B
250 Lo-Lohm Chek	CUTA2500306C	CUTA2500806B	CUTA2500606B
375 Lo-Lohm Chek	CUTA3750106C	CUTA3750206B	-
500 Lo-Lohm Chek	CUTA5000106C	CUTA5000216B	-
093 Chek	CUTA0930106C	-	-
125 Chek	CUTA1250306C	-	-
(8000 psi, 55 Mpa rated)			
156 Chek	CUTA1560106C	-	-
187 Chek	CUTA1870210C	CUTA1870204B	CUTA1870404B
(8000 psi, 55 Mpa rated)			
250 Chek	CUTA2500406C	CUTA2500806B	CUTA2500606B
(8000 psi, 55 Mpa rated)			
375 Chek	CUTA3750306C	CUTA3750206B	-
(8000 psi 55 Mpa rated)			
500 Chek	CUTA5000206C	CUTA5000416B	-
(8000 psi 55 Mpa rated)			
500 Hi-Q Chek	CUTA5000306C	CUTA5000216B	-
250 Pilot Operated Chek	CUTX0503050B	CUTA2500806B	CUTA2500606B

TABLE IV -CONTINUED
Tool Set Part Numbers for Lee Inserts

	Installation/ Extraction Tool Sets	T-Handle Type Pin Jacking Tools	Rivet Tool Type Pin Jacking Tools
Lee Relief Valves			
187 PRI	CUTA1870104C	CUTA1870204B	CUTA1870404B
281 PRI	CUTA2810114C	CUTA2810214B	-
375 PRI (Forward)	CUTA3750106C	CUTA3750206B	-
375 PRI (Reverse)	CUTA3750214C	CUTA3750206B	-
500 PRI (Forward)	CUTA5000106C	CUTA5000216B	-
500 PRI (Reverse)	CUTA5000116C	CUTA5000216B	-
Hi-Lohm PRI	CUTA2810114C	-	-
187 TRI	CUTA1870104C	CUTA1870204B	CUTA1870404B
250 PRI	CUTA2500406C	-	-
(8000 psi, 55 Mpa rated)			
281 PRI	CUTA2810114C	-	-
(8000 psi, 55 Mpa rated)			
375 PRI	CUTA3750514C	-	-
(8000 psi, 55 Mpa rated)			
187 TRI	CUTA1870210C	-	-
(8000 psi, 55 Mpa rated)			
250 TRI	CUTA2500406C	-	-
(8000 psi, 55 Mpa rated)			
281 Zero Leak PRI	CUTA2810114C	-	-
Lee Shuttle Valves			
187 Shuttle Valve	CUTA1870137C	CUTA1870204B	CUTA1870404B
281 Shuttle Valve	CUTA2810137C	CUTA2810214B	-
500 Shuttle Valve	CUTA5000137C	CUTA5000216B	-
187 Shuttle Valve	CUTA1870137C	CUTA1870204B	CUTA1870404B
(5000 psi, 34 Mpa rated)			
281 Shuttle Valve	CUTA2810137C	CUTA2810214B	-
(5000 psi, 34 Mpa rated)			
500 Shuttle Valve	CUTA5000237C	CUTA5000416B	-
(5000 psi, 34 Mpa rated)			
281 Detented Shuttle Valve	CUTA2810114C	CUTA2810214B	-
500 Detented Shuttle Valve	CUTA5000337C	CUTA5000516B	-
187 Selective Shuttle Valve	CUTA1870104C	CUTA1870204B	-
250 Selective Shuttle Valve	CUTX0503050B	CUTA2500806B	CUTA2500606B
500 Selective Shuttle Valve	CUTA5000337C	CUTA5000516B	-
500 Inverse Shuttle Valve	CUTA5000206C	CUTA5000416B	-
Lee Safety Screens			
Safety Screen	CUTA1870128C	CUTA1870204B	CUTA1870404B
(Insert Retained)			

TABLE V**Trouble Shooting Guide**

<u>Problem</u>	<u>Probable Cause</u>
High Installation Forces	Hole is out of round.
Pin Deformation	Pin is inserted upside down. Pin mushroomed due to too many light taps. Insufficient or incorrect support shoulder. No wax on pin.
Low Installation Forces	Oversize or tapered hole. Wall section is too thin. Use of high film strength lubricant. Hole out of round.
Leakage and/or Low Retention Pressure	Oversize or tapered hole. Longitudinal scratch marks in installation hole. Installation hole too smooth (smoother than 16 microinches RMS (0,4 micrometers). Wall section is too thin. Insert not bottomed on support shoulder. Boss material is much harder than insert material. Improper surface treatment on installation hole. Thermally mismatched insert and boss material in large temperature variation application. Use of a lubricant on the installation hole.
Pin Backout	Use of a high film lubricant on the pin. Oversized installation hole. Flat Bottom support shoulder.

LEE INSERT EXTRACTION

It is sometimes necessary to remove inserts. The following procedures may permit removal of Lee Inserts without requiring rework of the boss or contamination of the passage.

Pin Extraction

There are three methods to remove a Lee Insert Pin. The preferred methods use pin jacking tools, where the extraction forces react against the rear of the insert. The two types of pin jacking tools available are the Rivet Tool and the T-Handle. At times the bolt and striker method may remove the insert with the pin. This tends to severely gall the installation hole. The pin jacking tools will prevent the body from being extracted with the pin and therefore leave the installation hole in better condition to receive another insert. Pin jacking tools are not available for all Lee inserts.

Pin Extraction - Rivet Tool (See Figure 7 on Sheet 27)

1. Thread the appropriate stud from the tool set listed in [Table IV on Sheets 22 - 24](#) into the pin to be removed.
2. Slide the sleeve down over the stud until it is seated against the end of the body.
3. Engage the grooved end of the stud into rivet tool, allowing some space between the tool end of the sleeve. Squeeze the handle until the pin is free.

Pin Extraction – T-Handle (See Figure 8 on Sheet 28)

1. Select the appropriate T-Handle pin jacking tool from [Table IV on Sheets 22 – 24](#).
2. Run the drive nut up the drive shaft until the extractor stud threads are clear of the extractor guide sleeve.
3. Hold the T-Handle to prevent the stud from turning, and run the wrenching nut down the drive shaft thread until the face of the extractor guide sleeve bears against the exposed face of the insert body.
4. While grasping the T-Handle, use an open-end wrench to turn the drive nut in a counter-clockwise direction.
5. Diminished drive nut wrenching force indicates that the pin is free.

Pin Extraction - Bolt and Striker (See Figure 10 on page 31)

1. Use the extraction tools from the appropriate tool set listed in **Table IV on Sheets 22 - 24**.
2. Slide the striker onto the pin extraction tool and thread it completely into the pin.
3. Strike the head of the pin extraction tool with the striker until the pin is removed.

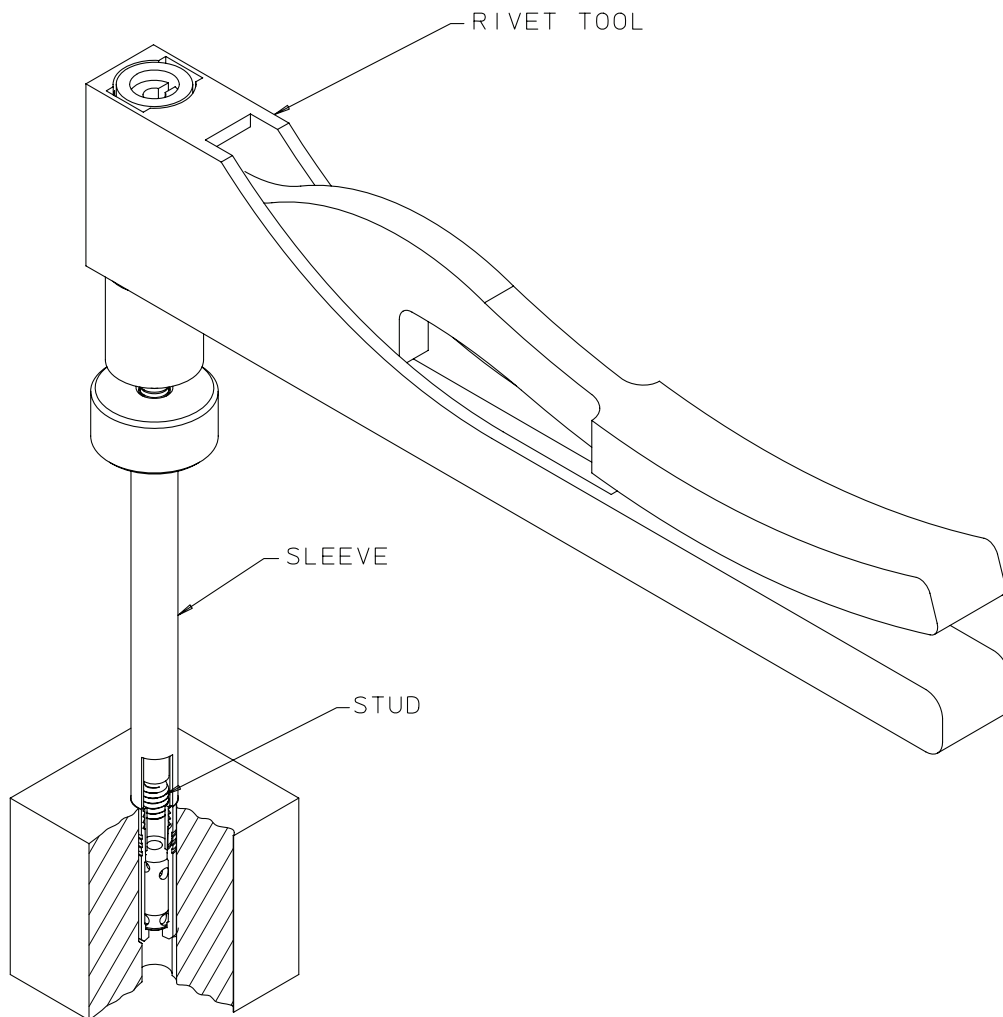


FIGURE 7
Rivet Type Pin Jacking Tool

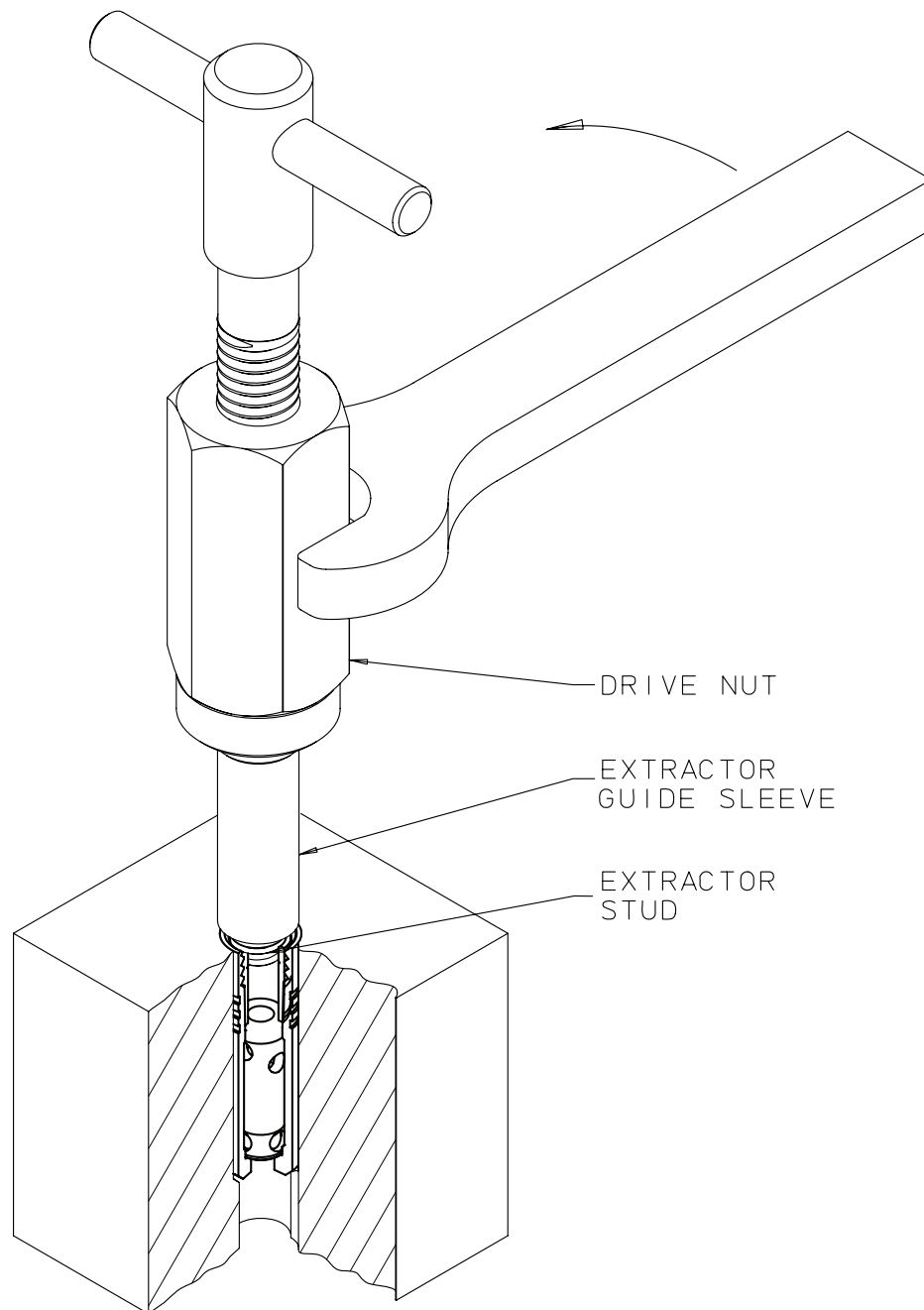


FIGURE 8
T-Handle Type Pin Jacking Tool

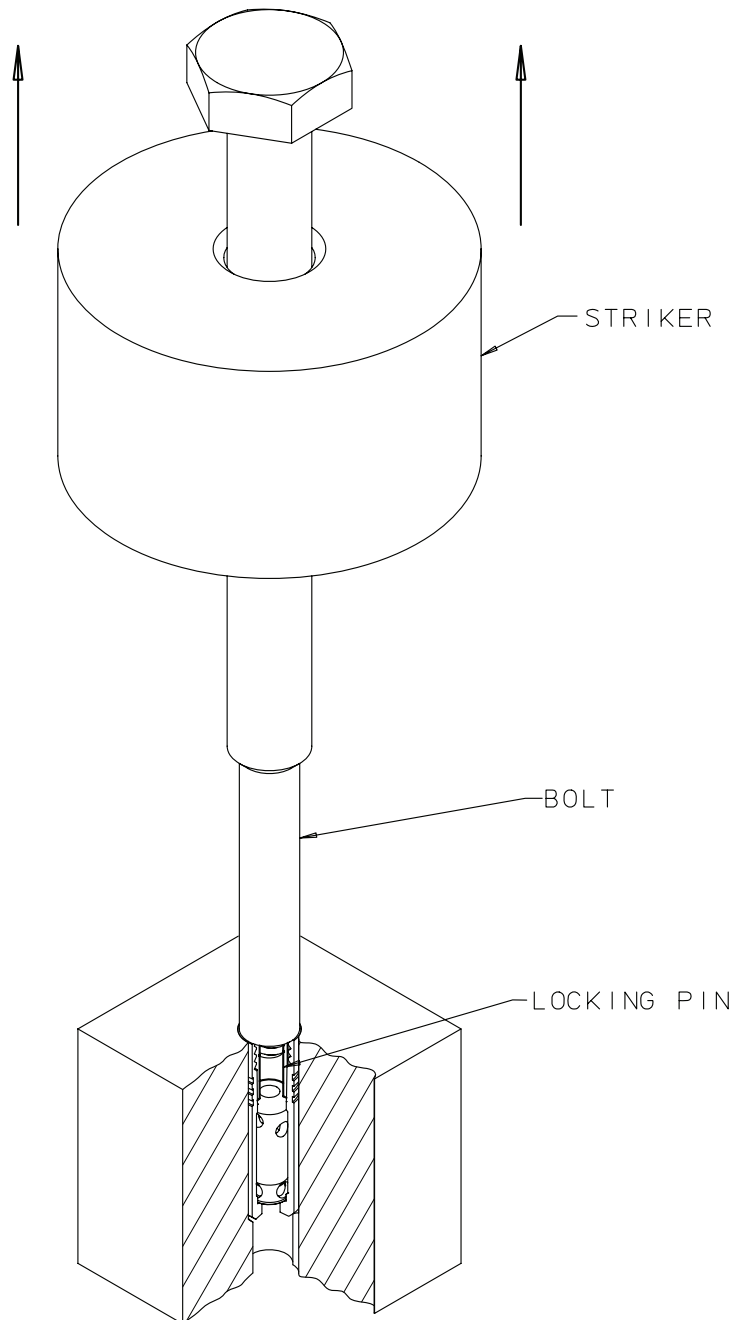


FIGURE 9
Pin Extraction Using Bolt and Striker

Insert Extraction

All Lee Inserts are readily removed with a bolt and striker. Some smaller diameter Lee Inserts do not have extraction threads and therefore threads must be tapped prior to extraction. The Shuttle Valves require a special tool to remove the nose/compression seal.

Extraction Method - (See Figure 10 on Sheet 31)

1. Use the extraction tools from the appropriate tool set listed in **Table IV on Sheets 22–24**.
2. Slide the striker onto the body extraction tool and thread the tool completely into the body.
3. Strike the head of the body extraction tool with the striker until the body is removed.
4. **Lee Shuttle Valves Only.**
 - 4a. Having already extracted the insert, thread the nose/compression seal extraction tool assembly such that the sleeve is not expanded by the end of the body and the threads are still engaged.
 - 4b. Slide the striker onto the tool.
 - 4c. Insert the tool into the installation hole until the head of the sleeve is through and beyond the nose/compression seal. Thread the tool assembly together expanding the end of the tool sleeve. (See Figure 11 on Sheet 32)
 - 4d. Lightly tap the nose seal from the hole with the striker.

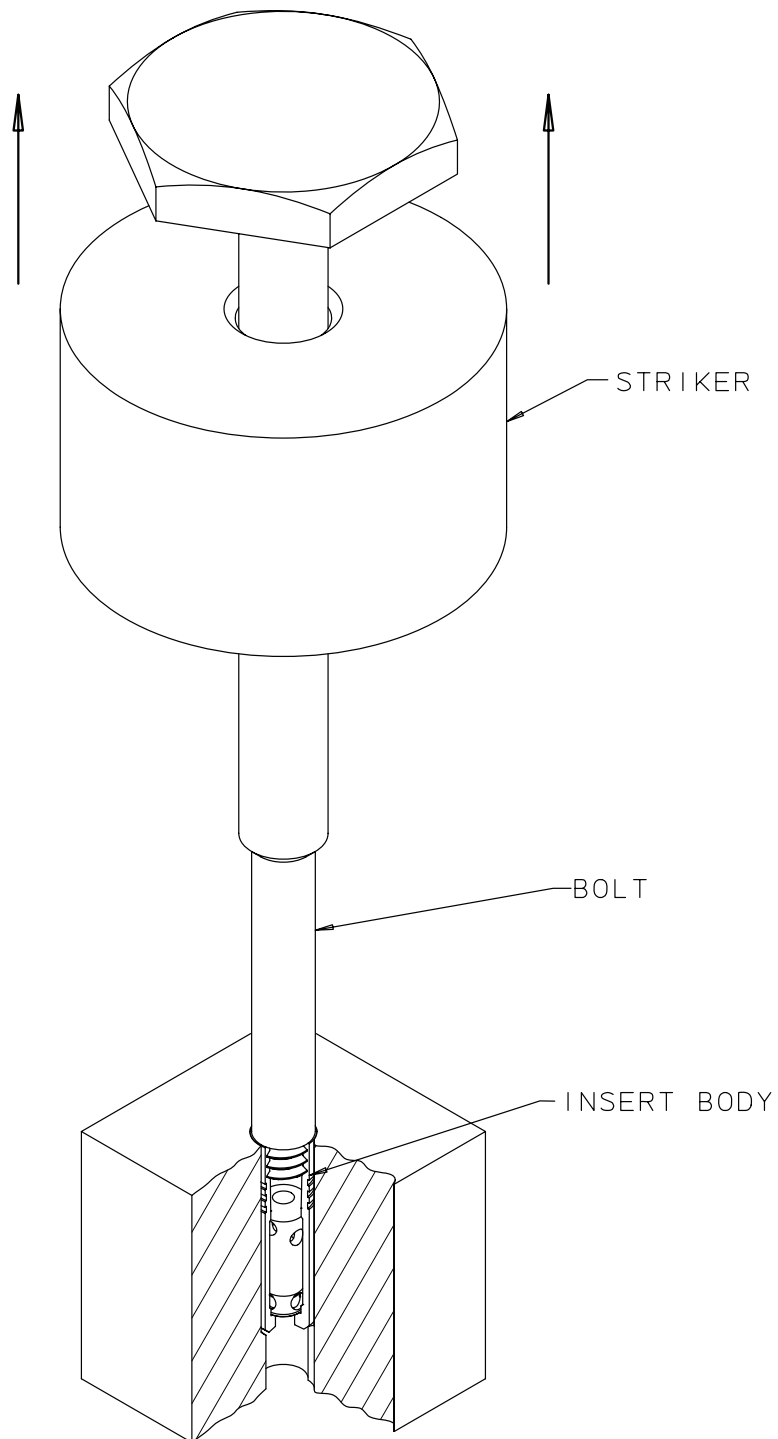


FIGURE 10
Extraction of Lee Insert

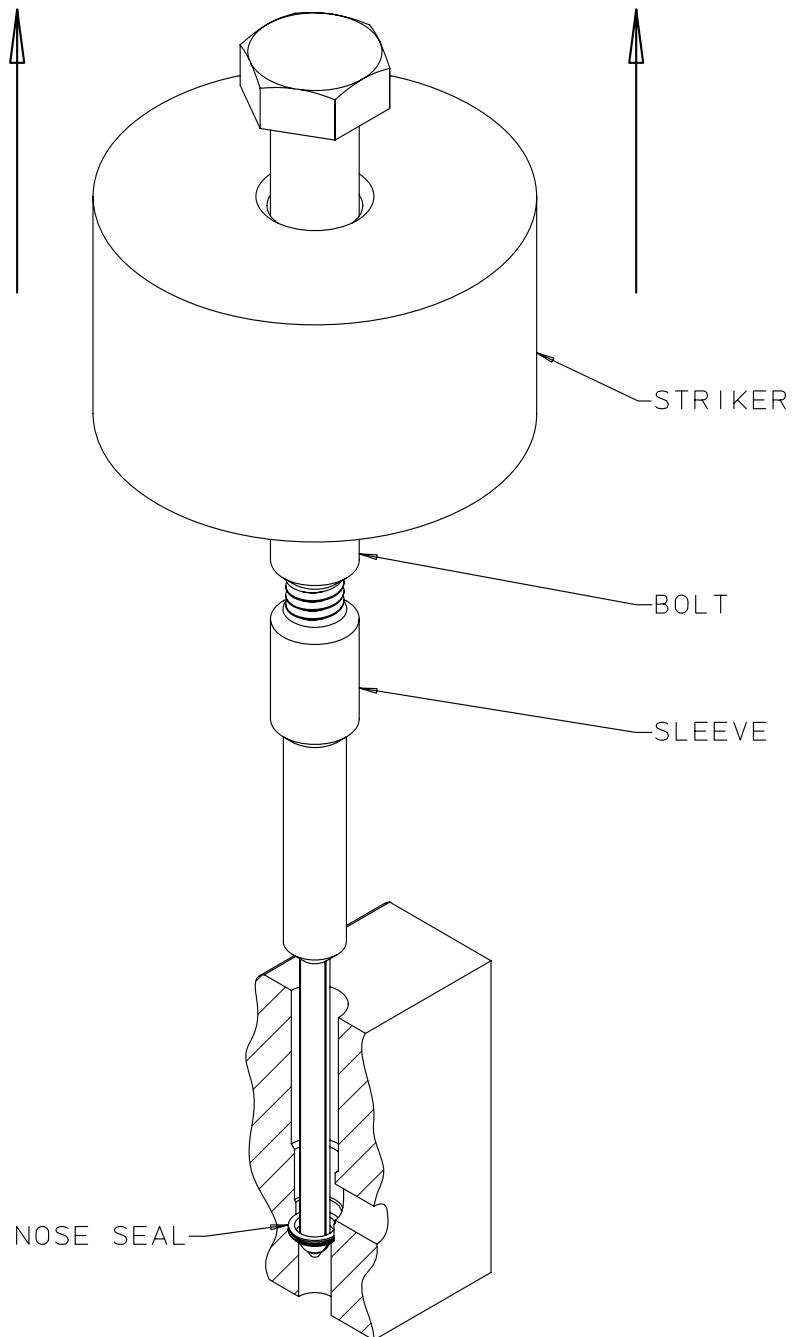


FIGURE 11
Nose/Compression Seal Extraction Tool

CONCLUSION

Adherence to the guidelines and procedures presented in this document will result in insert installations that are highly reliable, strong, and leak-free. Due to the multitude of environments and conditions to which the Lee Inserts may be exposed, retention testing by Lee Insert users is an essential part of the Lee Insert installation process. Retention pressure testing should be conducted by flow testing restrictors and reverse flow valves in the reverse direction at the maximum transient pressure listed in **Table I**. Forward flowing valves should be retention pressure tested by hydrostatically pressurizing the valve to the retention pressure listed in **Table II**. This testing serves to verify the integrity of the unit and indicates any inserts which may have been improperly installed. Installations must be fully shielded during testing in case an improperly installed insert should fail.

For any additional help or information, please feel free to contact a Lee Sales Engineer at any of the **locations** listed on the next few pages.

Lee Company U. S. Sales Offices

THE LEE COMPANY Technical Center P. O. Box 424, 2 Pettipaug Road Westbrook, CT 06498-0424 Tel: (860) 399- 6281 (800) 533-7584 (LEE PLUG) Fax: (860) 399-7058 Order Entry (860) 399-7037 Technical Information (860) 399-2270 Advertising Web: www.theleeco.com E-mail: ct-sales@theleeco.com	
THE LEE COMPANY 1511 N. Westshore Blvd. Suite 200 Tampa, FL 33607 Tel: (813) 287- 9293 Fax: (813) 287-9295 fl-sales@theleeco.com	THE LEE COMPANY 8600 W. Bryn Mawr Ave. Suite 160-N Chicago, IL 60631-3505 Tel: (773) 693-0880 Fax: (773) 693-1015 il-sales@theleeco.com
THE LEE COMPANY 7755 Center Ave. Suite 1020 Huntington Beach, CA 92647 Tel: (714) 899-2177 Fax: (714) 899-2176 ca-sales@theleeco.com	THE LEE COMPANY 3000 Town Center Suite 2580 Southfield, MI 48075 Tel: (248) 827-0981 Fax: (248) 827-2144 mi-sales@theleeco.com
THE LEE COMPANY 1250 Bayhill Drive Suite 113 San Bruno, CA 94066 Tel: (650) 238-2045 Fax: (714) 899-2176 ca-sales@theleeco.com	THE LEE COMPANY 545 E. John Carpenter Fwy. Suite 875 Irving, TX 75062 Tel: (972) 791-1010 Fax: (972) 791-1717 tx-sales@theleeco.com

International sales Offices and Distributors (continued)

<i>Subsidiary for the United Kingdom and Ireland</i> LEE PRODUCTS LIMITED (LPL) 3 High Street, Chalfont St. Peter, Gerrards Cross Buckinghamshire SL9 9QE ENGLAND Tel: + 44 1 753-886664 Fax: + 44 1 753-889588 sales@leeproducts.co.uk	<i>Subsidiary for Denmark, Sweden, Norway, Finland and Russia</i> THE LEE COMPANY SCANDINAVIA AB Pajalagatan 56 SE-162 65 Vällingby SWEDEN Tel: + 46 8 579 701 70 Fax: + 46 8 875252 sales@theleeco.se Helsinki, Finland Tel: + 358 44 0111 246 Fax: + 358 19 331 890 marko.koskinen@theleeco.net
<i>Subsidiary for Germany, Austria, Eastern Europe and German speaking Switzerland</i> LEE HYDRAULISCHE MINIATURKOMPONENTEN, GmbH (LPD) Am Limespark 2 65843 Sulzbach / Taunus Germany Tel: + 49 6196-77369-0 Fax: + 49 6196-77369-69 info@lee.de Bonn Office: Tel: + 49 22 44 871263 Fax: + 49 22 44 871264	<i>Agent for South America</i> TRUSTY COMÉRCIO E REPRESENTAÇÕES LTDA. Av. J.K. de Oliveira 580 Sala: 41, Guaratinguetá, São Paulo, 12505-300 BRAZIL Tel: + 55 12 3132-3418 Fax: + 55 12 3132-3560 rui@tcr-brazil.com.br
<i>Subsidiary for France, Spain and French speaking Switzerland</i> LEE COMPANY S.A. (LPF) 44 rue Jean Bart 78960 Voisins-le-Bretonneux FRANCE Tel: +33 1 30 64 99 44 Fax: +33 1 30 64 91 26 info@leecompany.fr Toulouse Office: Tel: +33 5 67 31 00 92 Fax: +33 5 34 60 50 40 h.reberga@leecompany.fr Madrid Office: SPAIN & PORTUGAL Tel: +34 913 010 572 p.sanchez.martin@leecompany.fr	<i>Distributor for Australia and New Zealand</i> CGB PRECISION PRODUCTS PTY LTD Unit 9, 32 Silkwood Rise Carrum Downs VIC 3201 AUSTRALIA Tel: + 61 3 9775 1125 Fax: + 61 3 9770 8844 info@cgb.com.au
<i>Subsidiary for Italy & Italian speaking Switzerland</i> LEE SRL. (LPI) Via Rondoni, 1 20146 Milano ITALY Tel: + 39 02 43981750 Fax: + 39 02 461050 sales@leesrl.it	<i>Distributor for Belgium, Netherlands & Luxemburg</i> DENIS DE PLOEG BV Geneindestraat 33 6301 HC Valkenburg (L) NETHERLANDS Tel: + 31 43 820 0250 Fax: + 31 43 820 0251 bs.deploeg@ddp.nl

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<i>Agent for Israel</i> ENL ENGINEERING AND LOGISTICS LTD. 35/8 Hasaifan Street P. O. Box 1074 Ramat-Hasharon 47100 ISRAEL Tel: + 972 3 549 3644 Fax: + 972 3 540 0262 enleng@netvision.net.il	<i>Agent for Singapore, Indonesia, Thailand and Malaysia</i> WINOVA PTE LTD. 31 Toh Guan Road East #05-08 LW Technocentre SINGAPORE 608608 Tel: + 65 6425 2116 Mobile: + 65 9655 9910 Fax: + 65 6425 1109 sales@winova.com.sg
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<i>Distributor for Japan</i> JUPITOR CORPORATION 3-17-4 Minami Aoyama Minato-Ku, Tokyo 107-0062 JAPAN Tel: + 81 33 403 1313 Fax: + 81 33 403 1319 t_suzuyama@jupitor.co.jp	<i>Distributor for Korea</i> MIN SUNG GC CORPORATION Minsung Building, Jegi-Dong 89 Yangnyeongjungang – Ro, Dongdaemun – gu, Seoul, KOREA Tel: + 822 961 7833 Fax: + 822 961 6249 minsung@minsunggc.com
<i>Distributor for People's Republic of China and Hong Kong</i> EBS FLOW CONTROL LTD. Suite 2503, Block B Lead International Building No. 2 Zhong Huan Nan Lu Jia Wang Jing, Chaoyang District Beijing 100102 CHINA Tel: + 86 10 84721177 Fax: + 86 10 84721263 info@ebshk.com.cn	

APPENDIX A

Sample Certificate of Conformance

THE LEE COMPANY

P.O. BOX 424

2 Pettipaug Road

Westbrook, CT 06498

(860) 399-6281

Date:

This is to certify that the dimensional, functional requirements, special surface treatments, and all blueprint notes of The Lee Company drawings have been inspected and are in conformance to all applicable specification requirements.

We further certify that physical and chemical test reports demonstrating conformance to applicable specifications of the material used in the manufacturing of these units, listed below, shipped to you on your order # _____ are on file at The Lee Company and are available for your review.

Lee Co. P/N:

Customer P/N:

Item:

Signed: _____

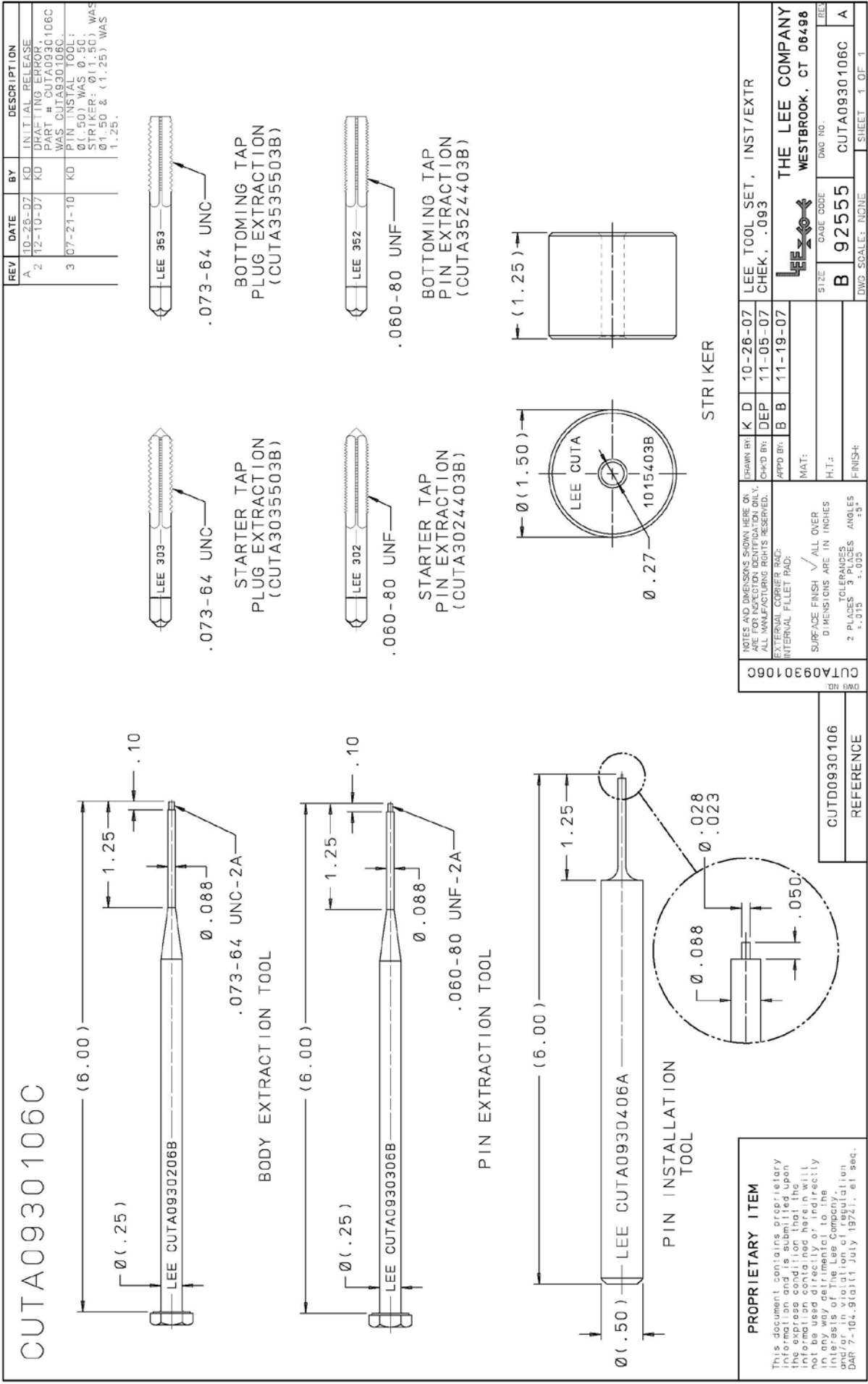
Quality Control Manager

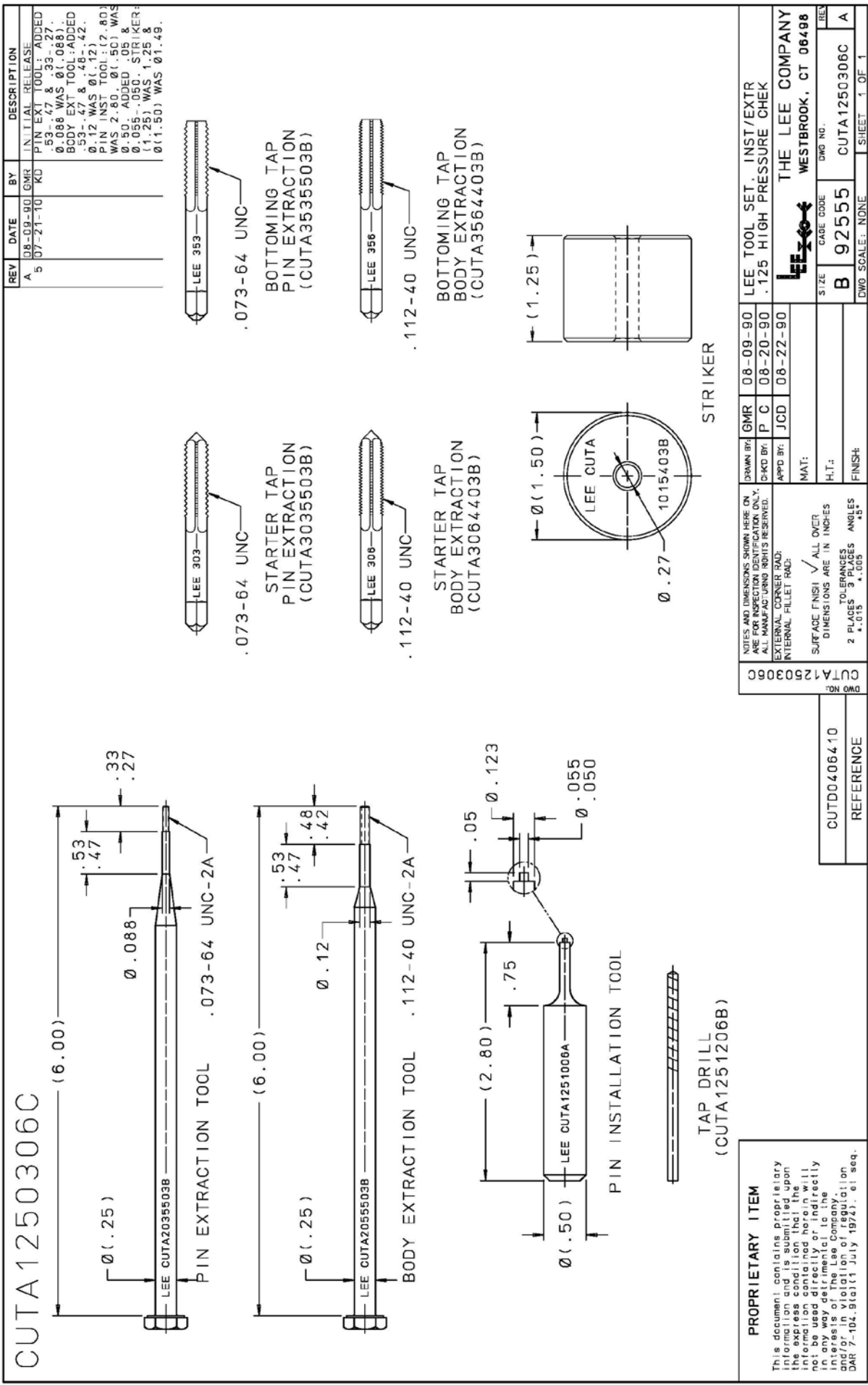
THE LEE COMPANY

Lee Form No. 195

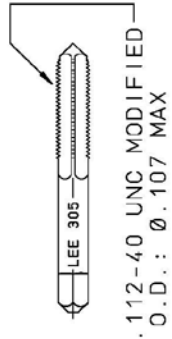
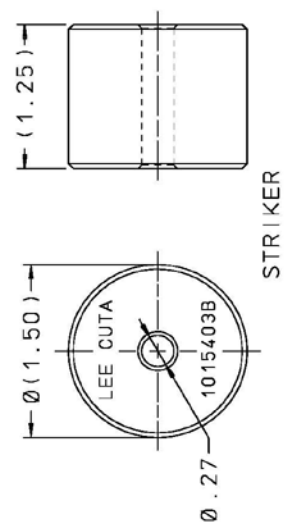
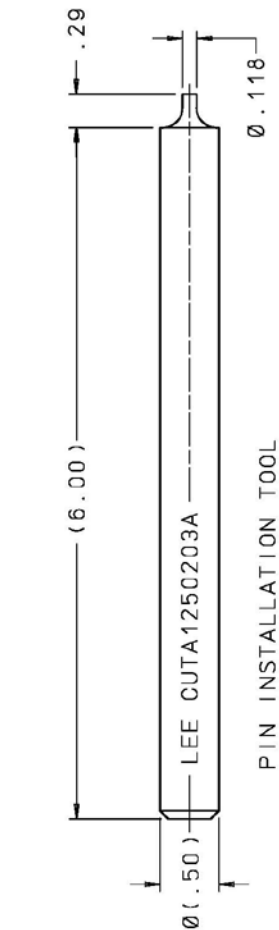
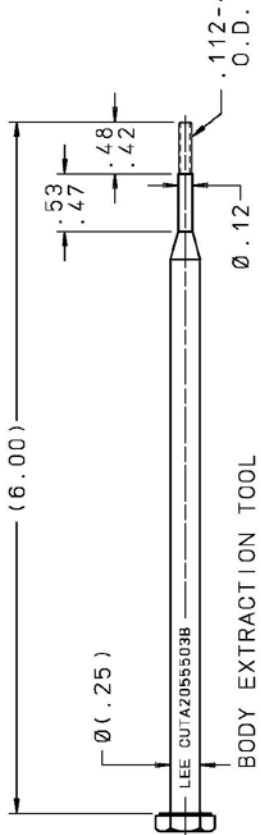
APPENDIX B**Tool Drawings (In alphanumerical order)**

CUTA0930106C	B1
CUTA1250306C	B2
CUTA1250801C	B3
CUTA1560104C	B4
CUTA1560106C	B5
CUTA1870104C	B6
CUTA1870109C	B7
CUTA1870110C	B8
CUTA1870128C	B9
CUTA1870137C	B10
CUTA1870204B	B11
CUTA1870210C	B12
CUTA1870306C	B13
CUTA1870404B	B14
CUTA1870504B	B15
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CUTA2500313B	B24
CUTA2500406C	B25
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CUTA2500606B	B27
CUTA2500706B	B28
CUTA2500801C	B29
CUTA2500806B	B30
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CUTA2810114C	B32
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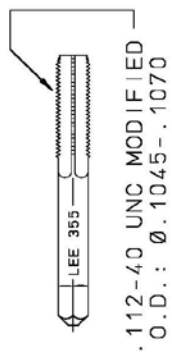




CUTA1250801C



STARTER TAP
BODY EXTRACTION
(CUTA3055503B)



BOTTOMING TAP
BODY EXTRACTION
(CUTA3555503B)

INSTALLATION/EXTRACTION TOOL SET FOR:
.125-.135 LEE JELA

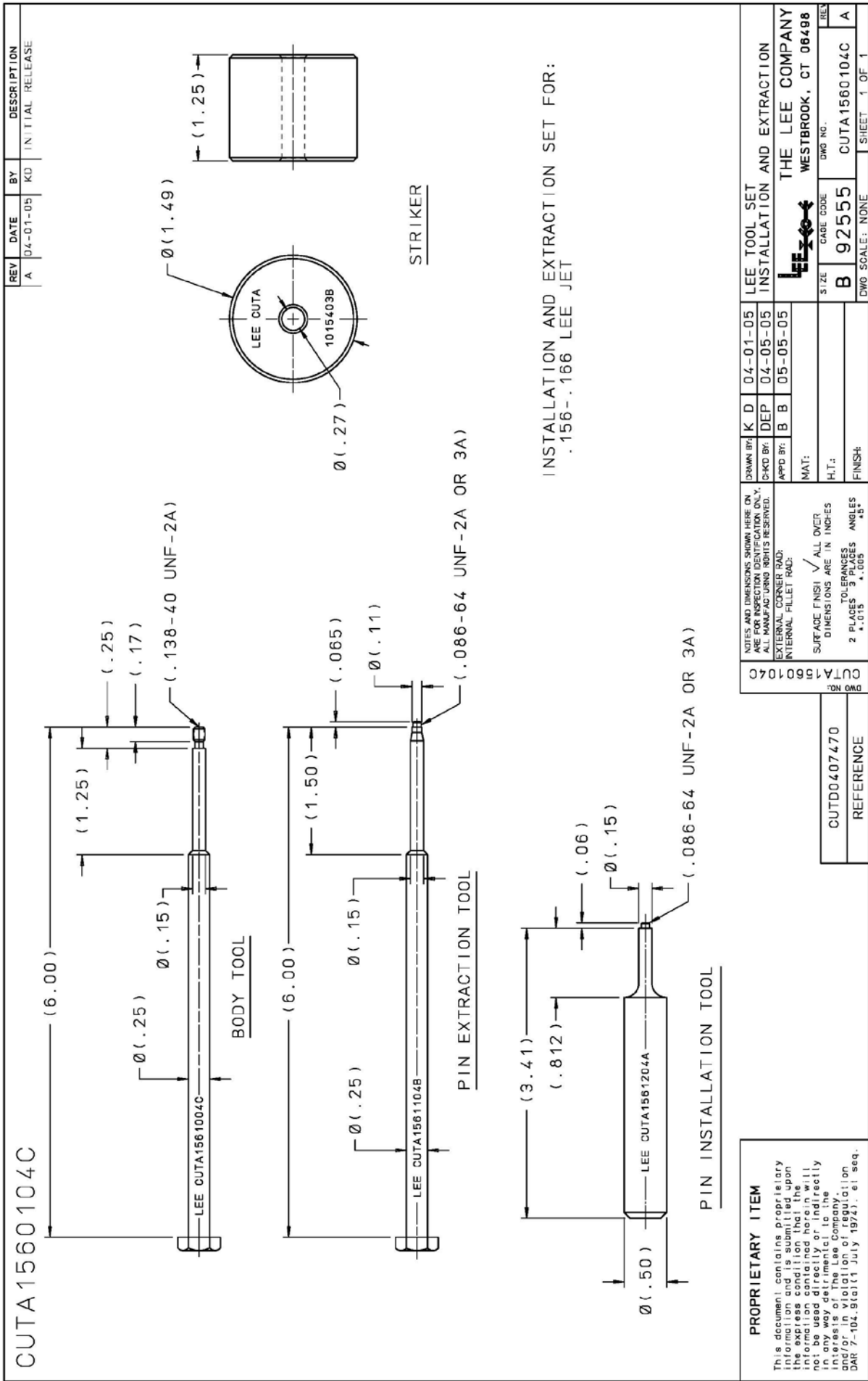
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EXTRACT BODY PER PS 203.

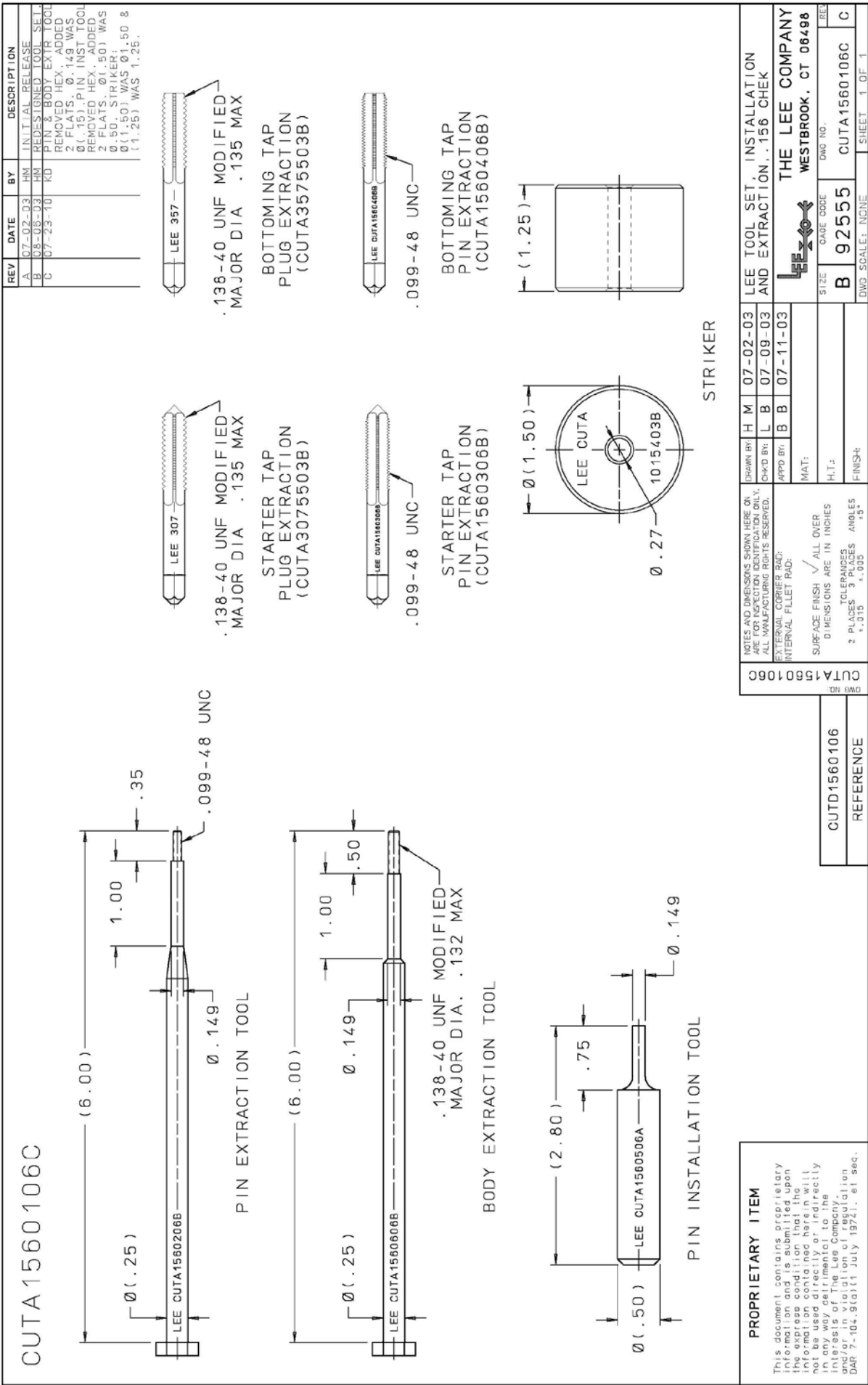
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B	05-10-06	HM	STARTER TAP WAS LEE 304. BOTTOMING TAP WAS LEE 354. BODY EXTRACTION TOOL WAS CUTA204403B. ADDED NOTE: REMOVED REV LETTER FROM MARKING ON STRIKER.
2	07-22-10	KD	BODY EXTRACTION TOOL: 0.12 WAS 0.121, 0.53, 0.47 WAS 0.50 & 0.48, 0.42 WAS 0.45. PIN INST TOOL: 29 WAS 1.29. STRIKER: 1.25 WAS 1.25 & 0.1501 WAS 0.150.

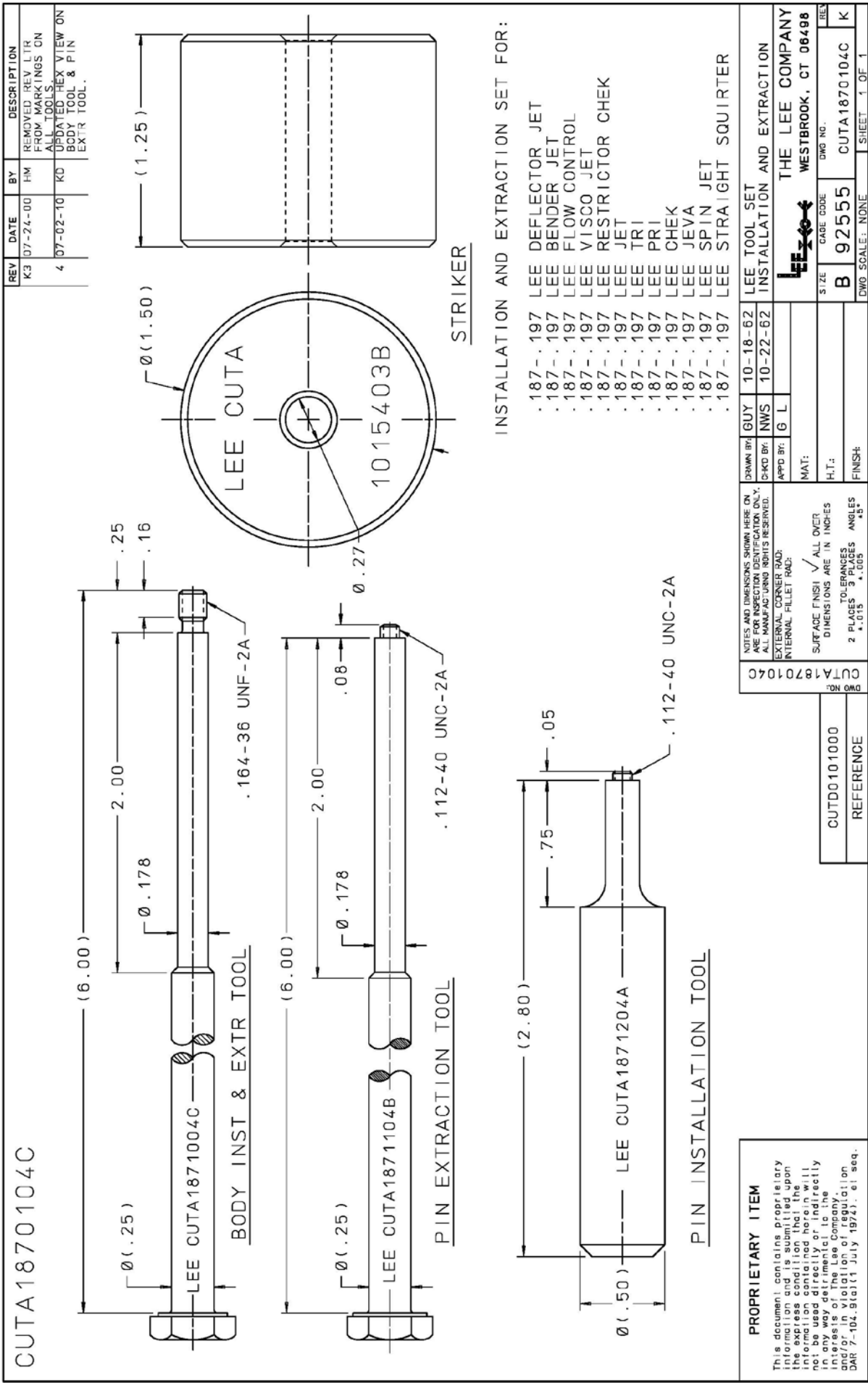
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CUTD01056500
REFERENCE

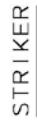
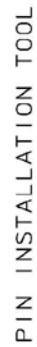
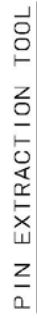
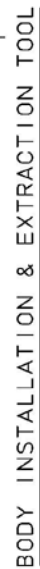
NOTES AND DIMENSIONS SHOWN HERE ON ARE FOR INSPECTION IDENTIFICATION ONLY. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.	DRAWN BY: B R	11-01-95	LEE INSTALLATION/EXTRACTION TOOL SET
EXTERNAL CORNER RND: INTERNAL FILLET RAD:	CHKD BY: L B	11-03-95	
SURFACE FINISH: ALL OVER DIMENSIONS ARE IN INCHES	APPD BY: B B	11-07-95	
2 PLACES 3 PLACES ANGLES	MAT:		
TOLERANCES: .015 .005 .45	H.T:		
FINISH:	SIZE: B	CAGE CODE: 92555	DWG NO: CUTA1250801C
	THE LEE COMPANY WESTBROOK, CT 06498		
		DWG SCALE: NONE	SHEET 1 OF 1





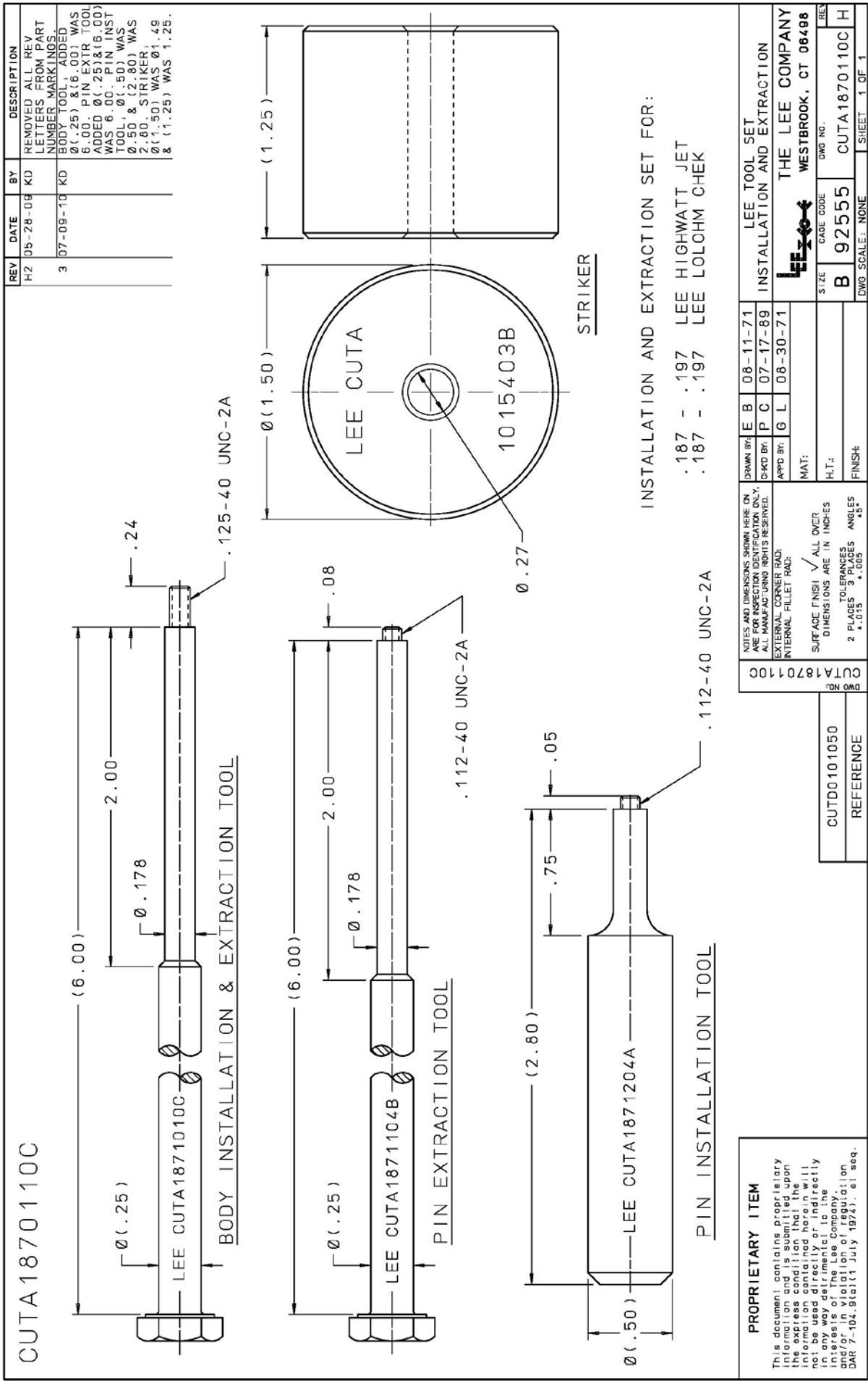


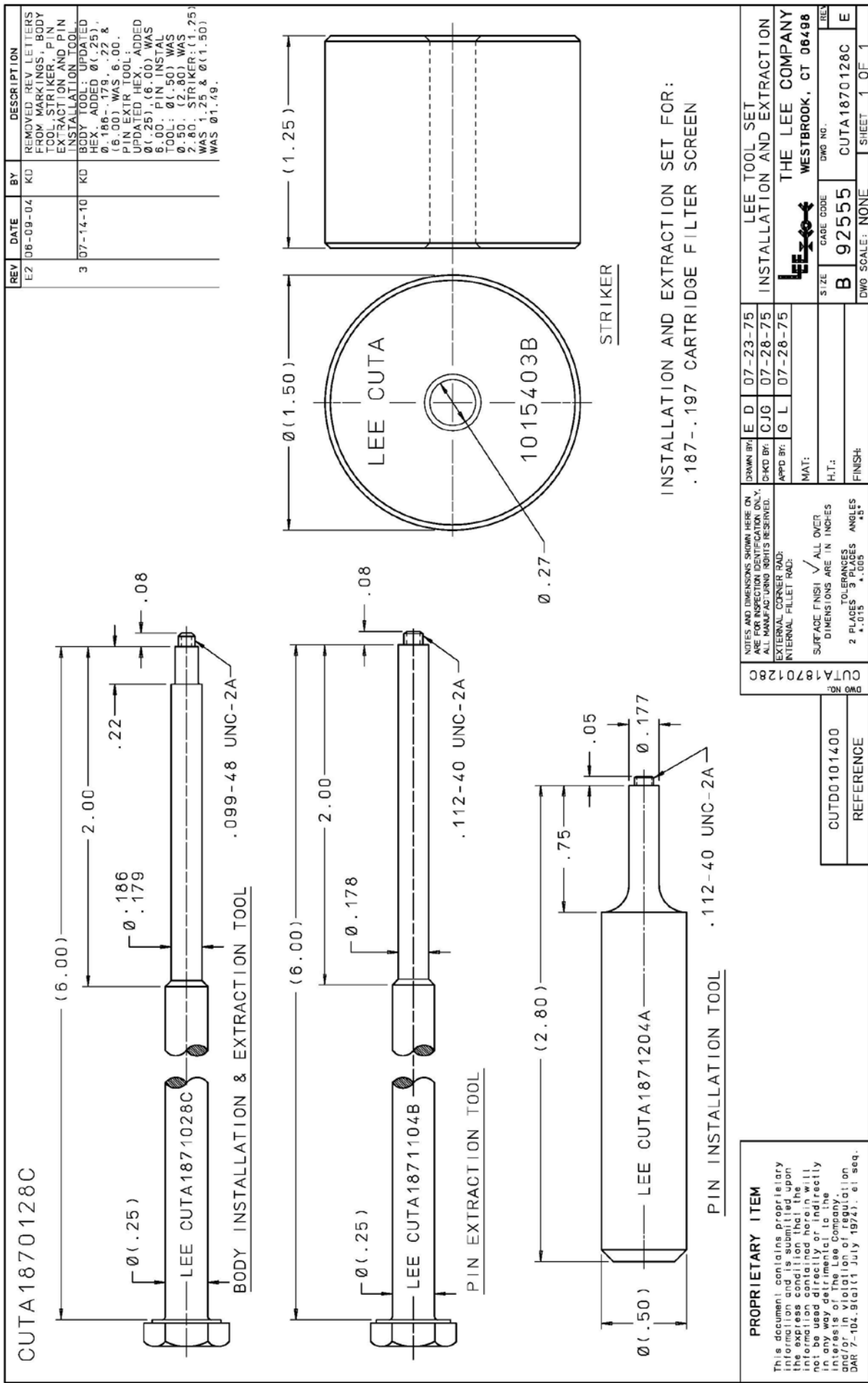
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3	07-14-10	KD	BODY TOOLS. UPDATED HEX. ADDED Ø(.25). PIN EXTRACT TOOL. UPDATED HEX. ADDED Ø(.25). PIN INSTAL TOOL: Ø(.50) WAS 2.80. STRIKER: (1.25) WAS 1.25 & Ø(1.50) WAS Ø1.50.

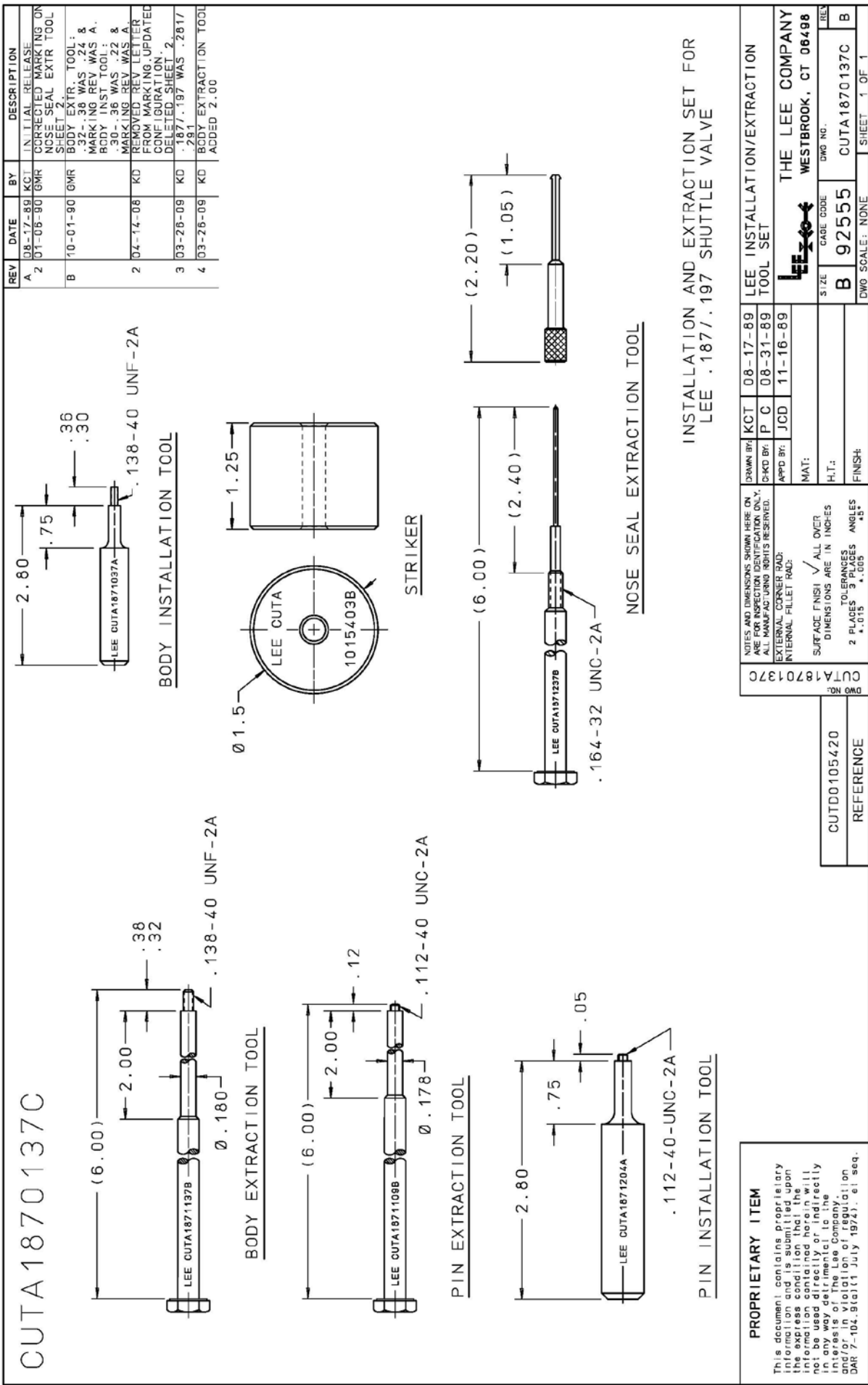


INSTALLATION AND EXTRACTION SET FOR:
 .187-.197 LEE HIGH PRESSURE BENDER.
 .187-.197 LEE HIGH PRESSURE VISCO.

PROPRIETARY ITEM	
This document contains proprietary information and shall remain confidential upon the express condition that the information contained herein will not be used directly or indirectly in connection with the business interests of The Lee Company, Inc. without its written consent and/or in violation of regulation BAR V-104, dated July 1974.	
CUTD00101430 REFERENCE	DWG NO.
NOTES AND DIMENSIONS SHOWN HERE ON ARE FOR INSPECTION IDENTIFICATION ONLY. ALL MANUFACTURING RIGHTS RESERVED. EXTERNAL CORNER RADIUS: INTERNAL FILLET RADIUS: SURFACE FINISH ✓ ALL OVER DIMENSIONS ARE IN INCHES TOLERANCES ANGLES .015 .005 .5°	
DRAWN BY: S B 12-12-85 CK'D BY: J B 12-23-85 APP'D BY: SEA 03-04-86 MAT: H.T.: FINISH:	LEE TOOL SET INSTALLATION AND EXTRACTION THE LEE COMPANY WESTBROOK, CT 06498 DWG NO.: CUTA 1870109C SHEET 1 OF 1





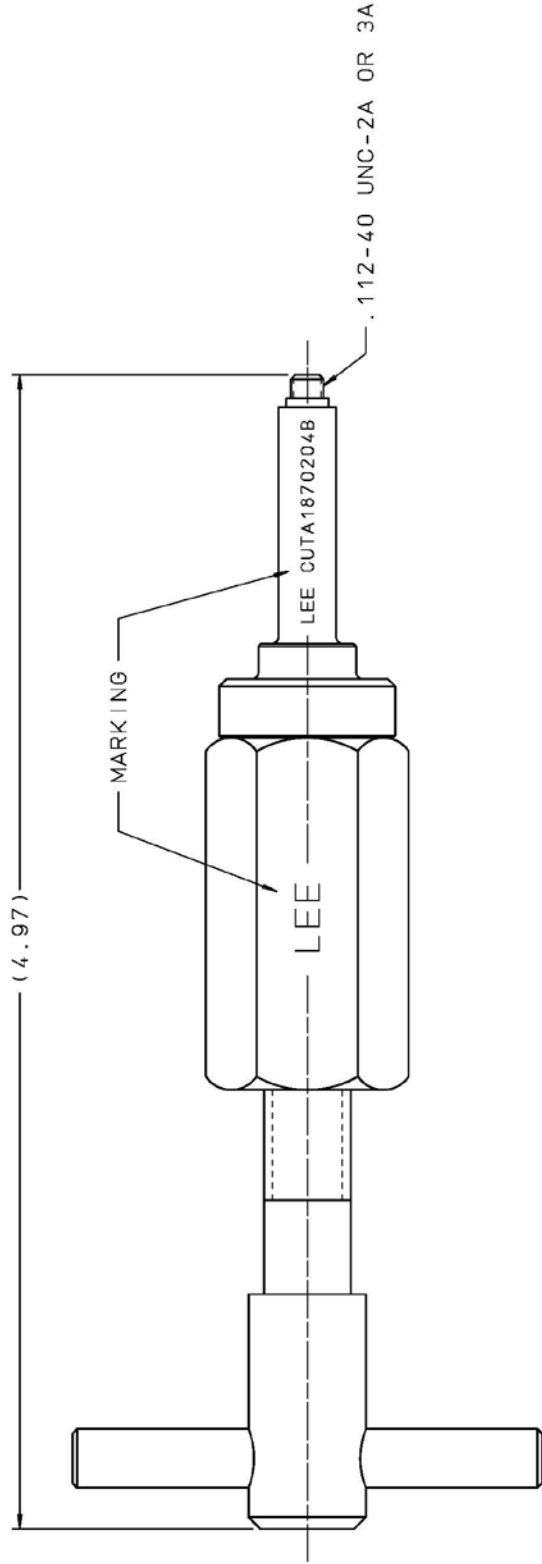


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B	10-01-90	GMR	BODY EXTR. TOOL: .32-.38 WAS .24 & MARKING REV WAS A. BODY INST TOOL: .30-.36 WAS .22 & MARKING REV WAS A. REMOVED REV LETTER FROM MARKING-UPDATED CONFIGURATION. 2. DELETED SHEET 2.
2	02-14-08	KD	REMOVED REV LETTER FROM MARKING-UPDATED CONFIGURATION. 2.
3	03-26-09	KD	.187/.197 WAS .281/.291
4	03-26-09	KD	BODY EXTRACTION TOOL ADDED 2.00

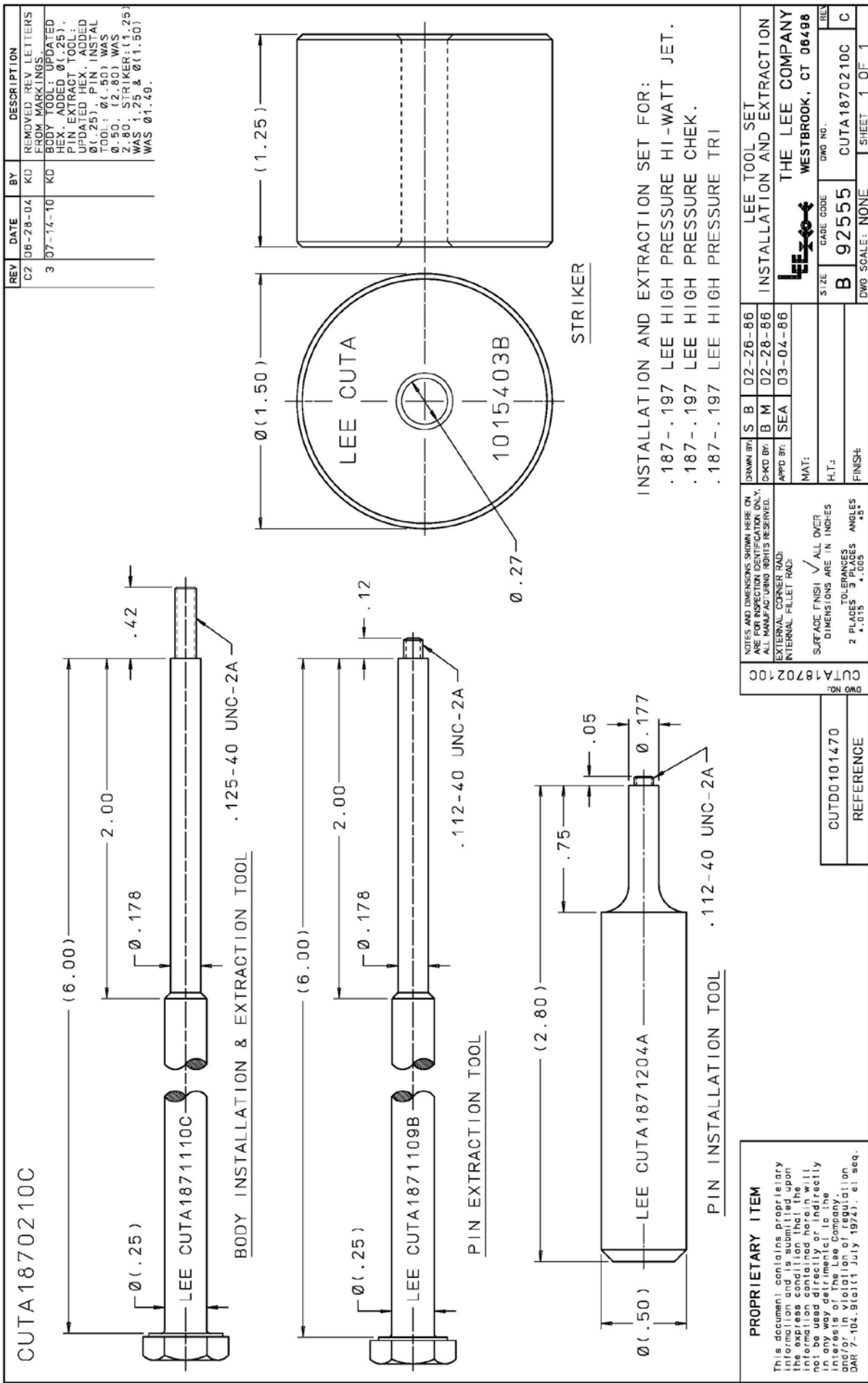
PROPRIETARY ITEM This document contains proprietary information and is submitted upon the express condition that the information contained herein will not be used directly or indirectly in any way detrimental to the interests of The Lee Company, and/or in violation of regulation DAR 7-104.9 (a) (1) July 1974. ei seq.		DWG NO. CUTA1870137C REFERENCE CUTD0105420		DRAWN BY: KCT C-KD BY: P C APPD BY: JOD NAT: H.T.: FINISH:		LEE INSTALLATION/EXTRACTION TOOL SET LEE .187-89 LEE .31-89 LEE .16-89		THE LEE COMPANY WESTBROOK, CT 06498 DWG NO. 92555 CUTA1870137C		SHEET 1 OF 1	

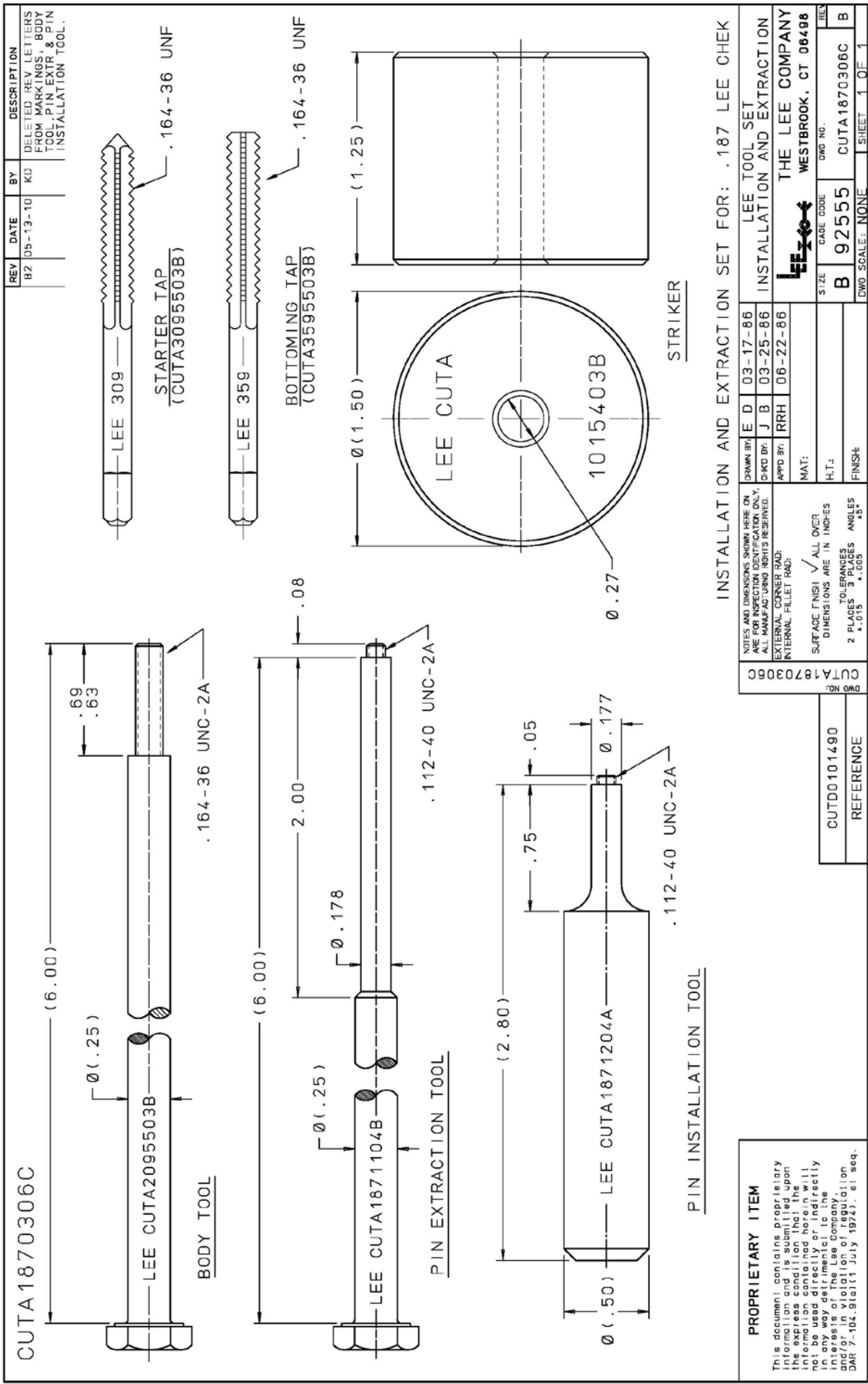
CUTA1870204B

REV	DATE	BY	DESCRIPTION
D3	11-14-94	BR	MARKING WAS "LEE" CUTA1870204B 4-40



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DWG NO: CUTA1870204B									
NOTES AND DIMENSIONS SHOWN HERE ON ARE FOR INSPECTION IDENTIFICATION ONLY. ALL MANUFACTURING RIGHTS RESERVED.									
EXTERNAL CORNER RAD: INTERNAL FILLET RAD:									
SURFACE FINISH: ☒ ALL OVER ☐ DIMENSIONS ARE IN INCHES									
2 PLACES: ☐ TOLERANCES: ☐ ANGLES: ☐ FINISH: ☐									
CUTD0472100									
REFERENCE									
DWG NO.: CUTA1870204B									
SIZE: B									
GAGE CODE: 92555									
DWG NO.: CUTA1870204B									
DWG SCALE: NONE									
SHEET 1 OF 1									
LEE JACKING TOOL									
THE LEE COMPANY									
WESTBROOK, CT 06498									
DRWN BY: KMN									
06-13-74									
CHKD BY: ECB									
08-22-74									
APPD BY: G L									
10-25-74									
MAT:									
H.T.:									
FINISH:									





REV	DATE	BY	DESCRIPTION
1	12-09-88	SEE	INITIAL RELEASE
2	09-08-90	GMR	ADDED NOTE 1, ADDED JEW NZS, JEL SVB TO NOTE 3, 3.27 WAS 2.82, 1.17, 4.72 WAS 2.82.
3	02-23-05	KD	MARKING WAS CUT A.18704048B.
4	08-17-10	KD	ADDED INSTR CARD. UPDATED PULL SHAFT. (4.72) WAS 4.72 & Ø.12) WAS Ø.12, JACKING TOOL SLEEVE, (3.27) WAS 3.27 (.25) WAS .25, Ø.50) WAS Ø.50, Ø.184) WAS Ø.184.



1. FOR USE WITH LEE RIVET TOOL PART NUMBER CUTA1870504B.

2. USE IN ACCORDANCE WITH LEE COMPANY PROCESS SPECIFICATION 187.
3. USE TO EXTRACT PINS FROM THE FOLLOWING LEE COMPANY PRODUCTS:
- | | |
|-------------|---------------------------------------|
| . 187-. 197 | LEE JET, JET ONLY |
| . 187-. 197 | LEE HI-WATT JET, JEH ONLY |
| . 187-. 197 | LEE BENDER JET, JEB ONLY |
| . 187-. 197 | LEE DEFLECTOR JET, JED ONLY |
| . 187-. 197 | LEE VISCO JET, VDC ONLY |
| . 187-. 197 | LEE CHEK, CKF/CKR ONLY |
| . 187-. 197 | LEE PRI, PRF/PRR ONLY |
| . 187-. 197 | LEE FLOW CONTROL, FCF/FCR ONLY |
| . 187-. 197 | LEE TRI, PRI ONLY |
| . 187-. 197 | LEE CARTRIDGE FILTER SCREEN, FSC ONLY |
| . 187-. 197 | LEE RESTRICTOR CHEK, RCF/RCR ONLY |
| . 187-. 197 | LEE JEVA, JEV ONLY |
| . 187-. 197 | LEE SPIN JET, NZS ONLY |
| . 187-. 197 | LEE LUBRICATION JET, JEL ONLY |
| . 187-. 197 | LEE SHUTTLE VALVE, SVB ONLY |

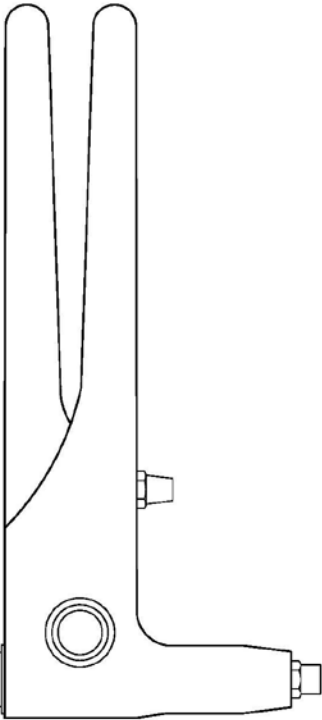
1. THREAD THE STUD INTO THE PIN TO BE REMOVED. 2 FULL TURNS MINIMUM.
2. SLIDE THE SLEEVE DOWN OVER THE STUD UNTIL IT IS SEATED AGAINST THE END OF THE BODY.
3. ENGAGE THE GROOVED END OF THE STUD INTO THE RIVET TOOL. ALLOW SOME SPACE BETWEEN THE GUN AND THE END OF THE SLEEVE. SQUEEZE THE HANDLE UNTIL THE PIN IS FREE.

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CUT A 1870404 B		NOTES AND DIMENSIONS: SEE LEE COMPANY FOR INSPECTION IDENTIFICATION ONLY. ALL MANUFACTURING RIGHTS ARE RESERVED.		DRAWN BY: S E 12-09-88		LEE JACKING TOOL SET .187 X .112-40	
TOLERANCES: 2 PLACES 3 ANGLES 3 PLACES 3 ANGLES ALL OTHERS .000		EXTERNAL CORNER RADIUS: INTERNAL FILET RADIUS:		CHKD BY: B M 03-01-89			
SURFACE FINISH: ✓ ALL OVER DIMENSIONS ARE IN INCHES				MATT: JCD 03-01-89			
SIZE		GAGE CODE		DWG NO.		REV	
B 92555		CUTA1870404 B					
FINISH:							
H.T.:							
THE LEE COMPANY WESTBROOK, CT 06498							

UTD0473000
REFERENCE

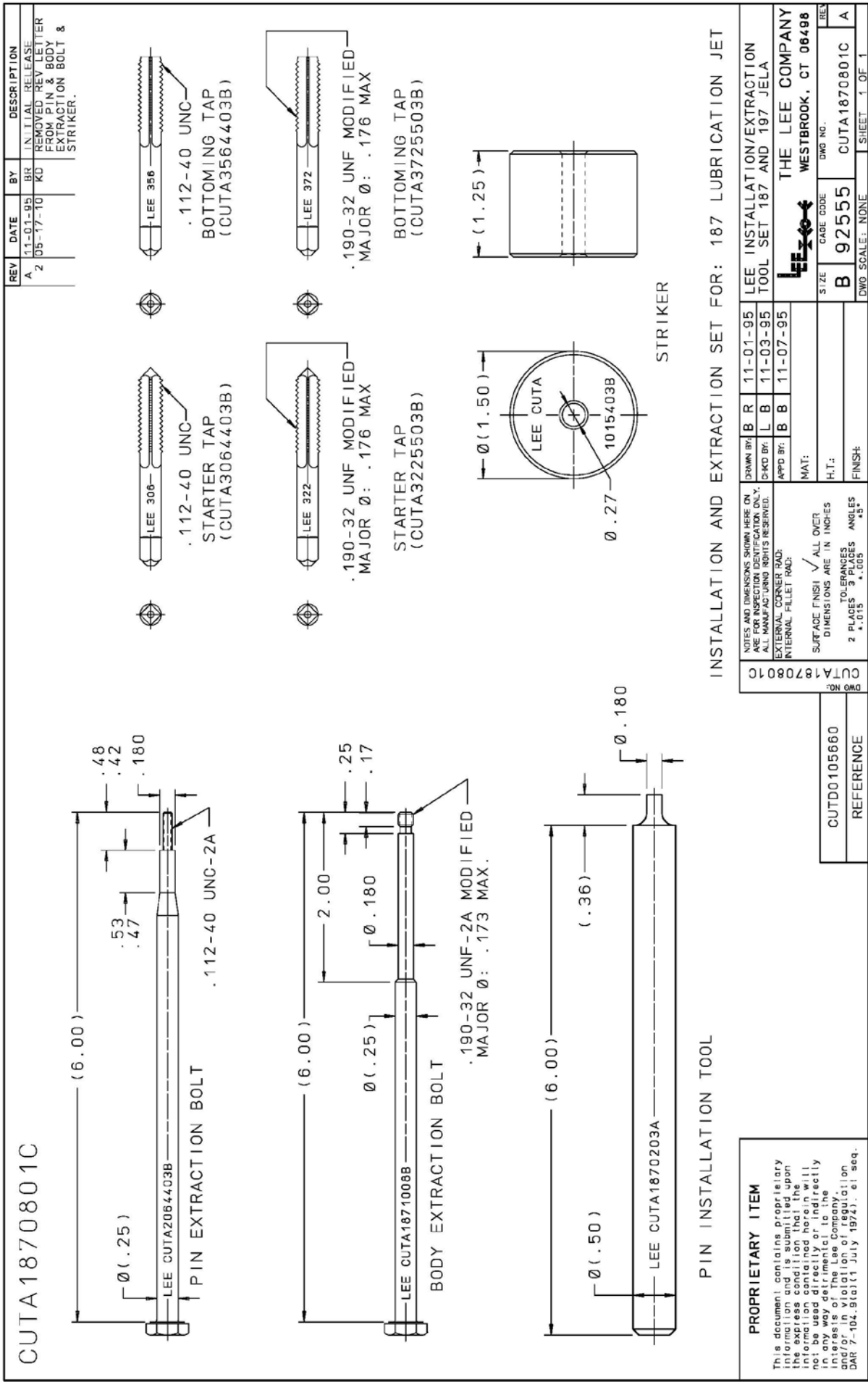
CUTA1870504B		REV		DATE	BY	DESCRIPTION
		A		01-27-89	SE	INITIAL RELEASE
		2		08-06-90	GMR	NOTE 1: CUTA2500608B WAS CUTA2500306B. CUTA2500706B WAS CUTA2500506B

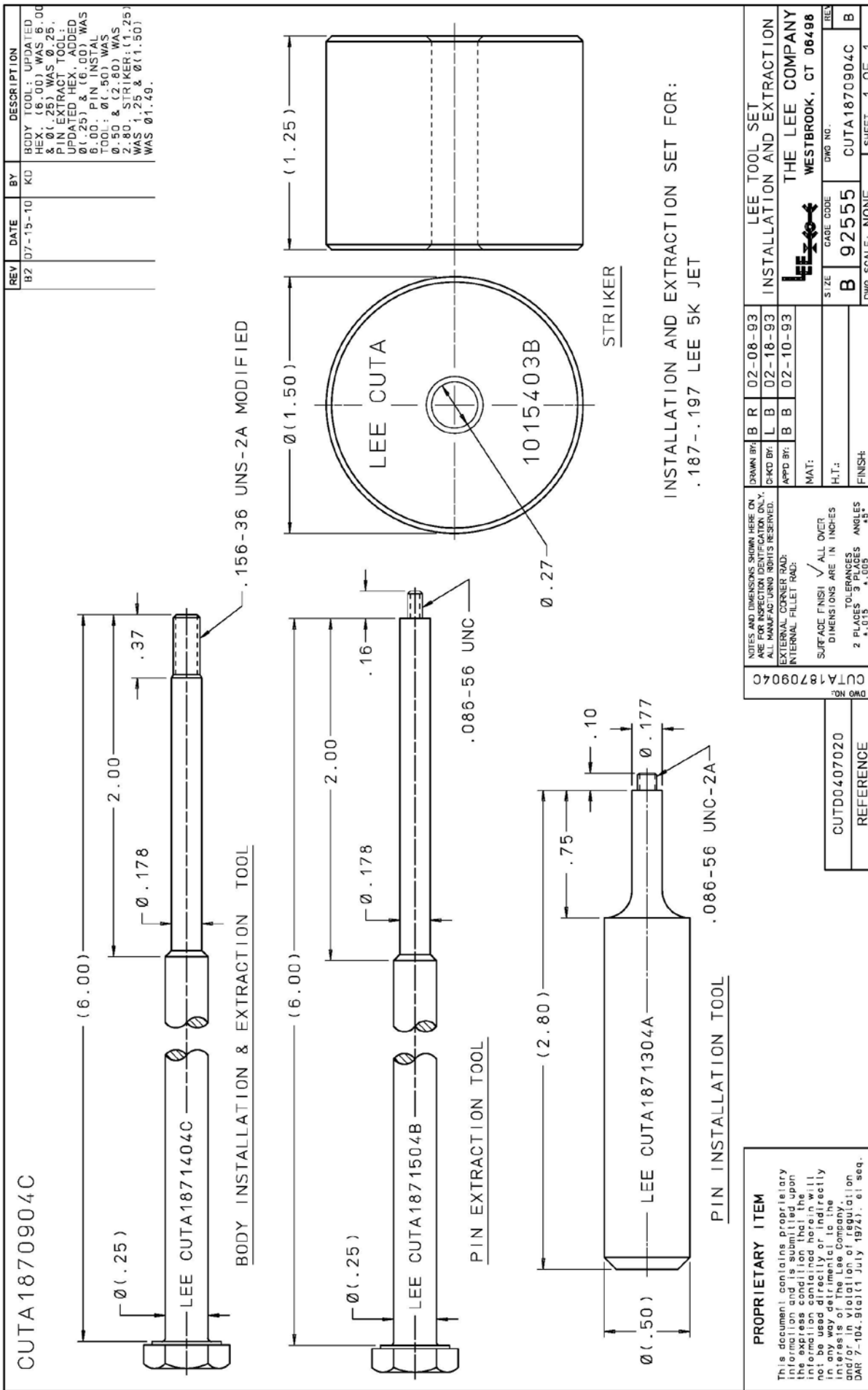


NOTES:

- FOR USE WITH LEE EXTRACTION TOOLS CUTA1870404B, CUTA2500608B, CUTA2500313B AND CUTA2500706B.
- USE IN ACCORDANCE WITH LEE PROCESS SPECIFICATION 187.

PROPRIETARY ITEM		LEE RIVET TOOL	
This document contains proprietary information and is submitted upon express condition that the information contained herein will not be used directly or indirectly in any way detrimental to the interests of The Lee Company, and/or in violation of regulation DAR 7-104, dated 1 July 1974. 61 seq.		DRAWN BY: S E 1-27-89 C-KD BY: B M 2-06-89 APPD BY: JCD 2-06-89 MAT: H.T.: FINISH:	
CUTA1870504B		NOTES AND DIMENSIONS SHOWN HERE ON ARE FOR INSPECTION IDENTIFICATION ONLY. ALL MANUFACTURING RIGHTS RESERVED. EXTERNAL CORNER RAD: INTERNAL FILLET RAD: SURFACE FINISH: ☒ ALL OVER DIMENSIONS ARE IN INCHES TOLERANCES: 2 PLACES .015 3 PLACES .005 ANGLES .5°	
CUTD0473350B	REFERENCE	THE LEE COMPANY WESTBROOK, CT 06498 SIZE: B 92555 GAGE CODE: CUTA1870504B DWG NO.: DWG SCALE: NONE SHEET 1 OF 1	





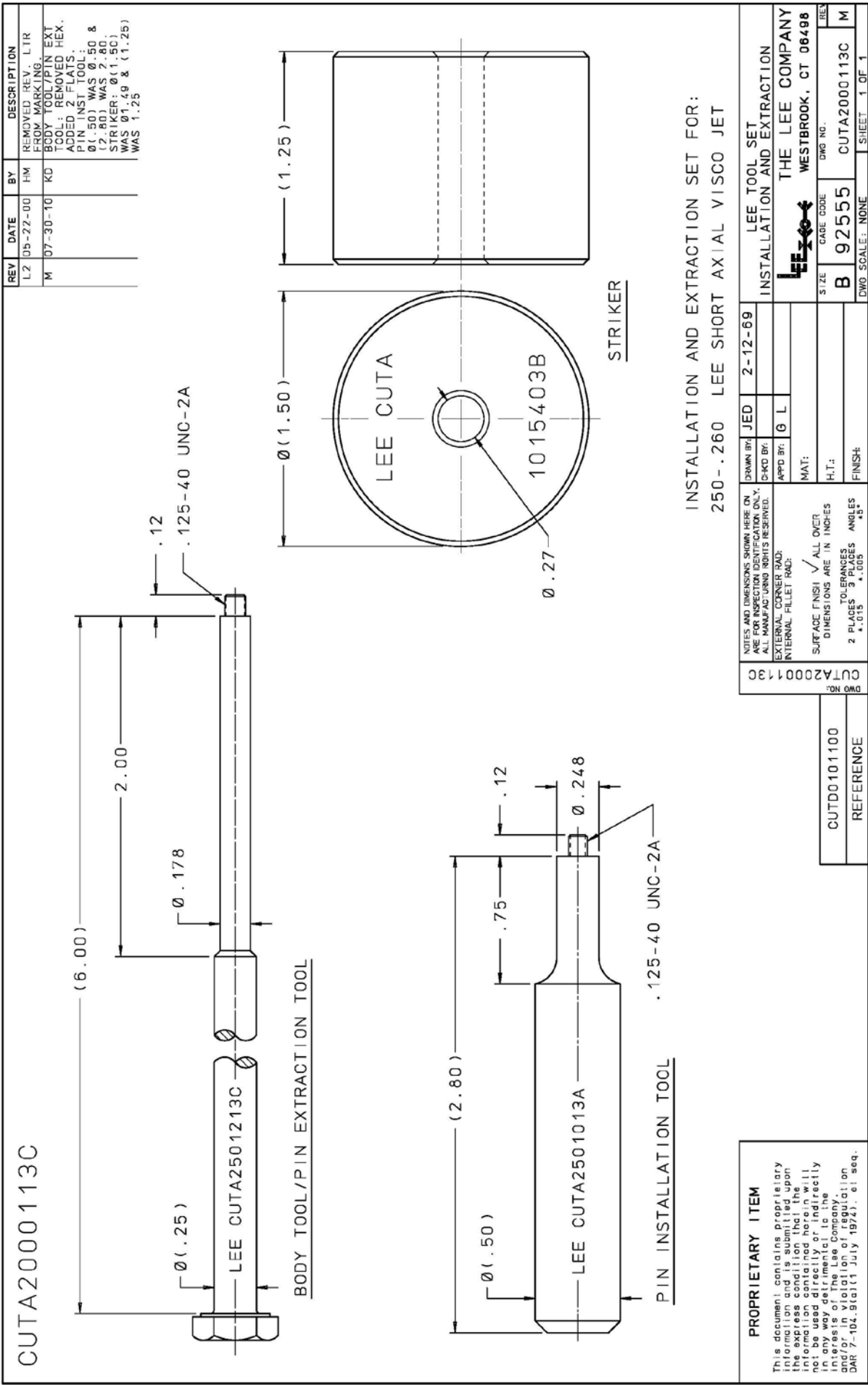
CUTA1871604B		REV A	DATE 05-10-07	BY MC	DESCRIPTION INITIAL RELEASE
--------------	--	----------	------------------	----------	--------------------------------

CUTA1871604B		NOTES AND DIMENSIONS SHOWN HERE ON ARE FOR INSPECTION IDENTIFICATION ONLY. ALL MANUFACTURING RIGHTS RESERVED.	DRAWN BY: M C CHECKED BY: DEP APPROVED BY: B B DATE: 05-10-07 DATE: 05-16-07 DATE: 05-25-07	JACKING TOOL, 5K JET PIN	
CUTA1871604B		EXTERNAL CORNER RAD: 1/8"	THE LEE COMPANY WESTBROOK, CT 06498		SIZE: B GAUGE CODE: 92555 DWG NO.: CUTA1871604B
CUTA1871604B		INTERNAL FILLET RAD: 1/8"	SURFACE FINISH: ✓ ALL OVER DIMENSIONS ARE IN INCHES TOLERANCES: 2 PLACES ±.015, 3 PLACES ±.005, ANGLES ±3°		DWG SCALE: NONE SHEET 1 OF 1
CUTD0507850		REFERENCE			

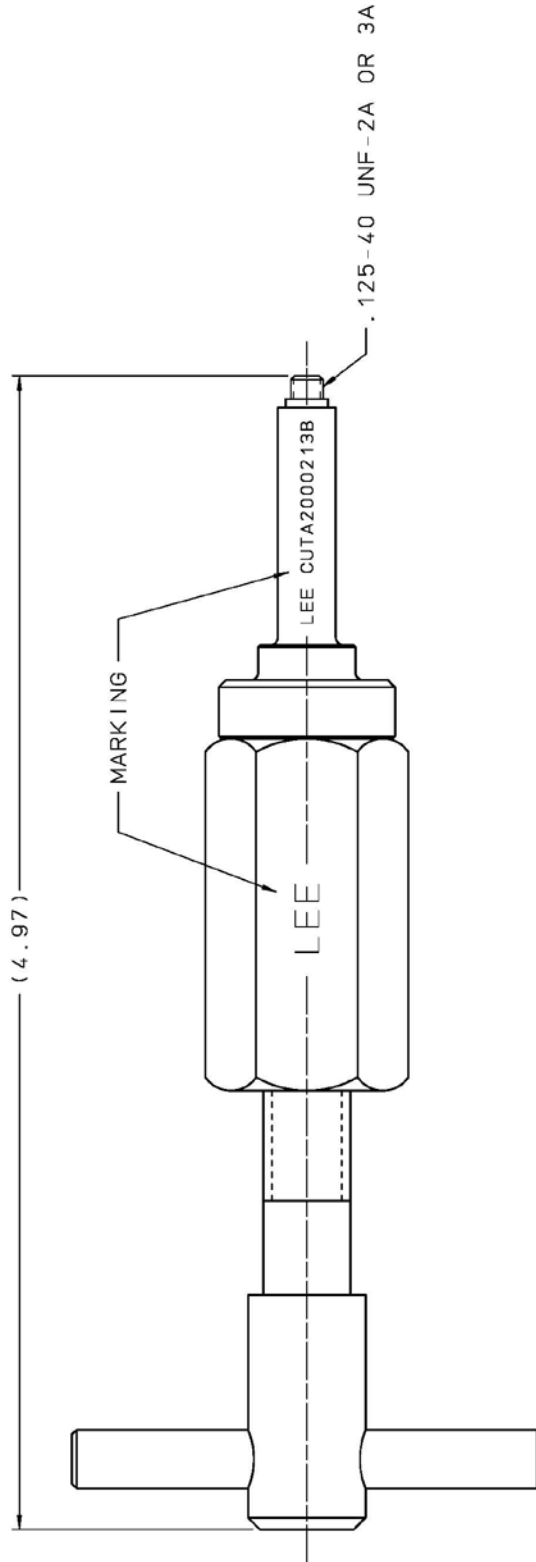
PROPRIETARY ITEM

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DAR 7-104, 91d11 July 1974, 61 Sec.



CUTA2000213B



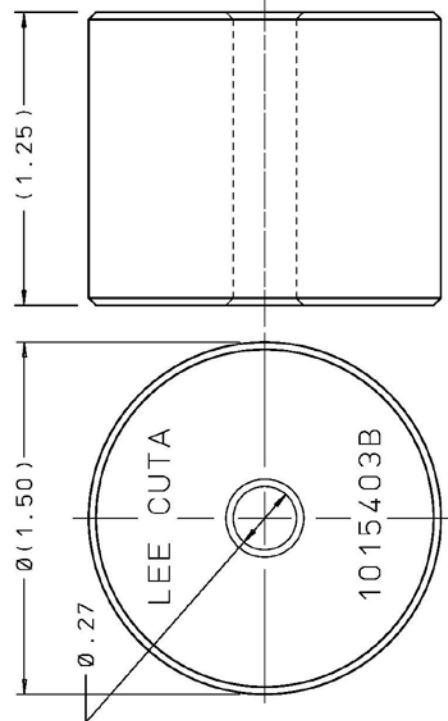
REV	DATE	BY	DESCRIPTION
C	09-10-76	KS	DWG NO. WAS CUTX-0472300A
2	09-29-80	TD	DAL WAS (.4.97)
3	08-13-81	GR	MARKING WAS "LEE"
4	11-14-94	BR	CUTA2000213B 5-40" MARKING WAS "LEE" CUTA2000213BD"

PROPRIETARY ITEM
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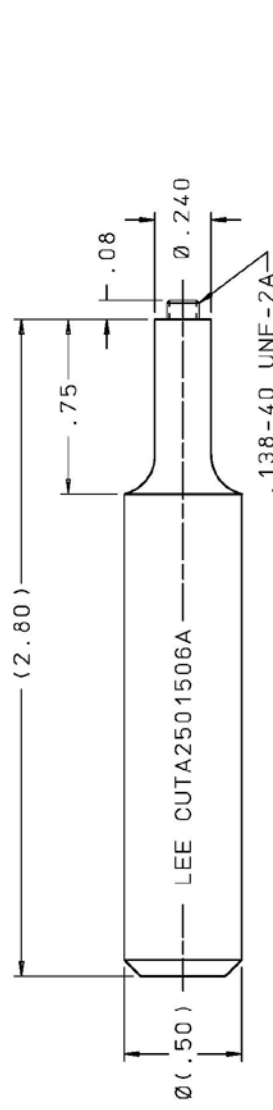
CUTA2000213B		NOTES AND DIMENSIONS SHOWN HERE ON ARE FOR INSPECTION IDENTIFICATION ONLY. ALL MANUFACTURING RIGHTS RESERVED.	DRAWN BY: S B	07-02-87	LEE JACKING TOOL	
		EXTERNAL CORNER RAD:	C-KD BY: J B	07-29-87	THE LEE COMPANY	
		INTERNAL FILLET RAD:	APPD BY: SEA	08-03-87	WESTBROOK, CT 06498	
		SURFACE FINISH ✓ ALL OVER	MAT:		DWG NO.	
		DIMENSIONS ARE IN INCHES	H.T.:		SIZE	
		TOLERANCES	FINISH:		B 92555	
		2 PLACES .015			CUTA2000213B	
		3 PLACES .005			DWG SCALE: NONE	
		ANGLES .5°			SHEET 1 OF 1	

CUTD0472300
REFERENCE

REV	DATE	BY	DESCRIPTION
K2	05-05-10	KD	DELETED REV LETTERS FROM MARKINGS: BODY TOOL, PIN EXTRACTION TOOL, INSTALLATION TOOL & STRIKER.



STRIKER



PIN INSTALLATION TOOL

PROPRIETARY ITEM

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INSTALLATION AND EXTRACTION SET FOR:
.250- .260 LEE CHEKS
.250- .260 LEE AXIAL VISCO JETS

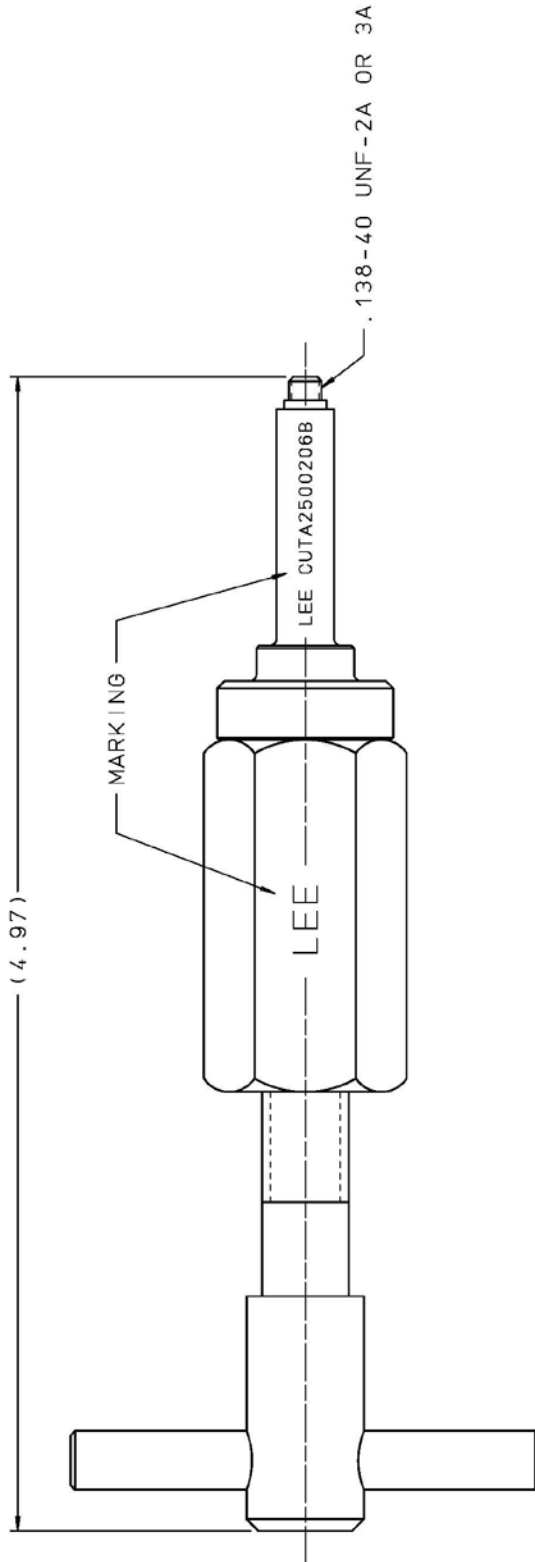
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CUTO A2500 106C SURFACE FINISH ✓ ALL OVER DIMENSIONS ARE IN INCHES 2 PLACES 3 PLACES ANGLES 0115 0115 0115		DOWNS BR CDD BY: J B APP'D BY: G L	10-18-62 04-09-64	LEE TOOL SET INSTALLATION AND EXTRACTION THE LEE COMPANY WESTBROOK, CT 06498	SIZE B DWG NO. CUTA2500 106C	GAGE CODE 92555	REC K
NOTES AND DIMENSIONS SHOWN HERE ON ARE FOR INSPECTION IDENTIFICATION ONLY. ALL MANUFACTURING RIGHTS IS RESERVED. EXTERNAL CORNER RADIUS INTERNAL FILLET RADIUS		FINISH:			DWG SCALE: NONE	SHEET: 4 OF 4	

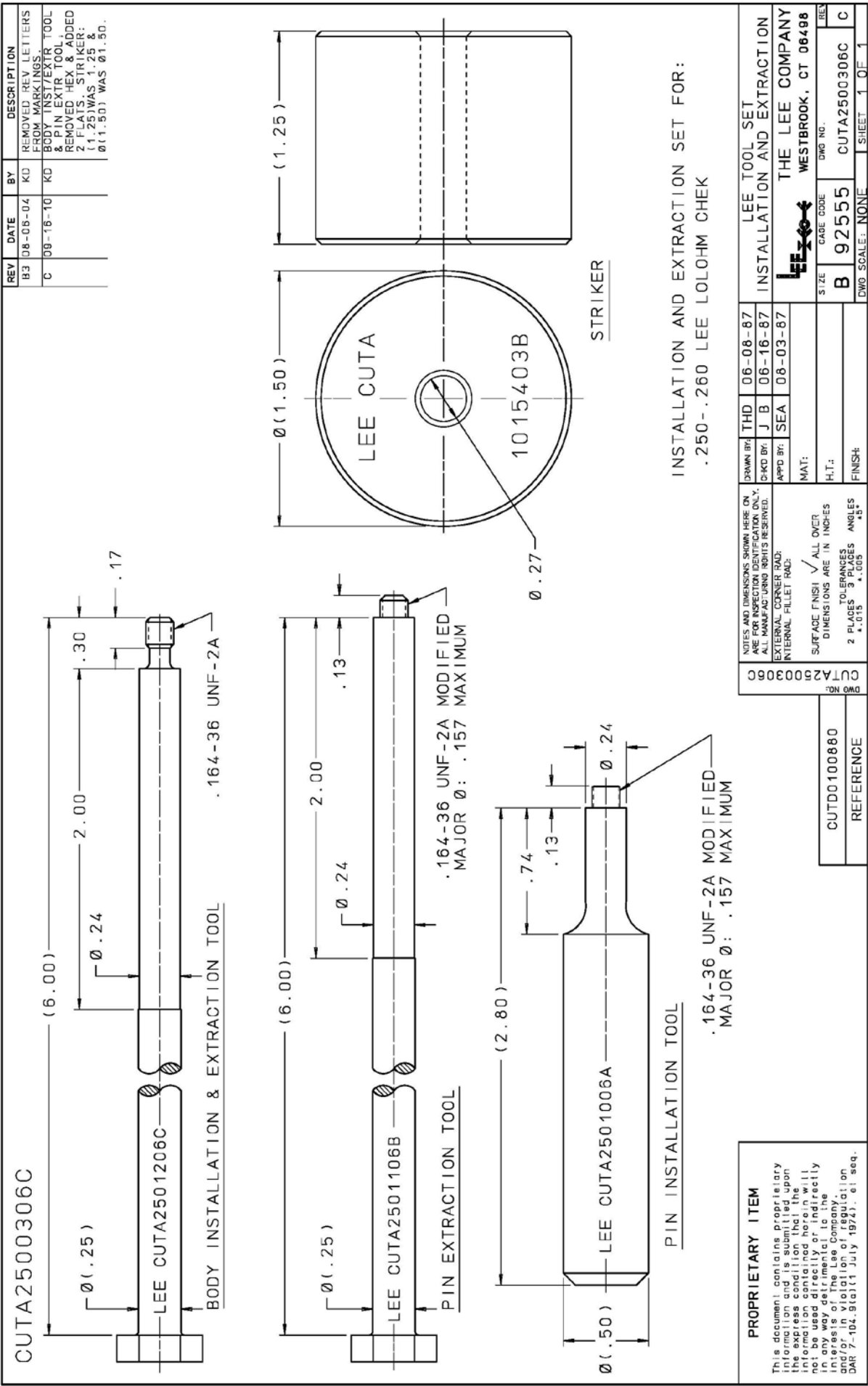
CUTD0101150	DWG NO.		CUTA2	
REFERENCE	TOLERANCES		ANGLES	
	2 PLACES $\pm .015$		3 PLACES $\pm .005$	
	DIMENSIONS ARE IN INCHES			
	SURFACE FINISH V ALL OVER			
	H.T.:			
	SIZE	CAGE CODE	DWG NO.	REV.
	B	92555	CUTA2500106C	K
	FINISH:		DWG SCALE: NONE	SHEET 4 OF 4

CUTA2500206B

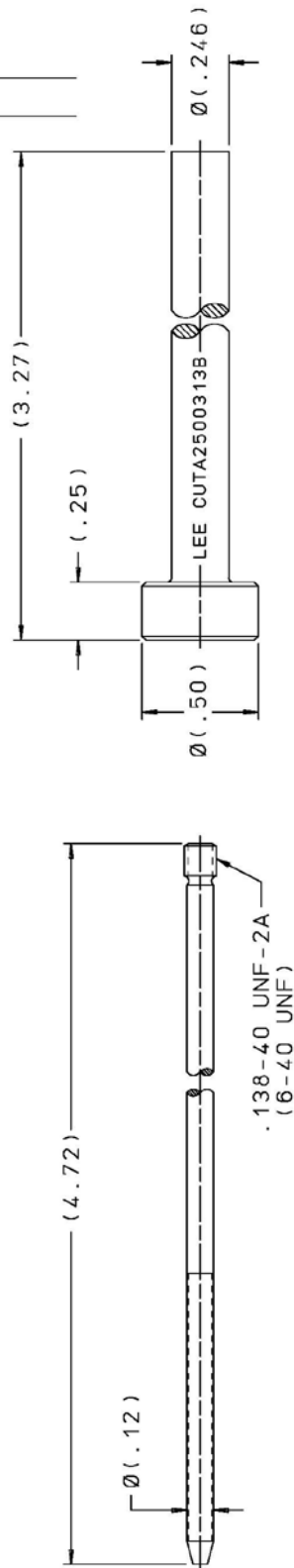
REV	DATE	BY	DESCRIPTION
0	08-10-76	KMS	REDRAWN TO NEW FMT
2	09-29-80	TD	QAL WAS (4.97)
3	12-08-83	TLC	MARKING WAS "LEE"
4	06-12-91	GMR	CUTA2500206B 6-40"
5	02-03-93	BR	REDRAWN TO CAD, DWG WAS A SIZE
6	10-11-93	BR	REMOVED REV LETTER FROM MARKING ADDED "OR 3A"



PROPRIETARY ITEM This document contains proprietary information and is submitted upon the understanding that the information contained herein will not be used directly or indirectly in any way detrimental to the interests of The Lee Company. Dated 7-10-91 in violation of regulation	CUTA2500206B		NOTES AND DIMENSIONS SHOWN HERE ON ARE FOR INSPECTION IDENTIFICATION ONLY. ALL MANUFACTURING RIGHTS RESERVED.	DRWN BY: KMN	06-13-74	LEE JACKING TOOL	
	DWG NO:		EXTERNAL CORNER RAD: INTERNAL FILLET RAD:	CHKD BY: ECB	08-22-74	THE LEE COMPANY	
	OUTD0472200		SURFACE FINISH: ☒ ALL OVER DIMENSIONS ARE IN INCHES	APPD BY: G L	10-25-74	WESTBROOK, CT 06498	
	REFERENCE		2 PLACES 3 PLACES TOLERANCES 4.015 4.005	MAT:		DWG NO.	
				H.T.:		SIZE	
				FINISH:		CAGE CODE	
						B 92555	
						DWG SCALE: NONE	
						SHEET 1 OF 1	



REV	DATE	BY	DESCRIPTION
A	12-09-88	SE	INITIAL RELEASE
B	09-08-90	GWR	3.27 WAS 1.17; 4.72 WAS 2.62.
2	02-28-97	HM	ADDED NOTE 1. REMOVED REV LTR. FROM MARKING
3	08-12-10	KD	ADDED INSTR CARD UPDATED PULP. 7/8FT. & 4.12) WAS 6.12 JACKING TOOL SLEEVE. (3.27) WAS 3.27 (.25) WAS .25 Ø1.50) WAS Ø.50 Ø1.246) WAS Ø.246.



INSTRUCTIONS FOR LEE RIVET TYPE
JACKING TOOL:

1. THREAD THE STUD INTO THE PIN TO BE REMOVED. 2 FULL TURNS MINIMUM.
2. SLIDE THE SLEEVE DOWN OVER THE STUD UNTIL IT IS SEATED AGAINST THE END OF THE BODY.
3. ENGAGE THE GROOVED END OF THE STUD INTO THE RIVET TOOL. ALLOW SOME SPACE BETWEEN THE GUN AND THE END OF THE SLEEVE. SQUEEZE THE HANDLE UNTIL THE PIN IS FREE.

PROPRIETARY	ITEM
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NOTES:

- NOTES:
1. USE WITH LEE RIVET TOOL PART NUMBER CUTA1870504B.
 2. USE IN ACCORDANCE WITH LEE COMPANY PROCESS SPECIFICATION 187.
 3. USE TO EXTRACT PINS FROM THE FOLLOWING LEE COMPANY PRODUCTS:
 - .250-.260 LEE CHEK, CKF/CKR ONLY.
 - .250-.260 LEE AXIAL VISCO JET, VXC 2502 AND 2503 ONLY.

CUTA2500313B DWG NO.		LEE JACKING TOOL SET .250 X .138-40	
SURFACE FINISH ✓ ALL OVER DIMENSIONS ARE IN INCHES TOLERANCES 2 PLACES 3 PLACES ANGLES .005 .005 .005		DRAWN BY: S E CHECK BY: B M APP'D BY: JCD MAT:	DATE: 12-09-88 DATE: 03-01-89 DATE: 03-01-89
INTERNAL CORNER RAD: EXTERNAL CORNER RAD: INTERNAL RILET RAD:		THE LEE COMPANY WESTBROOK, CT 06498	
SIZE B 92555		CASE CODE DWG NO.	REV.
FINISH:		CUTA2500313B	SHEET 1 OF 1

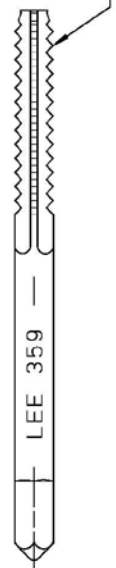
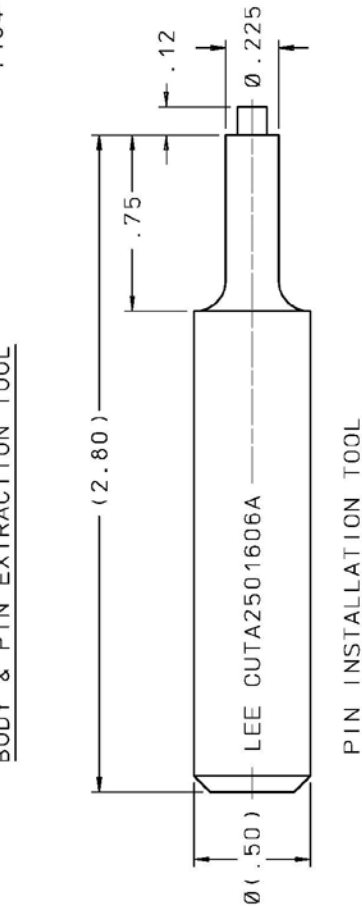
CUTD0473100

REFERENCE

B	9ZJJJ	C01AZ300313E
DWG SCALE: NONE		SHEET 1 OF 1

DWG SCALE: NONE	SHEET 1 OF 1
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REV	DATE	BY	DESCRIPTION
A	02-07-90	GWR	INITIAL RELEASE
B	05-01-90	GWR	BODY/PIN EXTRACTION TOOL: Ø. 175 WAS Ø. 2.60
2	05-04-00	HM	REDRAWN NEW FORMAT REMOVED REV LETTERS FROM MARKINGS.
3	07-28-10	KD	BODY/PIN EXTR TOOL: UPDATED HEX & ADDED Ø (.37), PIN INST TOOL: ADDED, 12. (2.80) WAS 2.80. (Ø.50) WAS Ø.50. STRIKER: Ø.12.00 WAS Ø2.00



BOTTOMING TAP (PIN EXTRACTION)

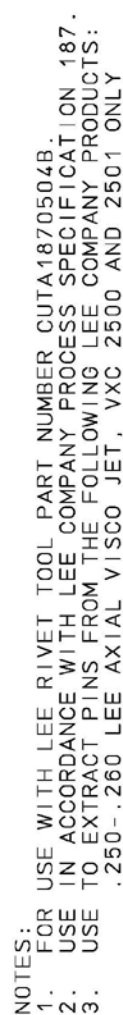
CUTA3595503B

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CUT A25900406C 90° 12.5"		SURFACE FINISH ☒ ALL OVER DIMENSIONS ARE IN INCHES TOLERANCES 2 PLACES ± .005 ANGLES ± .015		EXTERNAL CORNER RADIUS INTERNAL FILLET RADIUS		DRAWN BY: GMR CKD BY: P C APP'D BY: JCD		02-07-90 02-16-90 02-19-90		LEE TOOL SET INSTALLATION/EXTRACTION	
THE LEE COMPANY WESTBROOK, CT 06498						MAT:		H.T.:		FINISH:	
SIZE B 92555		GAGE CODE CUTA2500406C		DWG NO.:		REV:		SHEET 4 OF 4		B	

OUTD0101570	REFERENCE
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REV	DATE	BY	DESCRIPTION
A	12-09-88	SE	INITIAL RELEASE
B	06-06-89	KI	PART NO. WAS CUT-2500306B.
C	09-13-90	OR	3.27 WAS 1.17, 4.72 WAS 2.62. ADDED NOTE 1 & REV. LTR TO MARK REMOVED REV LETTER FROM MARKING.
2	06-09-95	BR	CORRECTED PULL SHAFT & MARKING ON JACKING TOOL.
3	04-15-09	KD	GOODS LEVEL SHAFT, 4.72 WAS 1.72 & 0.12 WAS 0.12
4	08-13-10	KD	JACKING TOOL STEEVE, (3.27) WAS 3.27 (.25) WAS .25 (.15) WAS .50. (.246) WAS .248.



- ### INSTRUCTIONS FOR LEE RIVET TYPE JACKING TOOL:

1. THREAD THE STUD INTO THE PIN TO BE REMOVED. 2 FULL TURNS MINIMUM.
2. SLIDE THE SLEEVE DOWN OVER THE STUD UNTIL THE STUD IS SEATED AGAINST THE END OF THE BODY.
3. ENGAGE THE GROOVED END OF THE STUD INTO THE RIVET TOOL. ALLOW SOME SPACE BETWEEN THE GUN AND THE END OF THE SLEEVE. SQUEEZE THE HANDLE UNTIL THE PIN IS FREE.

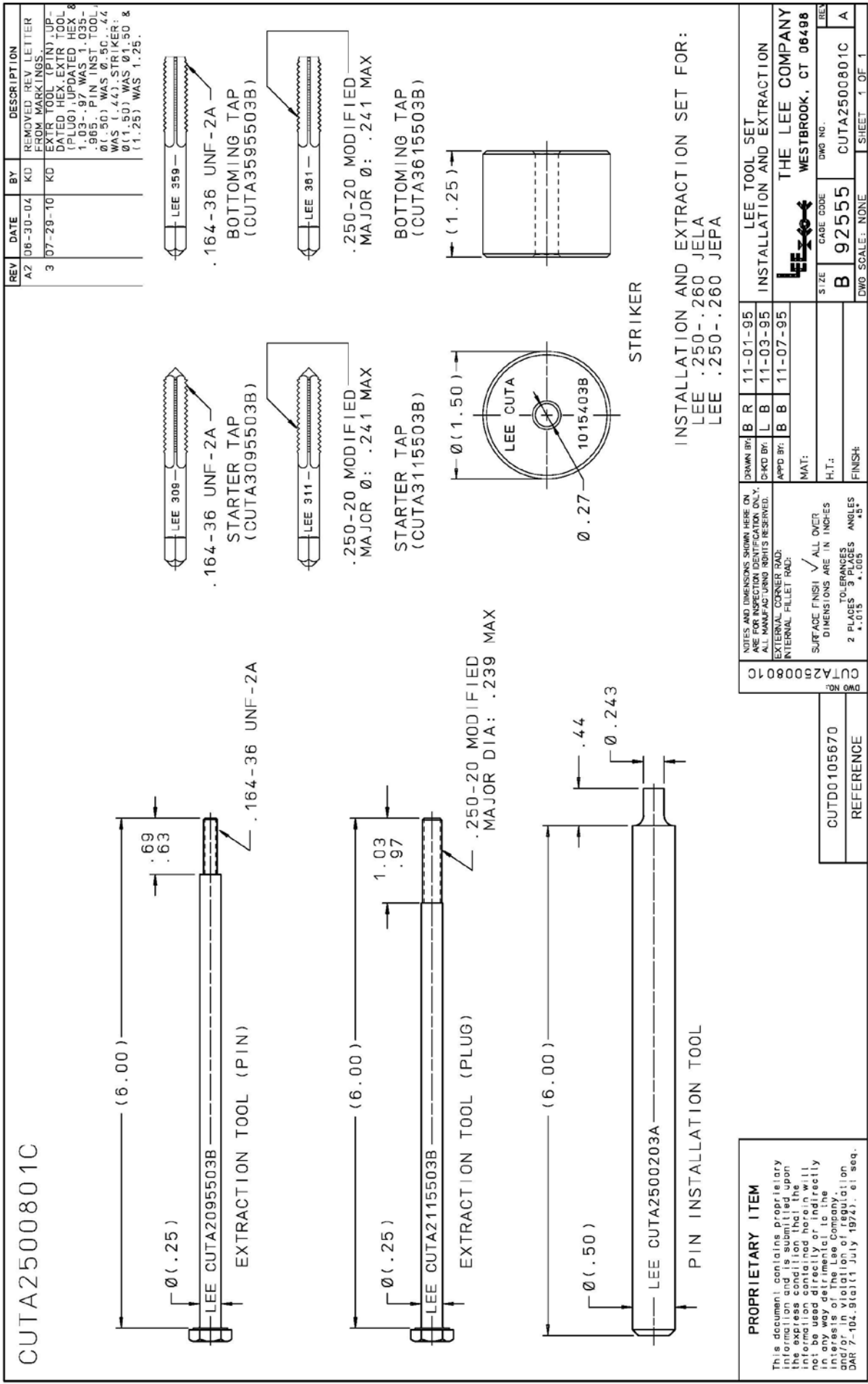
PROPRIETARY ITEM

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CUT A25007068		DRAWN BY: S E		12-09-88		LEE JACKING TOOL SET	
NOTES AND DIMENSIONS SHOWN HERE ON DRAWING FOR IDENTIFICATION ONLY. ALL MANUFACTURING RIGHTS IS RESERVED.		CHECK BY: B M		03-01-89		.250 X .125-40	
EXTERNAL CORNER RADIUS: INTERNAL "Fillet" RADIUS:		APPRO BY: JCD		03-01-89			
SURFACE FINISH: ☒ ALL OVER DIMENSIONS ARE IN INCHES		MATERIAL:				SIZE: CAGE CODE: DWG NO.: REV:	
TOLERANCES: ANGLES ± .015 ± .005		H.T.:				B 92555 CUTA25007068 C	
2 PLACES		FINISH:				DWG SCALE: NONE SHEET 4 OF 1	
 THE LEE COMPANY WESTBROOK, CT 06498							

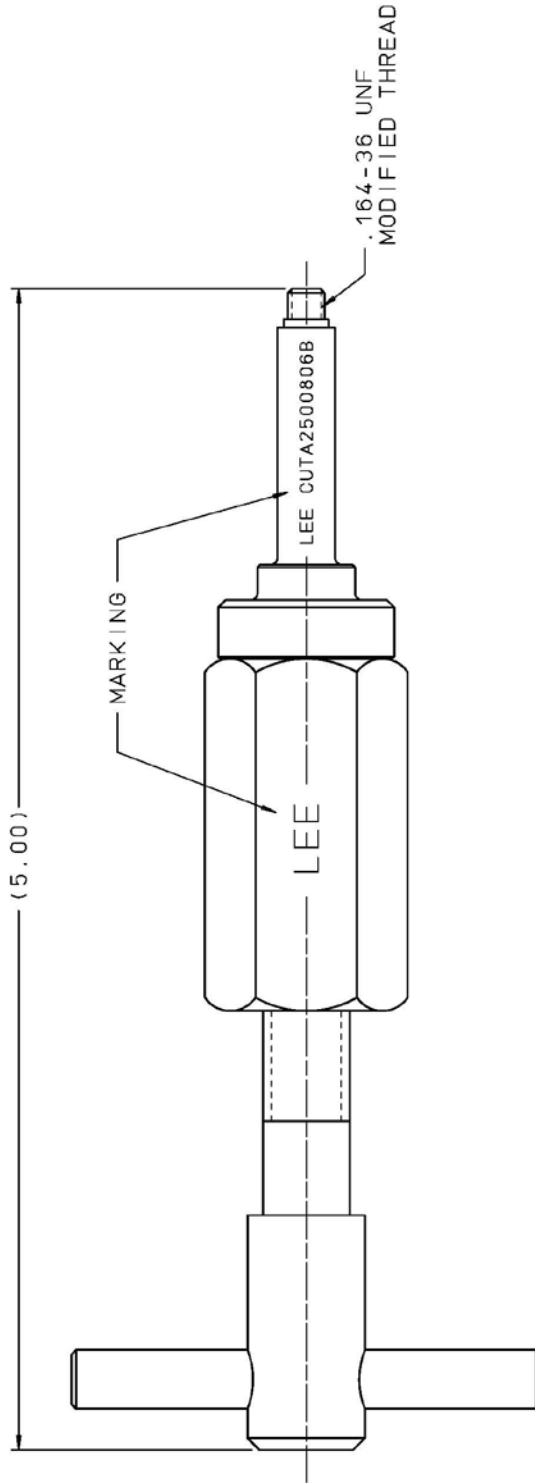
CUTD00473050

REFERENCE



CUTA2500806B

REV	DATE	BY	DESCRIPTION
A	07-23-99	HM	INITIAL RELEASE



PROPRIETARY ITEM

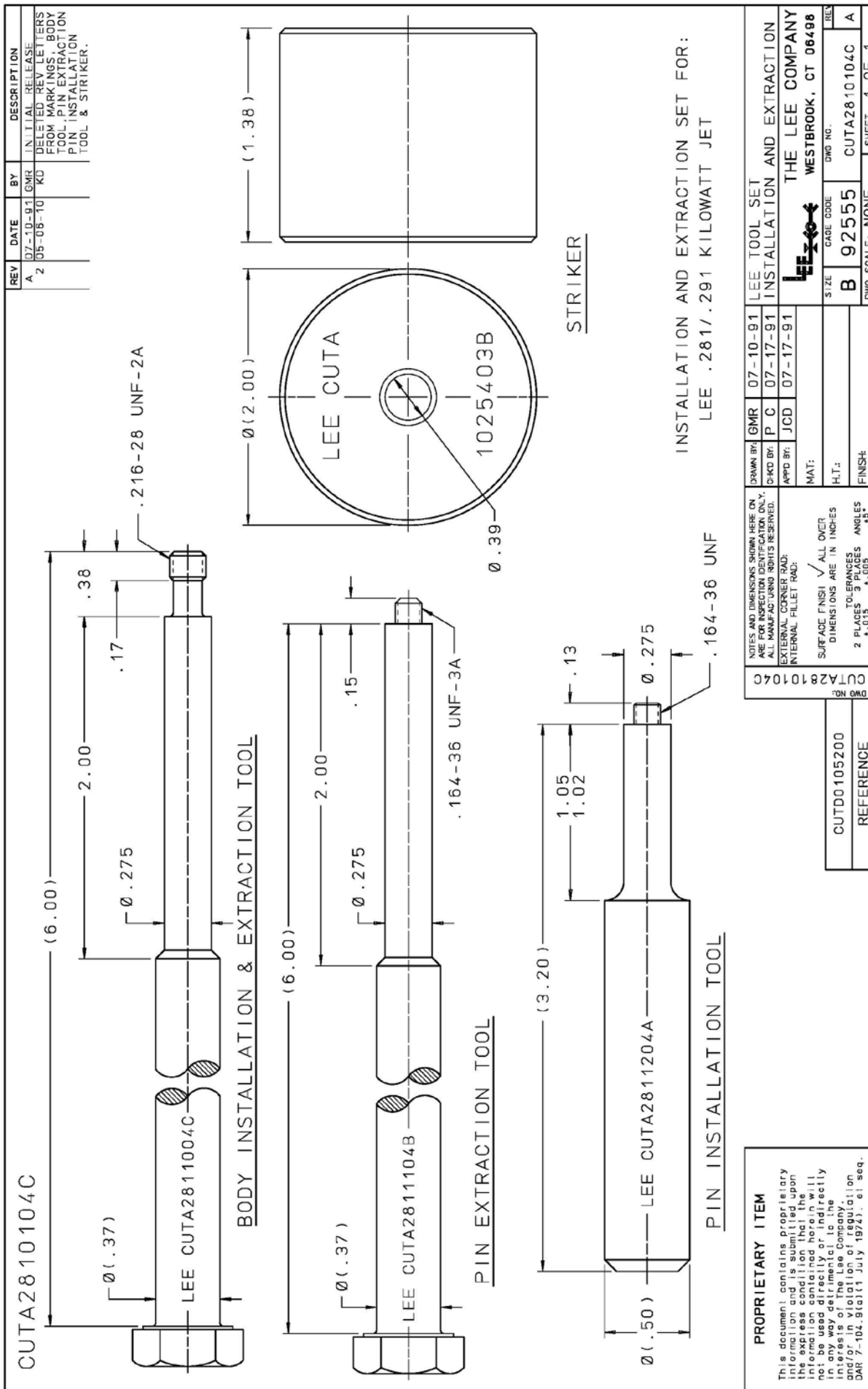
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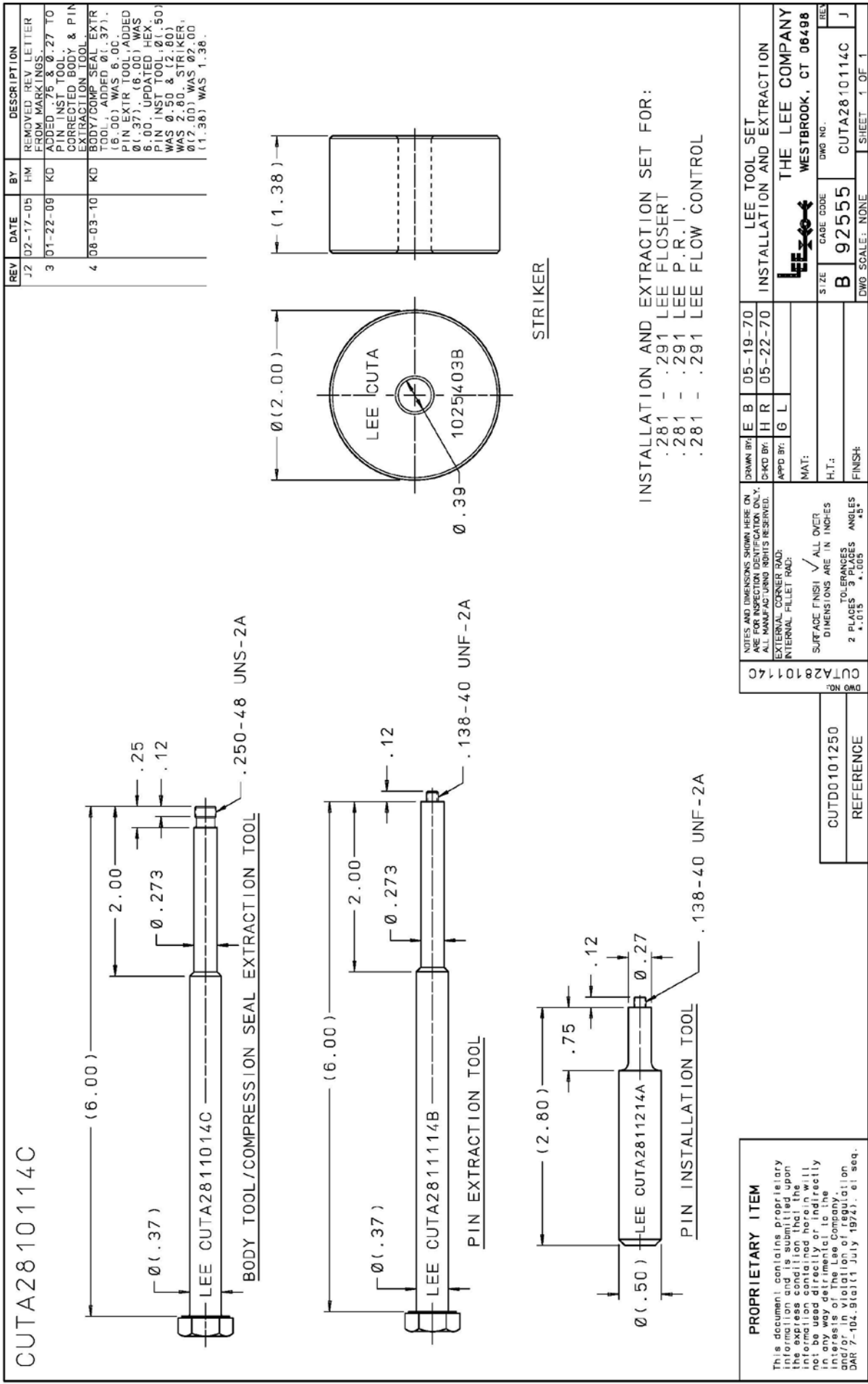
CUTA2500806B	DWG NO.
CUTD0472140	REFERENCE

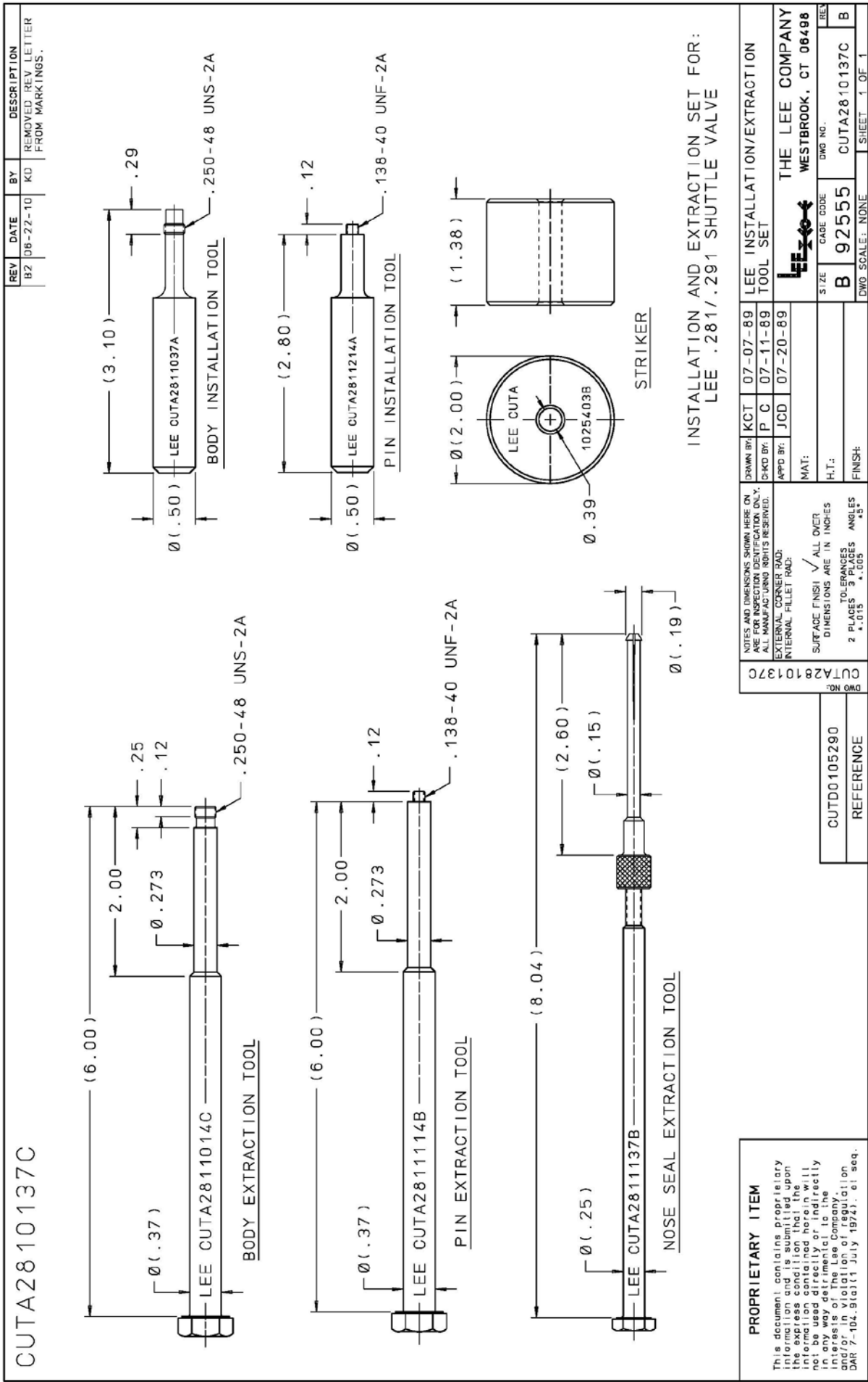
NOTES AND DIMENSIONS SHOWN HERE ON ARE FOR INSPECTION IDENTIFICATION ONLY. ALL MANUFACTURING RIGHTS RESERVED.
EXTERNAL CORNER RAD:
INTERNAL FILLET RAD:
SURFACE FINISH ☒ ALL OVER
DIMENSIONS ARE IN INCHES
TOLERANCES
2 PLACES $\pm .015$
3 PLACES $\pm .005$
ANGLES $\pm 5^\circ$

DESIGNED BY:	H M	07-23-99
DRAWN BY:	L B	07-27-99
APP'D BY:	B B	07-28-99
MAT:		
H.T.:		
FINISH:		

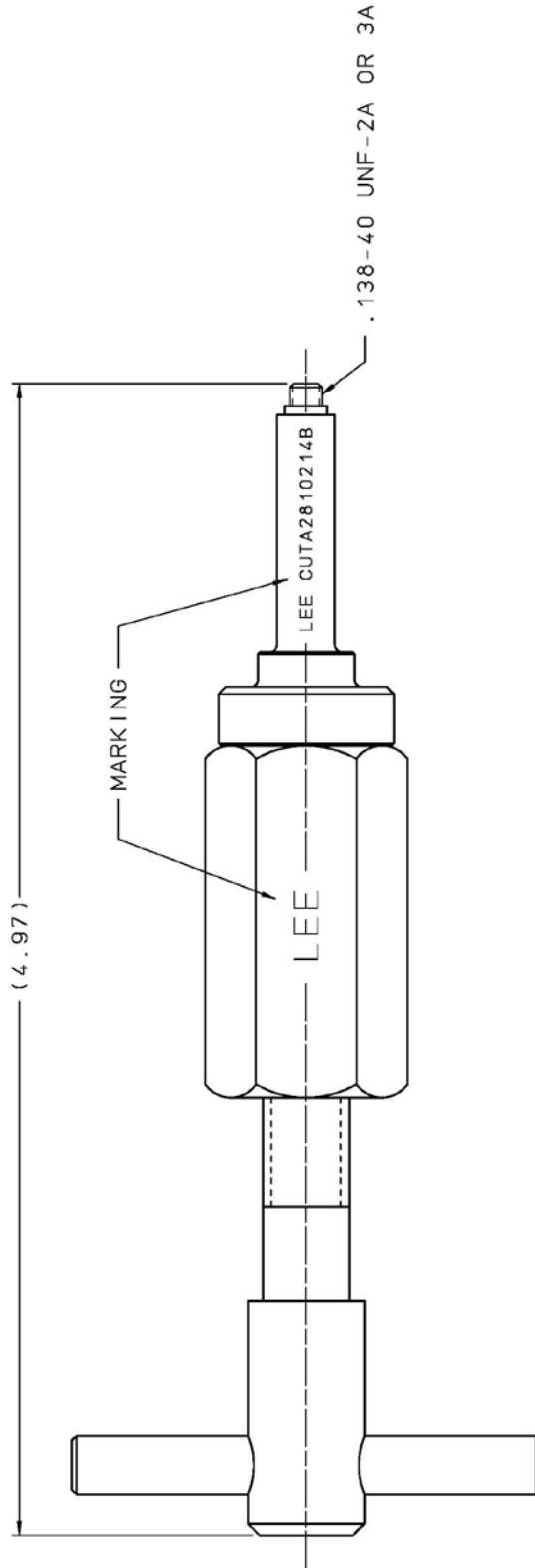
LEE JACKING TOOL	
THE LEE COMPANY WESTBROOK, CT 06498	
SIZE	GAGE CODE
B	92555
CUTA2500806B	DWG NO.
SHEET 1 OF 1	







CUTA2810214B



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CUTA2810214B	DWG NO.
CUTD0472400	REFERENCE

NOTES AND DIMENSIONS SHOWN HERE ON ARE FOR INSPECTION IDENTIFICATION ONLY. ALL MANUFACTURING RIGHTS RESERVED.

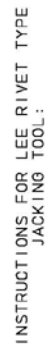
EXTERNAL CORNER RAD:
INTERNAL FILLET RAD:

SURFACE FINISH ✓ ALL OVER
DIMENSIONS ARE IN INCHES
TOLERANCES
2 PLACES .015
3 PLACES .005
ANGLES .5°

DRWN BY: KMN	08-07-74
C-KD BY: ECB	08-22-74
APPD BY: G L	10-25-74
MAT:	
H.T.:	
FINISH:	

LEE JACKING TOOL	
THE LEE COMPANY WESTBROOK, CT 06498	
SIZE	GAGE CODE
B	92555
DWG NO. CUTA2810214B	
DWG SCALE: NONE	
SHEET 1 OF 1	

REV	DATE	BY	DESCRIPTION
A	12-09-88	SE	INITIAL RELEASE
B	02-25-00	HM	UPDATED PULL SHAFT 4.72 WAS 2.62
2	08-15-10	KD	ADDED INSTR CARD. PULL SHAFT, Ø (.12) WAS Ø .12 JACKING TOOL SLEEVE (.25) WAS .25 Ø (.50) WAS Ø .50 Ø (.273) WAS Ø .273



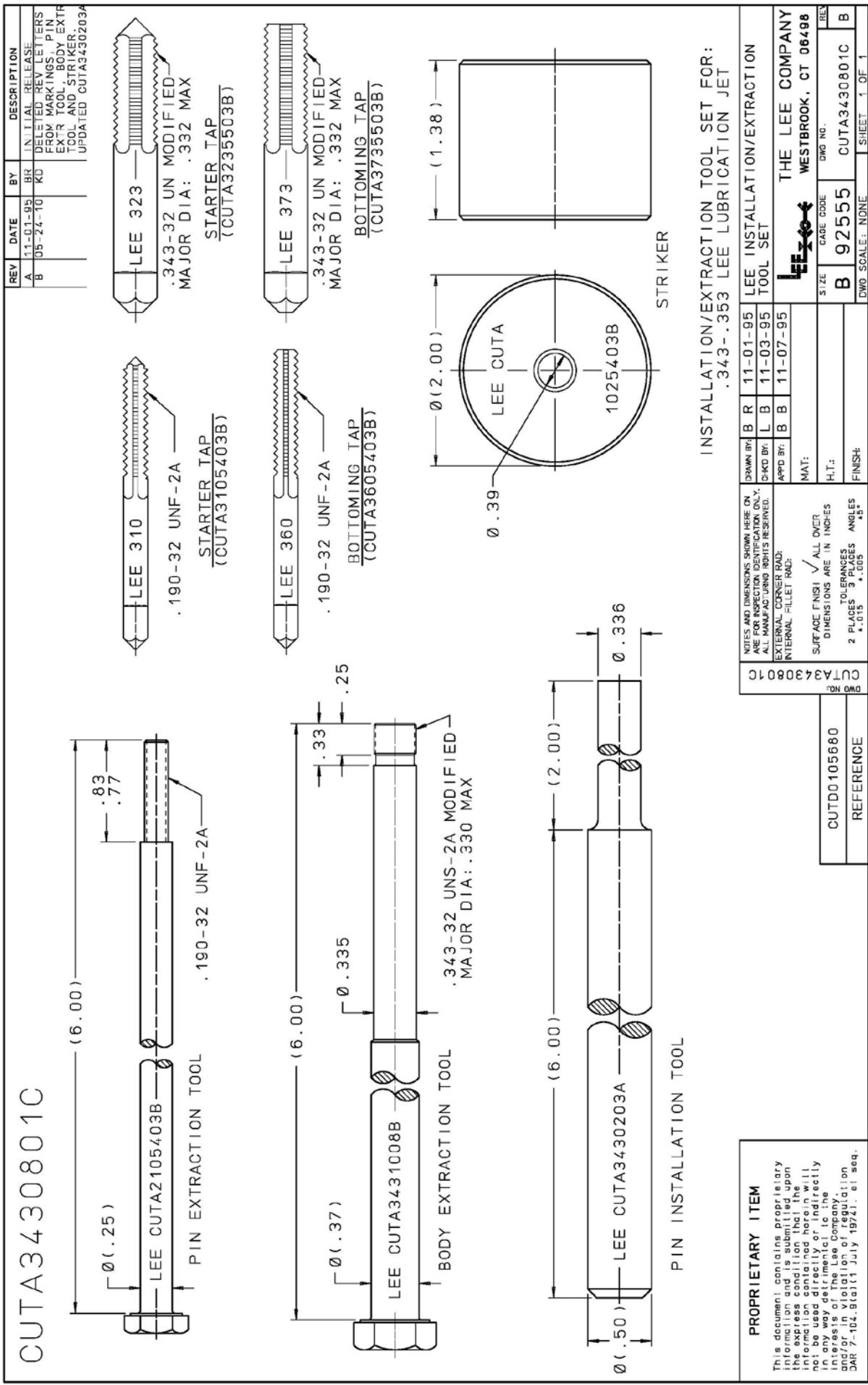
1. THREAD THE STUD INTO THE PIN TO BE REMOVED. 2 FULL TURNS MINIMUM.
2. SLIDE THE SLEEVE DOWN OVER THE STUD UNTIL IT IS SEATED AGAINST THE END OF THE BODY.
3. ENGAGE THE GROOVED END OF THE STUD INTO THE RIVET TOOL. ALLOW SOME SPACE BETWEEN THE GUN AND THE END OF THE SLEEVE. SQUEEZE THE HANDLE UNTIL THE PIN IS FREE.

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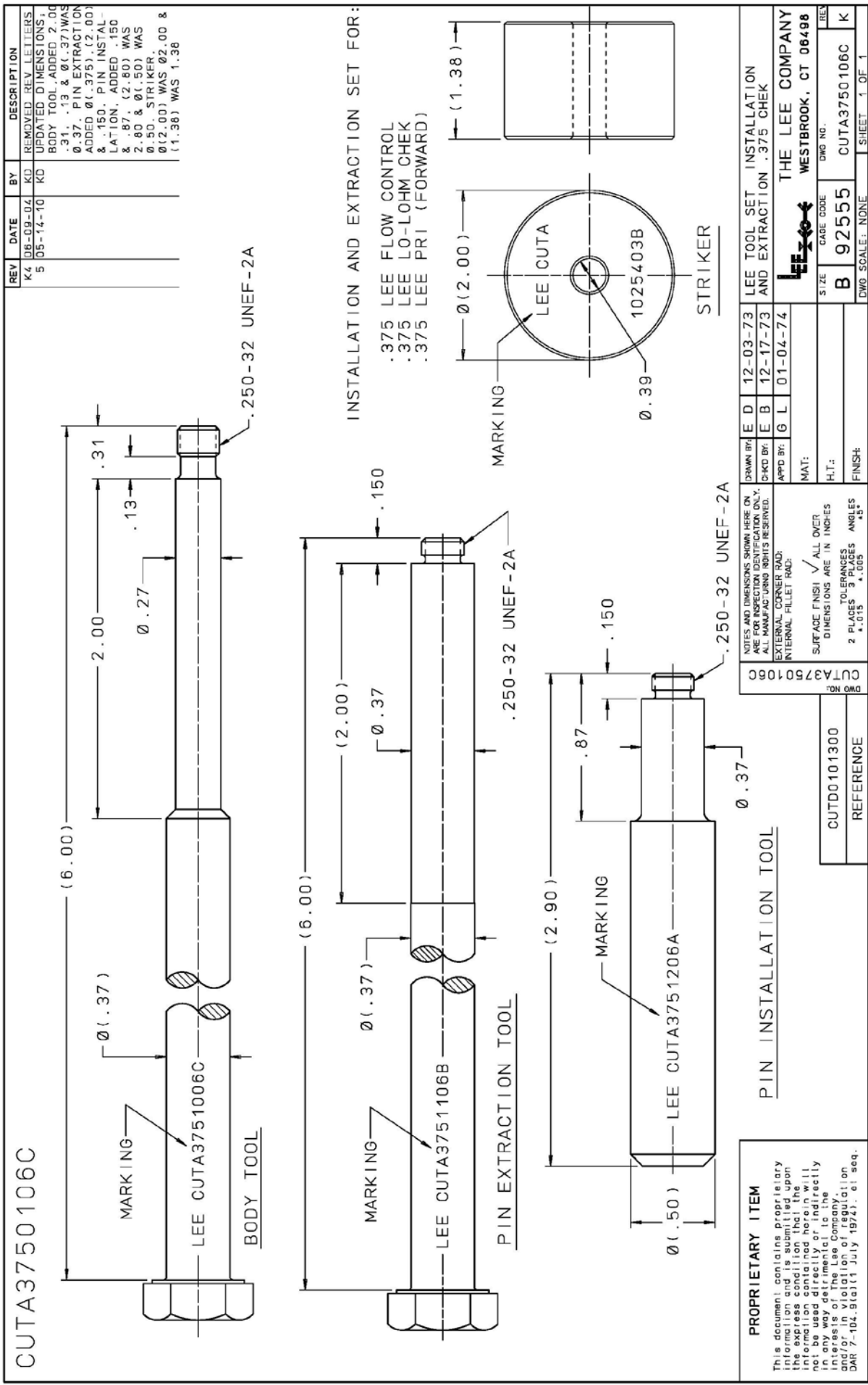
NOTES:

1. USE IN ACCORDANCE WITH LEE COMPANY PROCESS SPECIFICATION PS 187.
2. USE TO EXTRACT PINS FROM THE FOLLOWING LEE COMPANY PRODUCTS:
 - 281--291 LEE FLOSET, FLF/FLR ONLY.
 - 281--291 LEE PRR, PRF/PRR ONLY.

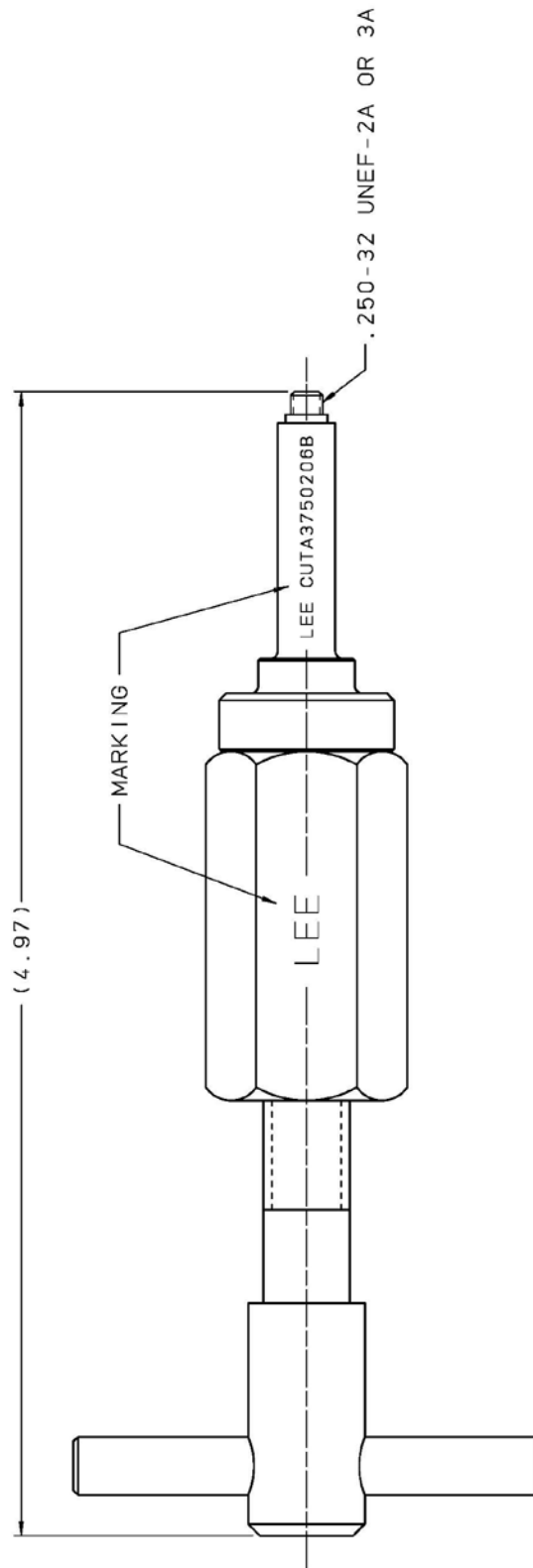
CUT2A2610314B		DRAWN BY		S E	12-09-88	LEE JACKING TOOL SET	
NOTES AND DIMENSIONS SHOWN HERE ON ARE FOR IDENTIFICATION ONLY. ALL MANUFACTURING RIGHTS RESERVED.		CUTD BY:		B M	03-01-89	.281 X .138-40	
EXTERNAL CORNER RADIUS: INTERNAL FILET RADIUS:		APPRO BY:		JOD	03-01-89	THE LEE COMPANY	
SURFACE FINISH ✓ ALL OVER DIMENSIONS ARE IN INCHES		MATERIAL:		WESTBROOK, CT 06498			
TOLERANCES 2 PLACES .3 PLACES .5 ±.015 ±.005		H.T.:		SIZE		DWD NO.	
		FINISH:		B 92555		CUT2A2610314B	
				DWD SCALE: NONE		SHEET 1 OF 1	



NOTES AND DIMENSIONS SHOWN HERE ON ARE FOR INSPECTION IDENTIFICATION ONLY. ALL MANUFACTURING RIGHTS RESERVED.		DRWN BY: B R	11-01-95	LEE INSTALLATION/EXTRACTION TOOL SET	
EXTERNAL CORNER RAD: INTERNAL FILLET RAD:		CHKD BY: L B	11-03-95	TOOL SET	
SURFACE FINISH: ALL OVER DIMENSIONS ARE IN INCHES		APPD BY: B B	11-07-95	THE LEE COMPANY WESTBROOK, CT 06498	
TOLERANCES: 2 PLACES 3 PLACES ANGLES		MATERIAL:		DWG NO.:	
±.015 ±.005 ±.5°		FINISH:		SIZE: GAGE CODE	
REFERENCE		CUTD0105680		B 92555	
DWG NO. 3430801C		DWG NO. 3430801C		DWG NO. 3430801C	
SHEET 1 OF 1		SHEET 1 OF 1		SHEET 1 OF 1	



CUTA3750206B



REV	DATE	BY	DESCRIPTION
B	09-10-76	KS	DWG NO. WAS CUTX-0472300A
2	08-29-80	TD	DAL WAS (4.91)
3	08-13-81	GR	MARKING WAS 'LEE'
4	11-14-94	BR	CUTA2000213B 5-40' MARKING WAS 'LEE' CUTA2000213BD'

PROPRIETARY ITEM
This document contains proprietary information and is submitted upon the express condition that the information contained hereon will not be disclosed, copied, reproduced, or in any way detrimental to the interests of The Lee Company, and/or in violation of regulation DAR 7-104.9 (alt 1 July 1974). ei seq.

CUTA3750206B		NOTES AND DIMENSIONS SHOWN HERE ON ARE FOR INSPECTION IDENTIFICATION ONLY. ALL MANUFACTURING RIGHTS RESERVED.	DRAWN BY: KMN	08-06-74	LEE JACKING TOOL	
		EXTERNAL CORNER RAD:	C-KD BY: ECB	08-21-74		
		INTERNAL FILLET RAD:	APPD BY: G L	10-25-74		
		SURFACE FINISH: ☒ ALL OVER	THE LEE COMPANY			
		DIMENSIONS ARE IN INCHES	WESTBROOK, CT 06498			
		TOLERANCES	DWG NO.			
		2 PLACES .0005 ANGLES .05°	SIZE: B 92555			
			CUT A3750206B			
			DWG SCALE: NONE			
			SHEET 1 OF 1			

CUTD0472500
REFERENCE

CUTA3750114C

Body Tool

LEE CUTA3751014C

3125-24 UNF-2A

6.00

2.00

0.367

0.367

0.60

0.56

0.40

Pin Extraction Tool

LEE CUTA3751106B

250-32 UNF-2A

6.00

2.00

0.370

0.150

0.37

Pin Installation Tool

LEE CUTA3751206A

250-32 UNF-2A

2.90

0.87

0.150

0.370

0.50

Striker

LEE CUTA

1025403B

2.00

1.38

0.39

Table:

REV	DATE	BY	DESCRIPTION
A3	08-18-10	KD	BODY TOOL, REMOVED REV LTR FROM MARKING ADDED 0.37, 1.2.00, 0.60-0.56 & 0.40, 0.367 WAS 0.370. PIN EXTR TOOL, REMOVED REV LTR FROM MARKING. ADDED 0.37, 1.2.00, 0.60-0.56 & 0.40, 0.367 WAS 0.370. STRIKER, REMOVED REV LTR FROM MARKING. 0.39 WAS 0.38 & 1.38 WAS 1.38.

Notes:

ALL DIMENSIONS SHOWN HERE ON ARE FOR INSPECTION IDENTIFICATION ONLY. ALL MANUFACTURING RIGHTS RESERVED.

EXTERNAL CORNER RAD:

INTERNAL FILLET RAD:

SURFACE FINISH: ☒ ALL OVER

DIMENSIONS ARE IN INCHES

TOLERANCES: ANGLES

2 PLACE 3 DECIMALS

0.015 0.005 0.5

Table:

REV	DATE	BY	DESCRIPTION
B	92555	KD	LEE TOOL SET INSTALLATION AND EXTRACTION

Table:

REV	DATE	BY	DESCRIPTION
B	92555	KD	LEE TOOL SET INSTALLATION AND EXTRACTION

Table:

REV	DATE	BY	DESCRIPTION
B	92555	KD	LEE TOOL SET INSTALLATION AND EXTRACTION

Table:

REV	DATE	BY	DESCRIPTION
B	92555	KD	LEE TOOL SET INSTALLATION AND EXTRACTION

Table:

REV	DATE	BY	DESCRIPTION
B	92555	KD	LEE TOOL SET INSTALLATION AND EXTRACTION

Table:

REV	DATE	BY	DESCRIPTION
B	92555	KD	LEE TOOL SET INSTALLATION AND EXTRACTION

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REV	DATE	BY	DESCRIPTION
B	92555	KD	LEE TOOL SET INSTALLATION AND EXTRACTION

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REV	DATE	BY	DESCRIPTION
B	92555	KD	LEE TOOL SET INSTALLATION AND EXTRACTION

Table:

REV	DATE	BY	DESCRIPTION
B	92555	KD	LEE TOOL SET INSTALLATION AND EXTRACTION

Table:

REV	DATE	BY	DESCRIPTION
B	92555	KD	LEE TOOL SET INSTALLATION AND EXTRACTION

Table:

REV	DATE	BY	DESCRIPTION
B	92555	KD	LEE TOOL SET INSTALLATION AND EXTRACTION

Table:

REV	DATE	BY	DESCRIPTION
B	92555	KD	LEE TOOL SET INSTALLATION AND EXTRACTION

Table:

REV	DATE	BY	DESCRIPTION
B	92555	KD	LEE TOOL SET INSTALLATION AND EXTRACTION

Table:

REV	DATE	BY	DESCRIPTION
B	92555	KD	LEE TOOL SET INSTALLATION AND EXTRACTION

Table:

REV	DATE	BY	DESCRIPTION
B	92555	KD	LEE TOOL SET INSTALLATION AND EXTRACTION

Table:

REV	DATE	BY	DESCRIPTION
B	92555	KD	LEE TOOL SET INSTALLATION AND EXTRACTION

Table:

REV	DATE	BY	DESCRIPTION
B	92555	KD	LEE TOOL SET INSTALLATION AND EXTRACTION

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B	92555	KD	LEE TOOL SET INSTALLATION AND EXTRACTION

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REV	DATE	BY	DESCRIPTION
B	92555	KD	LEE TOOL SET INSTALLATION AND EXTRACTION

Table:

REV	DATE	BY	DESCRIPTION
B	92555	KD	LEE TOOL SET INSTALLATION AND EXTRACTION

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REV	DATE	BY	DESCRIPTION
B	92555	KD	LEE TOOL SET INSTALLATION AND EXTRACTION

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REV	DATE	BY	DESCRIPTION
B	92555	KD	LEE TOOL SET INSTALLATION AND EXTRACTION

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REV	DATE	BY	DESCRIPTION
B	92555	KD	LEE TOOL SET INSTALLATION AND EXTRACTION

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REV	DATE	BY	DESCRIPTION
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Table:

REV	DATE	BY	DESCRIPTION
B	92555	KD	LEE TOOL SET INSTALLATION AND EXTRACTION

Table:

REV	DATE	BY	DESCRIPTION
B	92555	KD	LEE TOOL SET INSTALLATION AND EXTRACTION

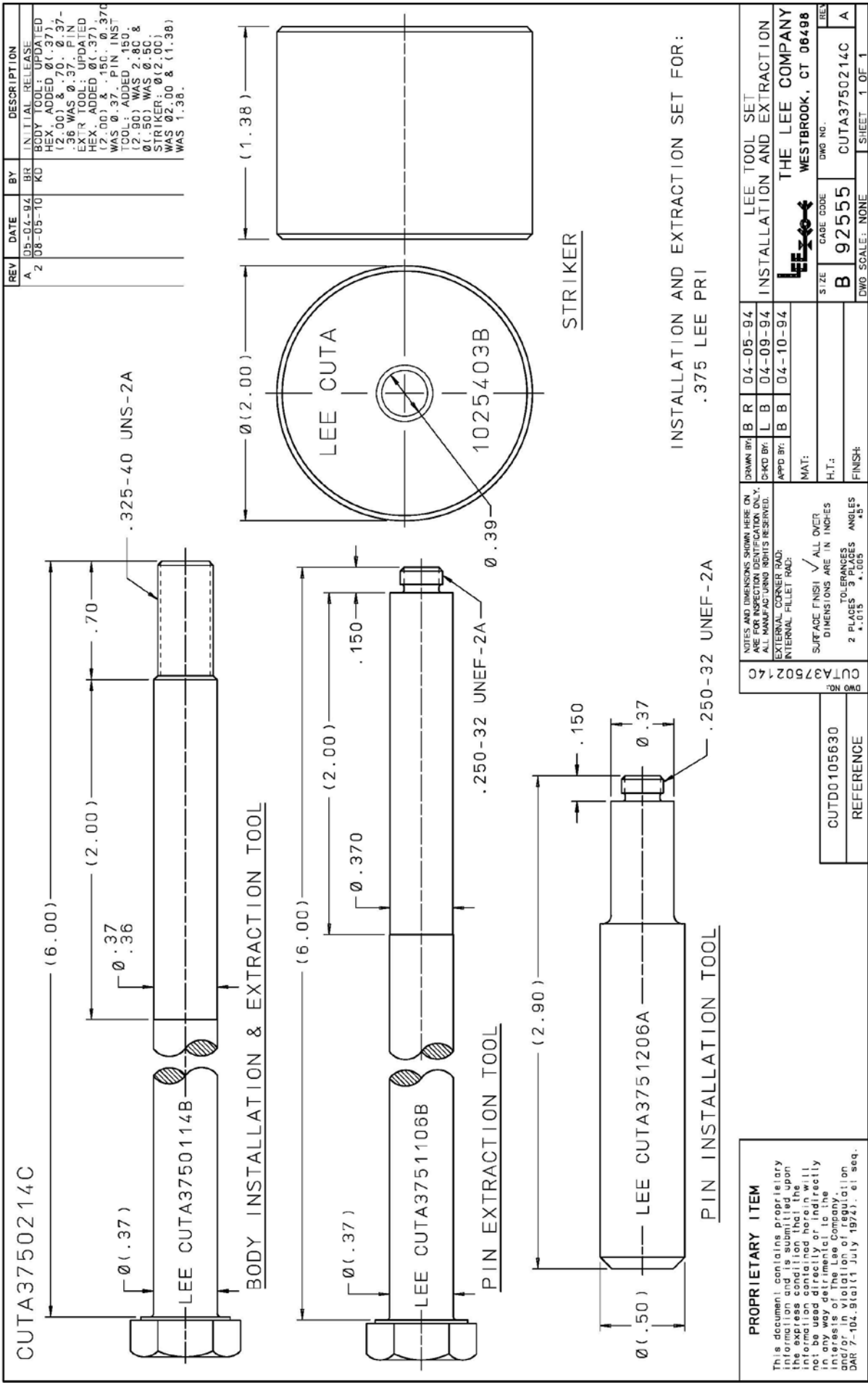
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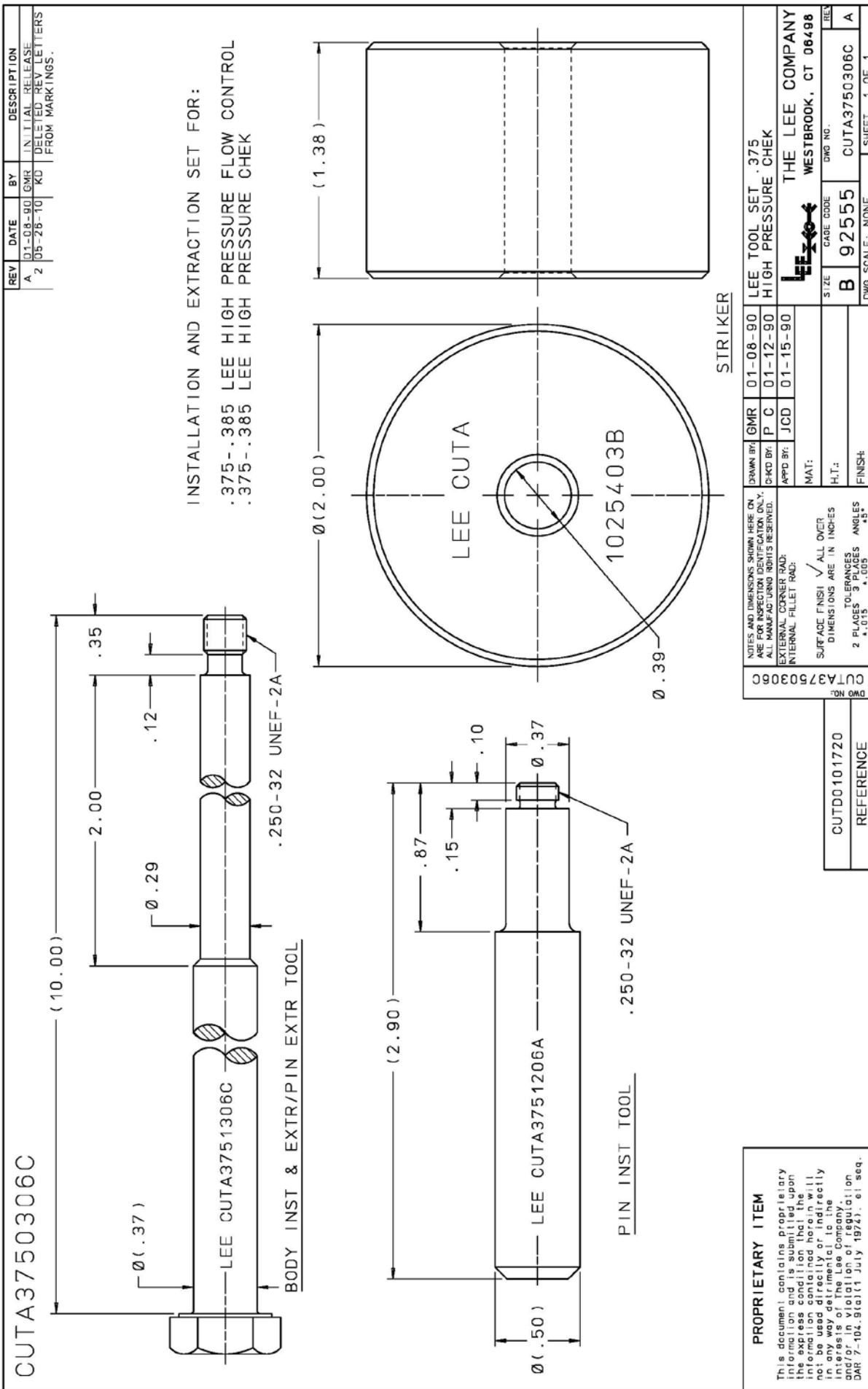
REV	DATE	BY	DESCRIPTION
B	92555	KD	LEE TOOL SET INSTALLATION AND EXTRACTION

Table:

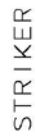
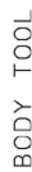
REV	DATE	BY	DESCRIPTION
B	92555	KD	LEE TOOL SET INSTALLATION AND EXTRACTION

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REV	DATE	BY	DESCRIPTION
A	03-15-07	KM	INITIAL RELEASE
2	12-02-10	HJ	BODY TOOL, ADDED @ (.37) (2.00), .40 & 61-.55 PIN EXT (.SOL) ADDED @ (.37) (1.00). P/N INSTAL TOOL IC ADDED - 87 - 15 & 10 @ (.50) WAS Ø.50 & Ø.37 WAS Ø.37Ø. STRIKER Ø12.00 WAS Ø2.00 & (1.38) WAS 1.39.



INSTALLATION & EXTRACTION SET FOR .375
HI PRESSURE PRI VALVE.

PROPRIETARY ITEM

CUTA3750514C		H M		03-15-07		LEE TOOL SET EXTRACTION FOR .375 BODY	
NOTES AND DIMENSIONS SHOWN HERE ON ARE FOR REFLECTION IDENTIFICATION ONLY. ALL MANUFACTURING RIGHTS RESERVED.		H M		03-20-07		THE LEE COMPANY WESTBROOK, CT 06498	
EXTERNAL CARRIER RACE: INTERNAL FLEET RACE:		B B		03-27-07		LEE 	
SURFACE FINISH ✓ ALL OVER DIMENSIONS ARE IN INCHES		MAT:		SIZE		DWG NO.	
2 PLACES TOLERANCES ±.015 ±.0025		H.T.:		B 92555		CUTA3750514C	
25°		FINISH:		DWG SCALE: NONE		SHEET 1 OF 1	

CUTD0105640

REFERENCE

REV	DATE	BY	DESCRIPTION
C2	02-21-02	HM	REMOVED REV LTR FROM MARKINGS, PASSIVATION WAS MIL-S-5002.
3	08-06-10	KD	BODY INST/EXTR TOOL UPDATED HEX, 0 (1, 50) WAS 0 (, 49) . PIN EXTR TOOL : UPDATED HEX, 0 (1, 50) WAS 0 (, 49) . PIN INST TOOL : (5, 00) WAS 5, 00 & 0 (, 50) WAS 0 (, 49) . STRIKER : 0 (2, 50) WAS 02, 50 & 12, 00) WAS 2, 00 . DELETED FINISH : PASSED/ASTM A967

REV	DATE	BY	DESCRIPTION
C2	02-21-02	HM	REMOVED REV LTR FROM MARKINGS, PASSIVATION WAS MIL-S-5002.
3	08-06-10	KD	BODY INST/EXTR TOOL UPDATED HEX, 0 (1, 50) WAS 0 (, 49) . PIN EXTR TOOL : UPDATED HEX, 0 (1, 50) WAS 0 (, 49) . PIN INST TOOL : (5, 00) WAS 5, 00 & 0 (, 50) WAS 0 (, 49) . STRIKER : 0 (2, 50) WAS 02, 50 & 12, 00) WAS 2, 00 . DELETED FINISH : PASSIVATE /ASTM A967

Technical drawing of a Lee CUTA5001006C tool bit. The drawing shows a side view of the tool with dimensions: a total length of 8.00, a diameter of .50, and a cutting edge width of .80. The tool is labeled "LEE CUTA5001006C".

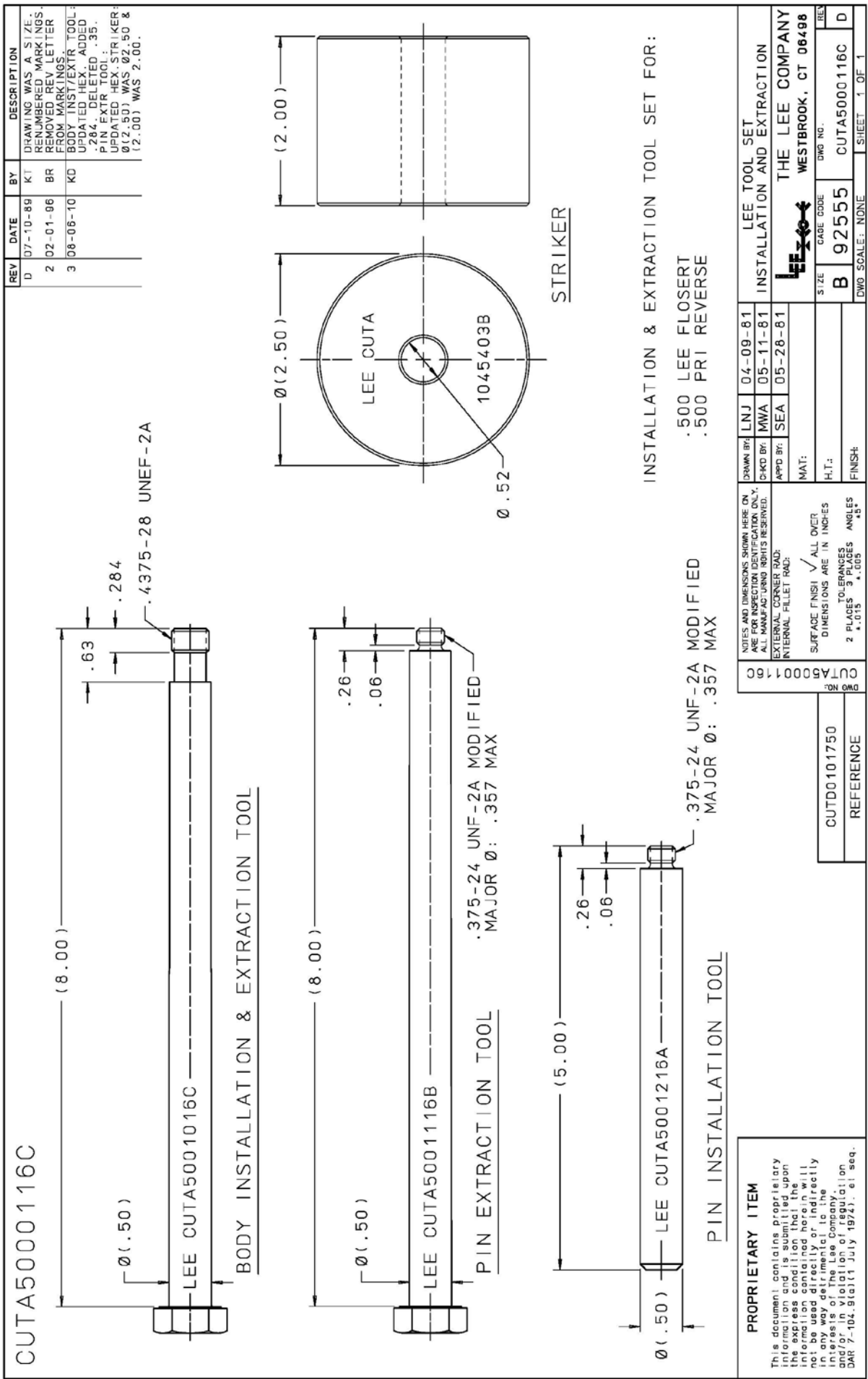
Technical drawing of a pin extraction tool. The tool is a long, thin cylinder with a threaded section at one end. Dimensions are given in inches: total length is 8.00, diameter is .50, and the threaded section has a length of .26 and a thread pitch of .06. The threaded section is labeled .375-24 UNF-2A MODIFIED MAJOR Ø: .357 MAX. The tool is labeled LEE CUTA5001116B and PIN EXTRACTION TOOL.

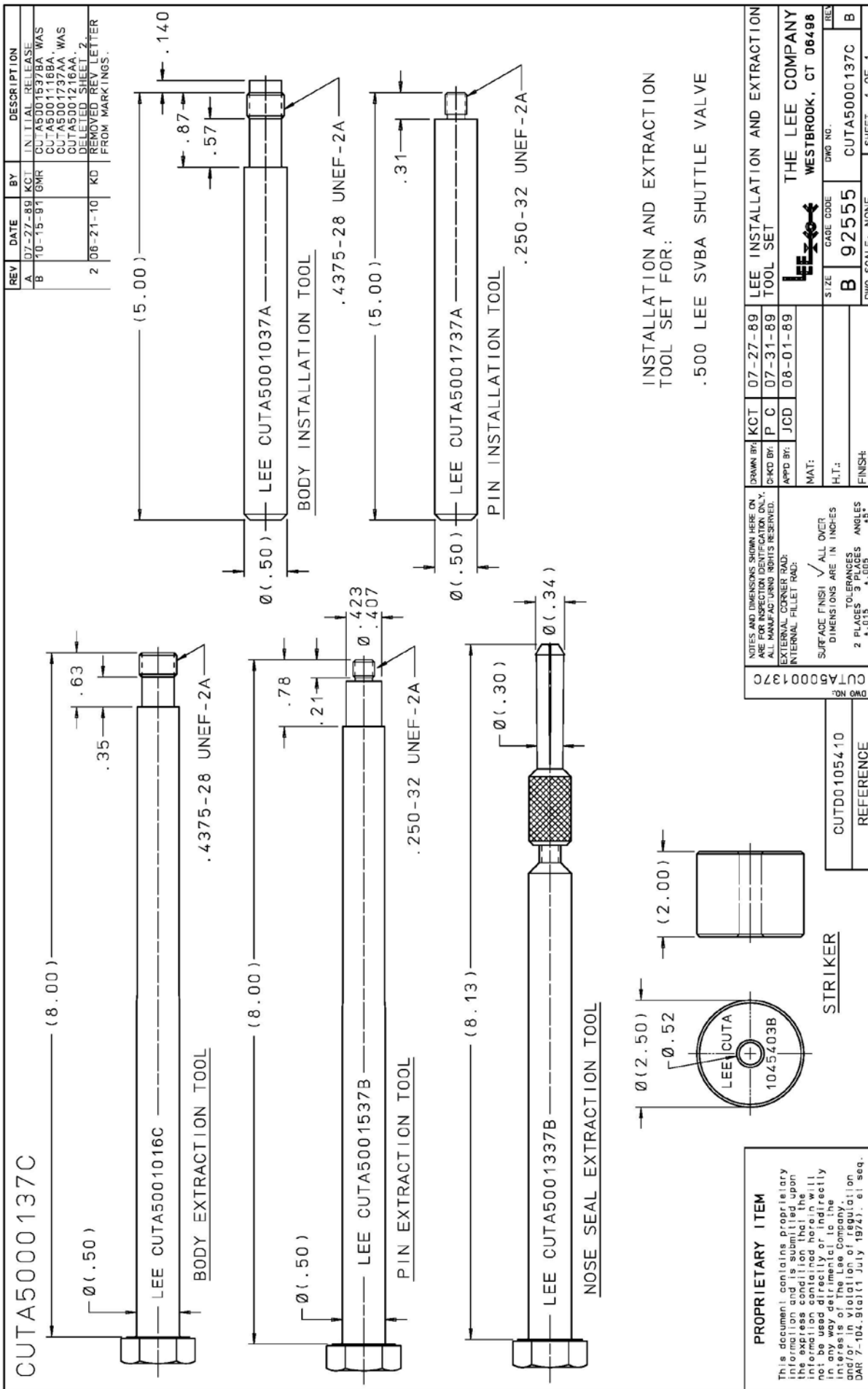
INSTALLATION & EXTRACTION TOOL SET FOR:

- .500 LEE FLOW CONTROL
- .500 LO LOHM CHEK
- .500 PRI FORWARD

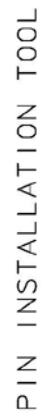
This document contains proprietary information and is submitted upon the express condition that the information contained herein will not be used directly or indirectly in any way detrimental to the interests of The Lee Company, and/or in violation of regulation DAR 7-104.9(a)(1 July 1974), et seq.

CUT A5000106C		SURFACE FINISH ☒ ALL OVER DIMENSIONS ARE IN INCHES TOLERANCES 2 PLACES 3/16" ± .015 1 PLACE .015 ± .015 ALL OTHERS .015 ± .015		DRAWN BY: E D CKD BY: J B APP'D BY: SEA INTERNAL CORNER RADIUS INTERNAL FILLET RADIUS		NOTES AND DIMENSIONS SHOWN HERE ON ARE FOR INSPECTION IDENTIFICATION ONLY. ALL MANUFACTURING RIGHTS IS RESERVED.		DATE: 06-17-87 H.T.: FINISH:		SIZE B 92555 DIM SCALE: NONE		GAGE CODE 92555 DWG NO.: CUTA5000106C		REC: C THE LEE COMPANY WESTBROOK, CT 06498 		LEE TOOL SET INSTALLATION AND EXTRACTION	
---------------	--	---	--	---	--	--	--	------------------------------------	--	------------------------------------	--	---	--	---	--	---	--



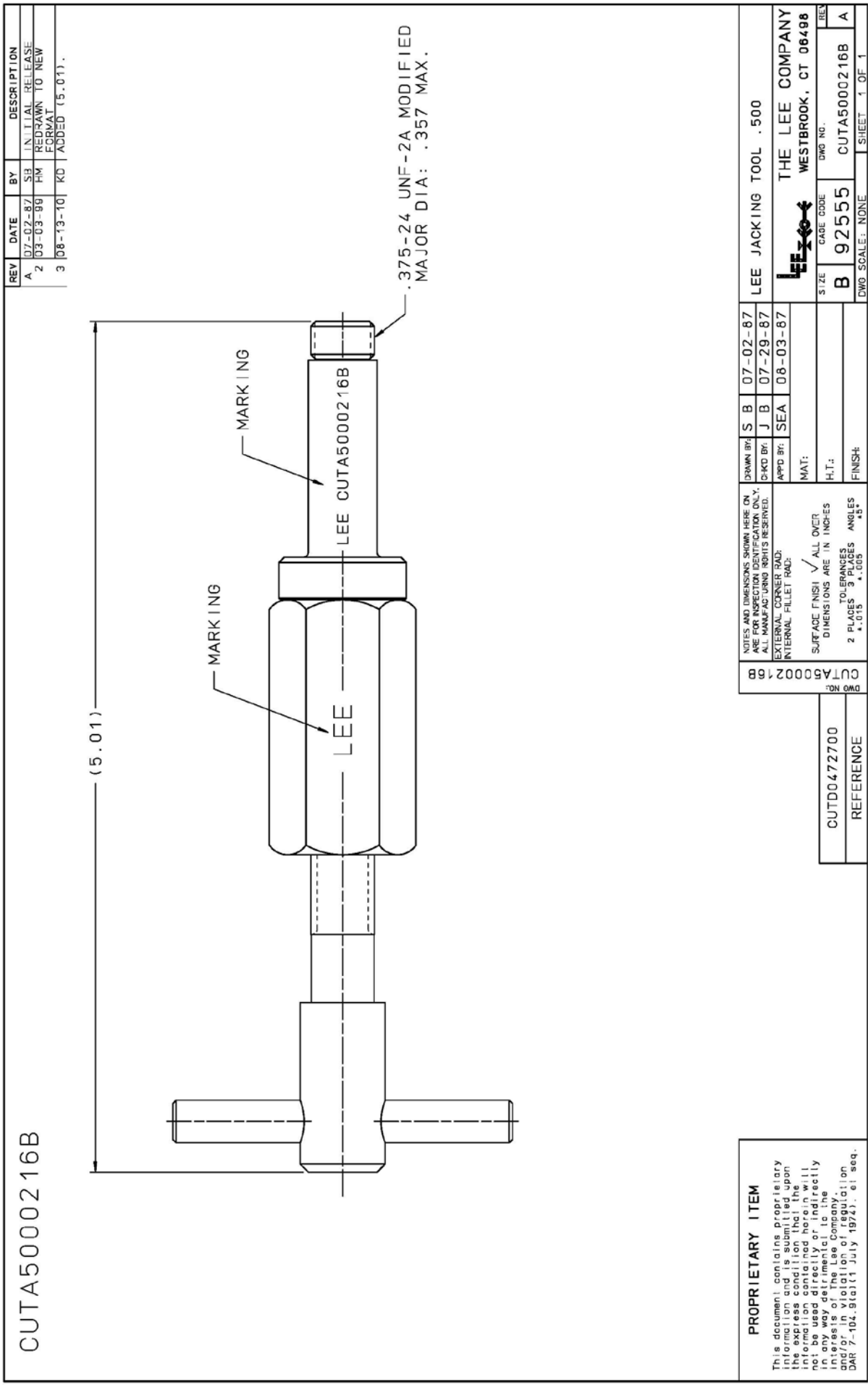


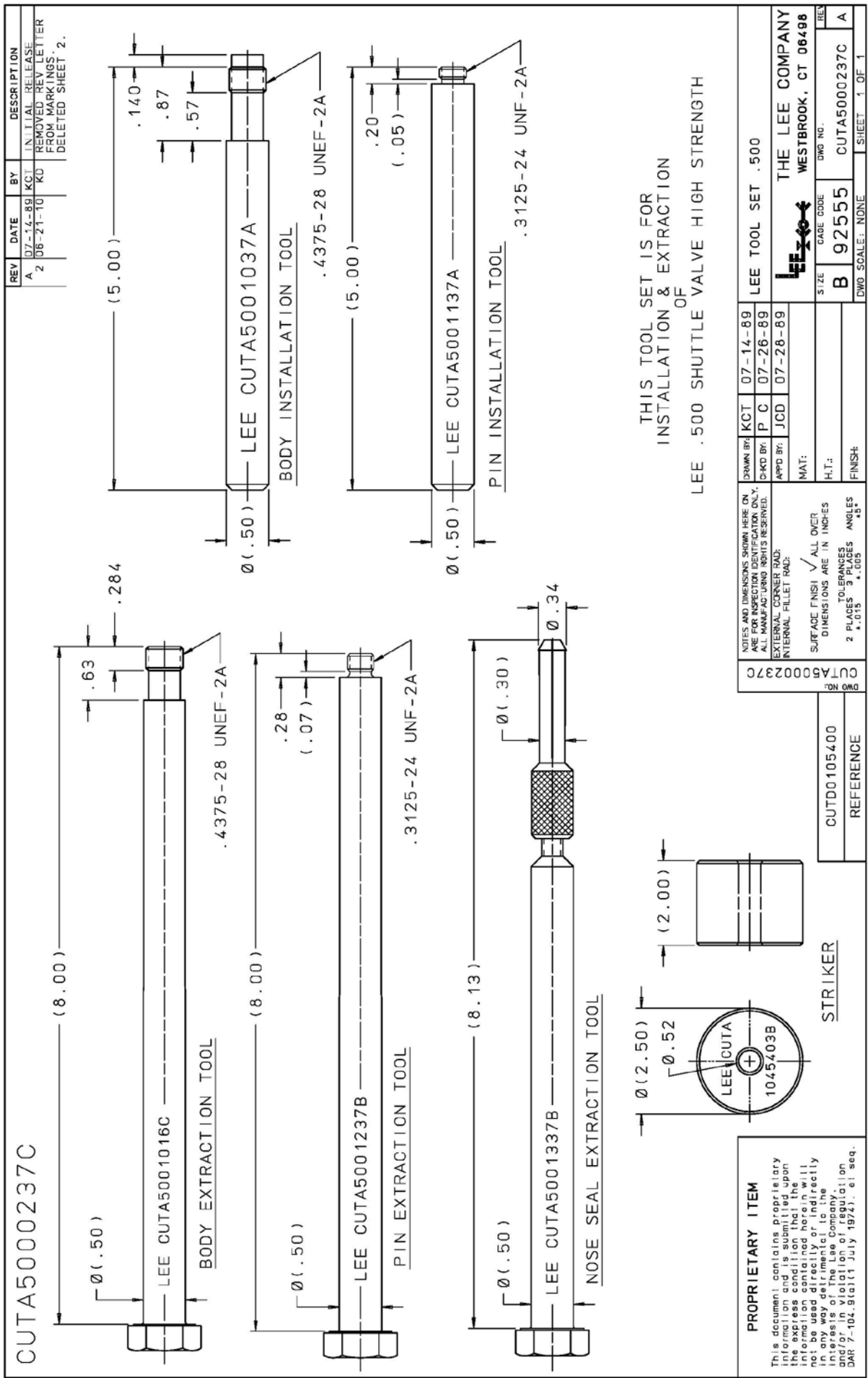
REV	DATE	BY	DESCRIPTION
1	10-01-90	GMR	INITIAL RELEASE
2	02-21-02	TM	REMOVED REV LTR FROM MARKINGS, CORRECTED LENGTH OF PIN LTR, BODY TOOL; PIN LTR/BODY TOOL; UPDATED HEX. Ø(.50) WAS Ø(.49)
3	08-06-10	KD	PIN INST TOOL: Ø(.50) WAS Ø.49 & (5.00) WAS 5.00.

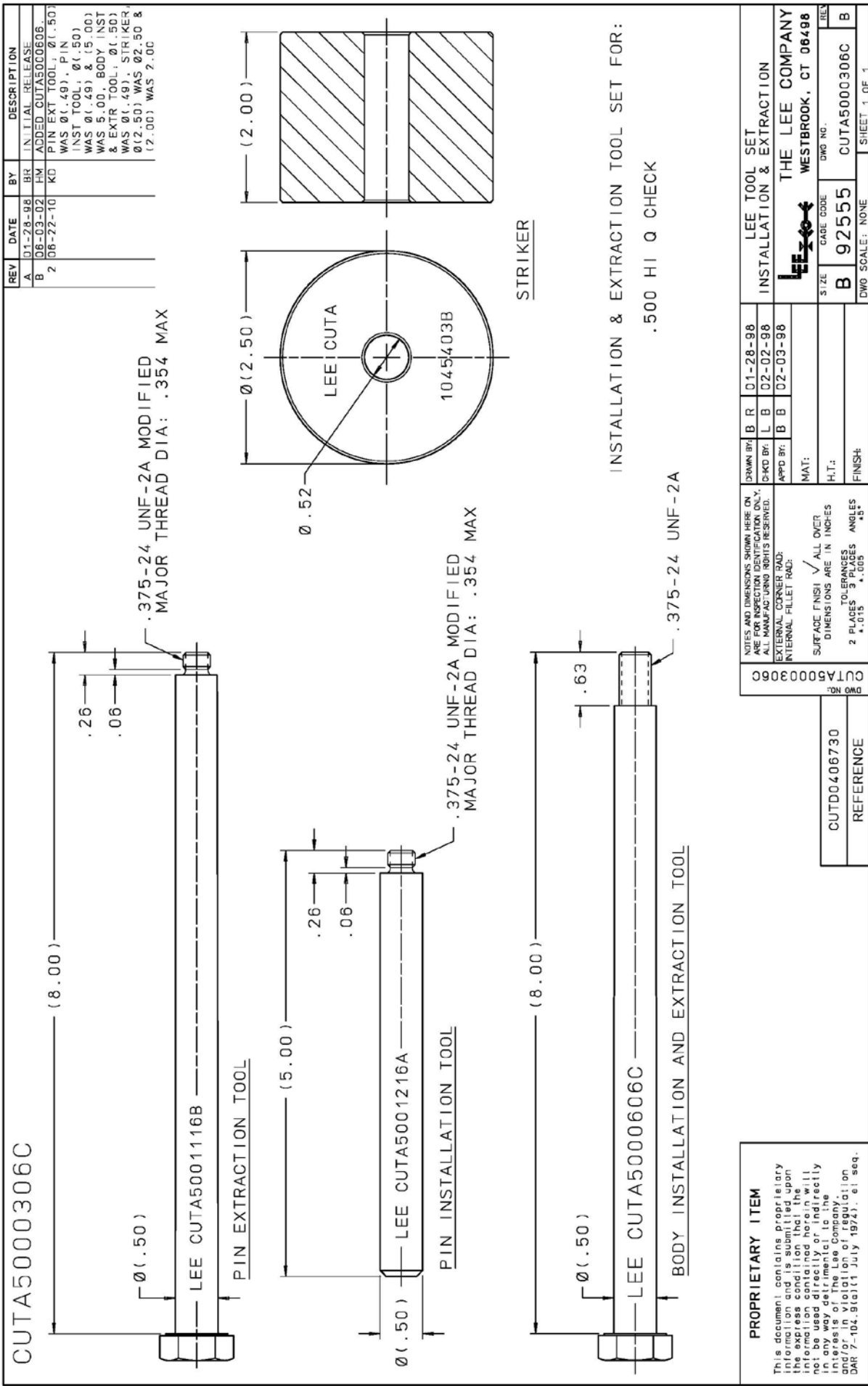


LEE .500 HIGH PRESSURE CHEK

PROPRIETARY ITEM This document contains proprietary information and is submitted upon the express condition that the information contained herein will not be used directly or indirectly in any way detrimental to the interests of The Lee Company and its subsidiaries. Date of this information: 7-104, 81a111 July 1974, 61 seq.		DWG NO.: CUTD0101640 REFERENCE		DWG NO.: CUTA5000206C REFERENCE	
NOTES AND DIMENSIONS SHOWN HERE ON ARE FOR INSPECTION IDENTIFICATION ONLY. ALL DIMENSIONS GIVEN GOVERN.		DWG NO.: CUTA5000206C REFERENCE		DWG NO.: CUTA5000206C REFERENCE	
EXTERNAL CORNER RADIUS: INTERNAL FILLET RADIUS:		DWG NO.: CUTA5000206C REFERENCE		DWG NO.: CUTA5000206C REFERENCE	
SURFACE FINISH: ☒ ALL OVER DIMENSIONS ARE IN INCHES		DWG NO.: CUTA5000206C REFERENCE		DWG NO.: CUTA5000206C REFERENCE	
2 PLACES 3 PLACES ANGLES .015 .005 .45		DWG NO.: CUTA5000206C REFERENCE		DWG NO.: CUTA5000206C REFERENCE	
TOLERANCES .015 .005 .45		DWG NO.: CUTA5000206C REFERENCE		DWG NO.: CUTA5000206C REFERENCE	
FINISH:		DWG NO.: CUTA5000206C REFERENCE		DWG NO.: CUTA5000206C REFERENCE	
H.T.:		DWG NO.: CUTA5000206C REFERENCE		DWG NO.: CUTA5000206C REFERENCE	
MAT:		DWG NO.: CUTA5000206C REFERENCE		DWG NO.: CUTA5000206C REFERENCE	
APP'D BY:		DWG NO.: CUTA5000206C REFERENCE		DWG NO.: CUTA5000206C REFERENCE	
C&D BY:		DWG NO.: CUTA5000206C REFERENCE		DWG NO.: CUTA5000206C REFERENCE	
GMR:		DWG NO.: CUTA5000206C REFERENCE		DWG NO.: CUTA5000206C REFERENCE	
10-01-90		DWG NO.: CUTA5000206C REFERENCE		DWG NO.: CUTA5000206C REFERENCE	
10-08-90		DWG NO.: CUTA5000206C REFERENCE		DWG NO.: CUTA5000206C REFERENCE	
10-08-90		DWG NO.: CUTA5000206C REFERENCE		DWG NO.: CUTA5000206C REFERENCE	
THE LEE COMPANY WESTBROOK, CT 06498		DWG NO.: CUTA5000206C REFERENCE		DWG NO.: CUTA5000206C REFERENCE	
LEE		DWG NO.: CUTA5000206C REFERENCE		DWG NO.: CUTA5000206C REFERENCE	
CASE CODE:		DWG NO.: CUTA5000206C REFERENCE		DWG NO.: CUTA5000206C REFERENCE	
92555		DWG NO.: CUTA5000206C REFERENCE		DWG NO.: CUTA5000206C REFERENCE	
SIZE:		DWG NO.: CUTA5000206C REFERENCE		DWG NO.: CUTA5000206C REFERENCE	
B		DWG NO.: CUTA5000206C REFERENCE		DWG NO.: CUTA5000206C REFERENCE	
DWG SCALE: NONE		DWG NO.: CUTA5000206C REFERENCE		DWG NO.: CUTA5000206C REFERENCE	
SHEET: 1 OF 1		DWG NO.: CUTA5000206C REFERENCE		DWG NO.: CUTA5000206C REFERENCE	



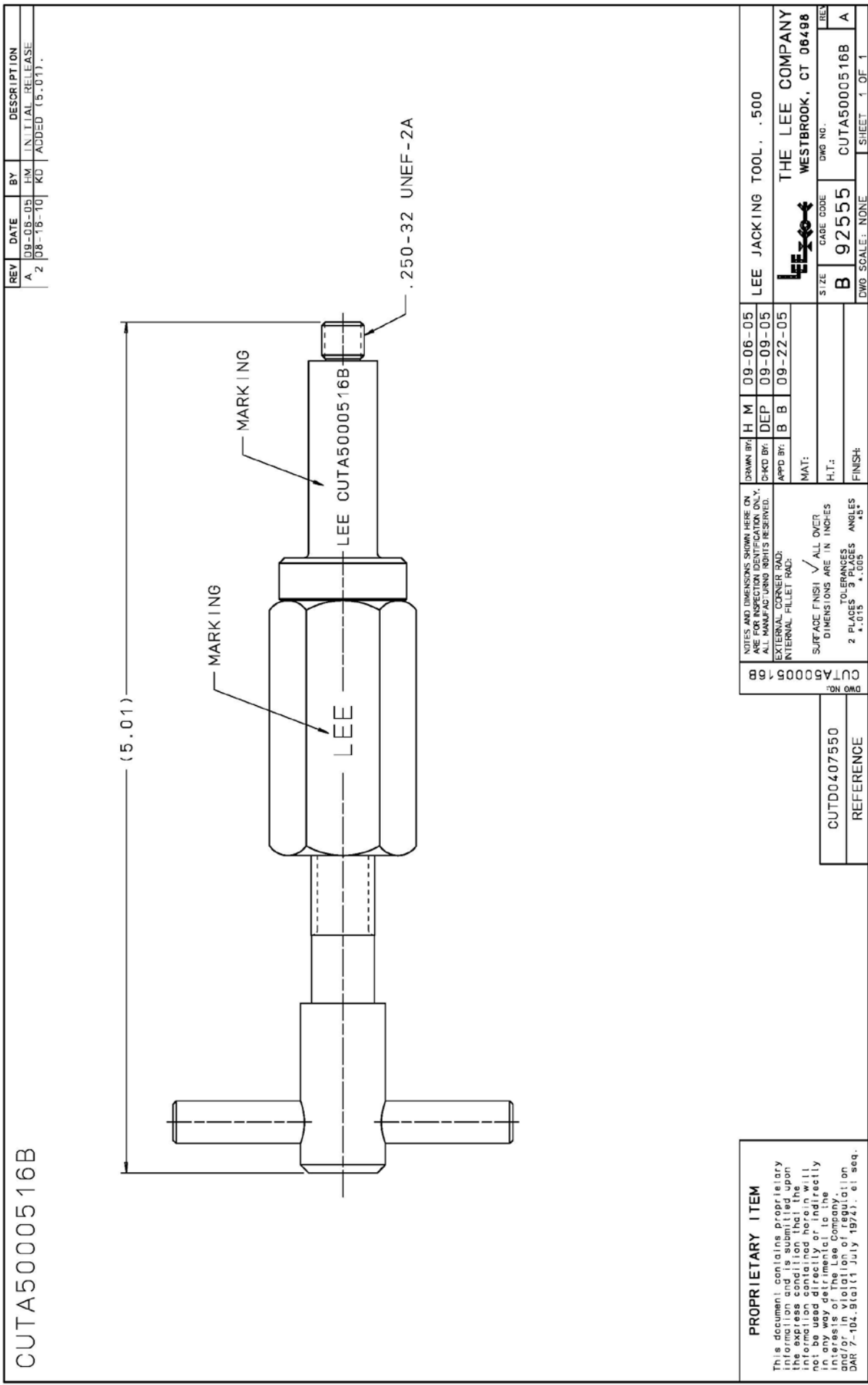




REV	DATE	BY	DESCRIPTION
A	10-07-03	HM	INITIAL RELEASE
2	08-16-10	KD	ADDED (5.01).



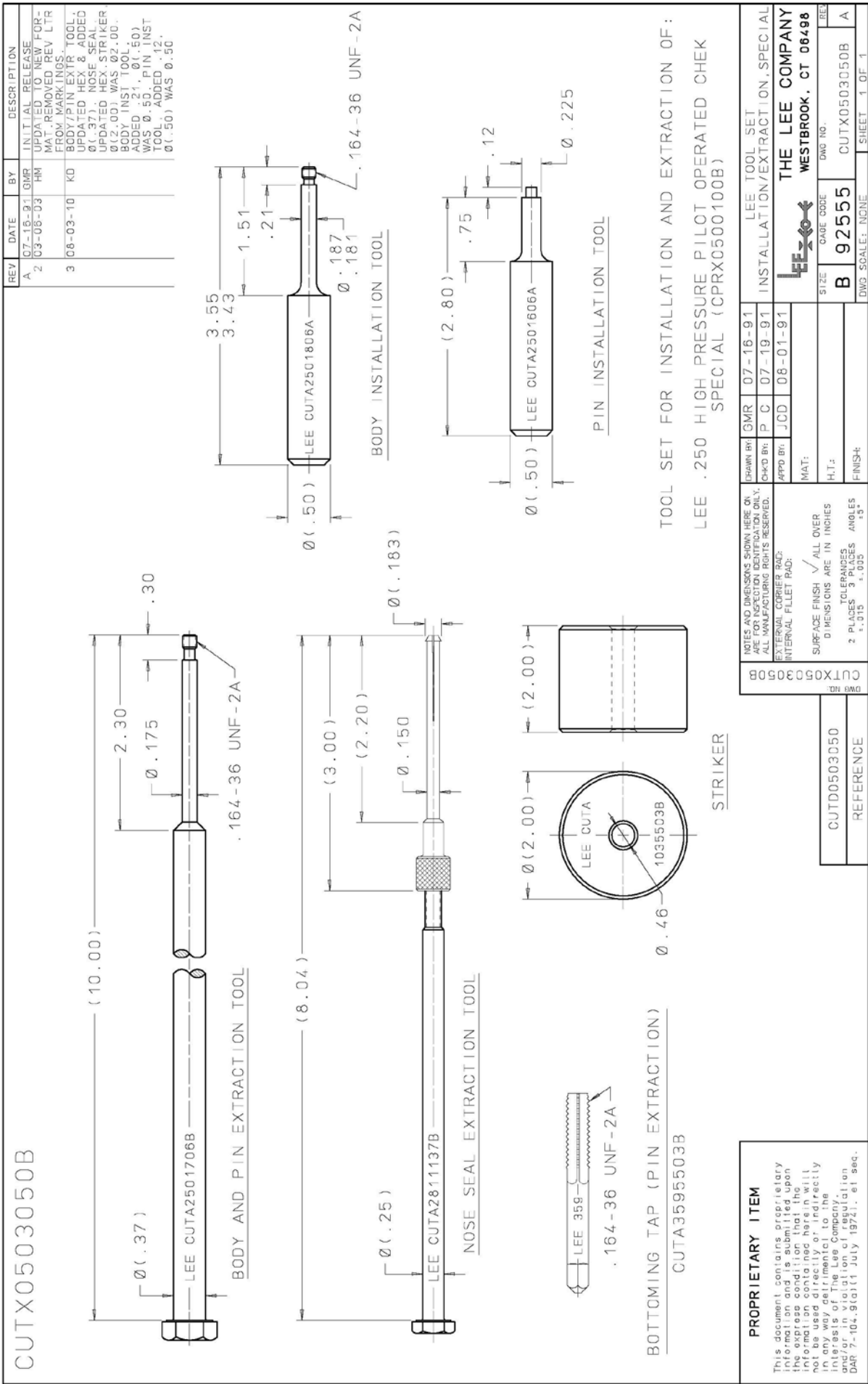
CUTD0407370
REFERENCE



REV	DATE	BY	DESCRIPTION
A	09-08-05	HM	INITIAL RELEASE
2	08-18-10	KD	ADDED (5.01).

CUTA5000516B

PROPRIETARY ITEM This document contains proprietary information and is submitted upon non-disclosure agreement. The information contained herein will not be used directly or indirectly in any way detrimental to the interests of the Lee Company, and/or in violation of regulation and/or statute July 1974, et seq.	REFERENCE		CUTD0407550		DWG NO.	
	CUTA5000516B		SURFACE FINISH ✓ ALL OVER DIMENSIONS ARE IN INCHES 2 PLACES 3 PLACES ANGLES ±.015 ±.005 ±.5°		NOTES AND DIMENSIONS SHOWN HERE ON ARE FOR INSPECTION IDENTIFICATION ONLY. ALL MANUFACTURING RIGHTS RESERVED.	
	DRWN BY: H M	09-06-05	DEP BY: B B	09-09-05	LEE JACKING TOOL . 500	
	APPD BY: B B	09-22-05	MATERIAL: THE LEE COMPANY WESTBROOK, CT 06498		SIZE GAGE CODE DWG NO.	
FINISH:		H.T.:		B 92555		CUTA5000516B
TOLERANCES		2 PLACES 3 PLACES ANGLES		DWG SCALE: NONE		SHEET 1 OF 1





THE LEE COMPANY

2 Pettipaug Road, Westbrook, CT 06498-0424 USA

Tel: 860-399-6281 / Toll Free: 800-533-7584

Fax: 860-399-7037

www.theleeco.com