



Coldwork Tooling Manual Table of Contents

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Section 1—Introduction

1.1 Introduction

The West Coast Industries, Inc. (WCI) family of hydraulically powered puller guns are used to pull a tapered mandrel through the workpiece in the coldworking process. Three standard puller guns are manufactured:

- WCI-1700: Used to coldwork hole diameters up to ³⁵/₆₄" (16-3-N), with a maximum material stackup of 3½ inches in aluminum. This tool is designed to develop 9,200 lbs of pull force at 10,000 psi hydraulic pressure. Weight is 6 lbs.
- WCI-1800: Used to coldwork holes to ⁶³/₆₄" (30-3-N), with maximum material stackup of 7", while developing 27,600 lbs of pull force at 10,000 psi. Weight is 13 lbs.
- WCI-1900: Used to coldwork holes to 1⁵¹/₆₄" (56-3-N), with maximum material stackup of 7", generating 38,000 lbs of pull force at 10,000 psi. Weight is 27 lbs.

While it is normally recommended our customers return the units to WCI for maintenance and repair, this manual is provided for those customers having tool repair facilities and trained technicians available to perform these types of repairs. It is important to note, due to the high hydraulic pressures developed by the unit, any repair or service must be in strict accordance to the steps outlined in this manual.



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1.2 Typical Applications

Refer to Figure 1-01. A standard nosecap may be used for most applications of coldworking. For restricted access situations wherein lateral or frontside access problems exist, it may be necessary to utilize an extension nosecap on a standard puller gun, or to fit the puller gun with an

offset adapter. Please consult the WCI Coldwork Tooling Catalog for the many restricted access solutions available, or contact our technical engineering department with your special needs.

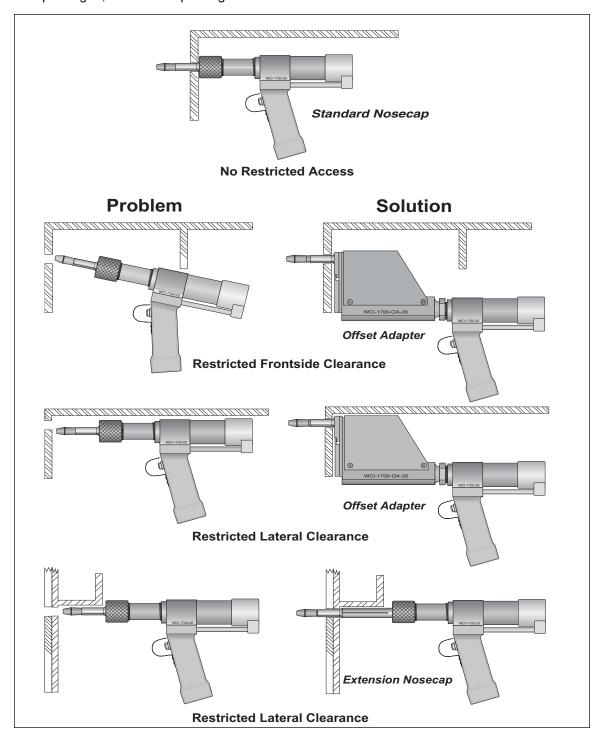


Figure 1-01



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Section 2—Coldworking Procedures

2.1 Tooling Selection

- 2.1.1 Select the proper mandrel, nosecap assembly, barrel, puller gun. The minimum mandrel length is equal to the stack-up thickness plus the nosecap assembly length. (e.g., a one inch stackup plus a two inch extension nosecap, would utilize a three inch mandrel).
- 2.1.2 Refer to Figure 2-01 for an overview of the coldworking procedures
- 2.1.3 Using the mandrel wear gage, check mandrel wear by attempting to insert the mandrel into the wear gage. If the mandrel will insert into the gage, the mandrel is worn beyond limits. Verify the mandrel part number is correct.

2.2 Assemble Tooling

Warning

To avoid possible operator injury, it is imperative the puller hose be disconnected from the power-pak prior to assembling or servicing the puller!

- 2.2.1 Refer to Figure 2-02. Unscrew nosecap from barrel.
- 2.2.2 If an offset adapter is needed due to a restricted access situation, refer to 5.2 for assembly of the puller gun and offset adapter.

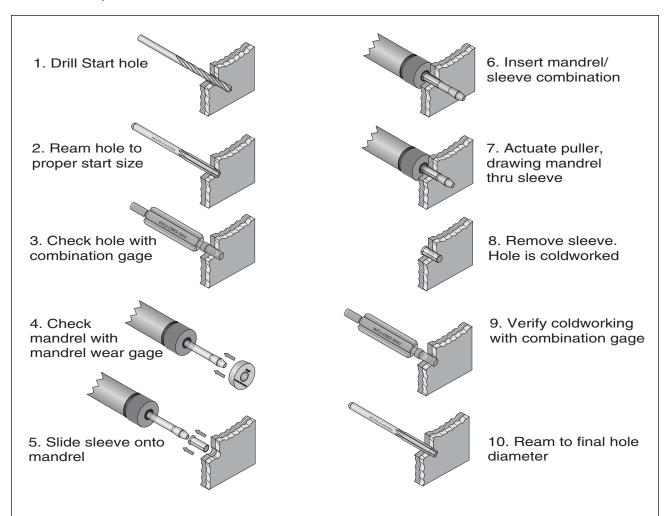


Figure 2-01



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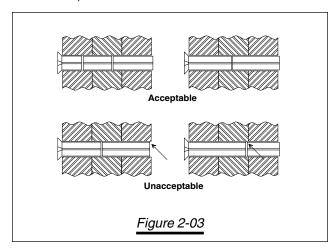
- 2.2.3 Loosen set screw on housing. Unscrew barrel.
- 2.2.4 Hand tighten the mandrel completely into the threaded adapter of the puller unit.
- 2.2.5 Tighten set screw on mandrel end of threaded adapter.
- 2.2.6 Screw barrel back onto the housing. Tighten set screw.
- 2.2.7 Slide the nosecap assembly onto the mandrel, and thread it onto the barrel of the puller unit.
- 2.2.8 Connect the puller gun hose assembly to the power supply unit. The quick connect couplings at the end of the hose assembly are designed to be connected in only one way.
- 2.2.9 Connect the shop air supply to the power supply unit.
- 2.2.10 Cycle the puller unit, drawing the mandrel completely into the nosecap. A mandrel not drawing into the nosecap may be caused by a failure to thread the mandrel completely into the threaded adapter, selection of incorrect mandrel length, or the incorrect stroke puller gun.
- 2.2.11 The output of the hydraulic power-pak is preset at the factory. It is strongly recommended that this setting not be adjusted lower. The power-pak will only provide the amount of pressure required to coldwork the hole.

NOTE

Insufficient pressure may prevent mandrel from pulling completely through the material.

2.3 Sleeve Selection and Installation

- 2.3.1 Select the proper sleeve for the task, ie., flared or straight, or a combination of the two.
- 2.3.2 Ensure the total sleeve length is a minimum of $\frac{1}{32}$ " longer than the material stackup (*ref. fig. 2-03*).



- 2.3.3 Stacked sleeves shall not have a separation within ¹/₁₆" of any faying surface. When stacking sleeves, it is recommended that sleeve splits be aligned to facilitate their removal after coldworking. (ref. fig. 2-03)
- 2.3.4 Slide the split sleeve(s) onto the mandrel, until flush against the nosecap.
- 2.3.5 The mandrel minor diameter length shall be a minimum of .063" longer than the sleeve length (ref. fig. 2-04).

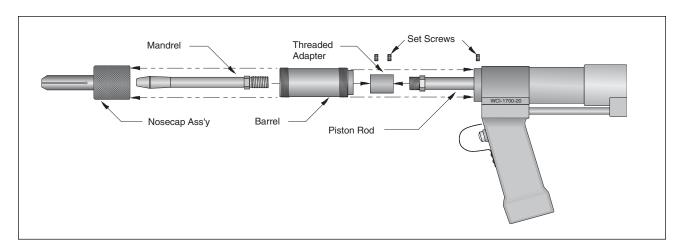


Figure 2-02



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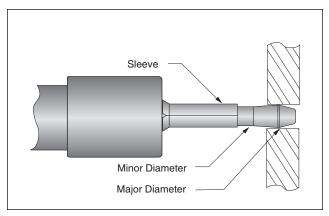


Figure 2-04

Warning

When utilizing a sleeve stackup, it is permissable to unthread the mandrel a minor amount to meet the above requirement. The mandrel must be threaded into the puller a minimum of one thread diameter.

2.4 Hole Preparation

- 2.4.1 Drill and/or ream the hole to proper starting hole dimensions. Clean the hole, removing all cutting fluid residue, after all machining operations have been completed. The pre-coldworked hole shall be free of all foreign materials, including paint, sealant, metal particles and any other foreign materials.
- 2.4.2 Verify the start hole diameter using the correct start hole gage, or combination gage.

2.5 Coldwork the Hole

- 2.5.1 Insert the assembled tooling completely into the hole. Ensure the nosecap is flush against the material to be coldworked. Do not side load the mandrel in the material.
- 2.5.2 Coldwork the hole by pulling the trigger on the puller gun. This will cause the mandrel to be drawn through the sleeve, cold expanding the hole. Remove the puller gun from the workpiece and release the trigger. This will cause the mandrel to extend back to the ready position.
- 2.5.3 Remove the sleeve(s) from the hole and discard

2.5.4 Final Steps

- 2.5.4.1 Verify the coldworking operation, utilizing the combination gage
- 2.5.4.2 For holes requiring postsizing, ream the hole to the final hole size utilizing the appropriate final reamer.



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Section 3—Puller Gun

3.1 Introduction

While it is normally recommended our customers return the units to WCI for maintenance and repair, this manual is provided for those customers having tool repair facilities and trained technicians available to perform these types of repairs. It is important to note, due to the high hydraulic pressures developed by the unit, any repair or service must be in strict accordance to the steps outlined in this manual.

3.2 Theory of Operation

The operation of the sleeve puller gun is a simple cylinder type function. Hydraulic fluid enters one side of the piston during the coldwork cycle and shop air supply is always present at the opposite side of the piston. A trigger valve controls the direction of the piston within the puller gun and cycles the hydraulic power supply. Refer to Figure 3-01. (Refer to Figure 3-02 for parts nomenclature).

When the air is connected to the power supply unit, a constant air supply is sent to the trigger valve in the puller gun handle assembly. A constant air supply, sent from the handle assembly to the end cap, is always present on the back side of the puller gun piston. This will extend the piston and mandrel to the starting position when the power supply unit is not activated.

When the trigger is depressed an air signal from the puller gun trigger is sent to the power supply unit. The air signal closes a normally open "Dump" valve and activates the pump on power supply. In the closed position, the dump valve prevents hydraulic fluid from entering the reservoir during the coldwork cycle, while allowing hydraulic fluid to travel to the housing of the puller gun.

Inside the housing, hydraulic fluid passes between the bearing assembly and the piston as-

sembly, moving the piston assembly and mandrel toward the rear of the housing. The sleeve is held in place by the nosecap on the puller gun as the mandrel passes through the sleeve in the workpiece. Known as the "sandwich effect", the mandrel pulls from one direction while the nosecap and puller gun react in the opposite direction.

The piston continues to travel rearward until it is stopped by either the lock nut on the piston assembly or the operator releasing the trigger. If the piston travel is stopped by the lock nut, the power supply will continue to operate. If the operator releases the trigger valve, the control signal, which closed the dump valve, will now vent to atmosphere through the vent port in the trigger valve, thus opening the dump valve and also deactivating the pump portion of the power supply.

This action allows the air, on the rear of the piston assembly, to force the hydraulic fluid from the puller gun to the reservoir in the power supply unit. As the hydraulic fluid is forced from the puller gun, the mandrel and piston assembly are moved forward until fully extended.

This completes one cycle of the coldworking process.



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WCI-1700/1800/1900 Puller Gun-Theory of Operation

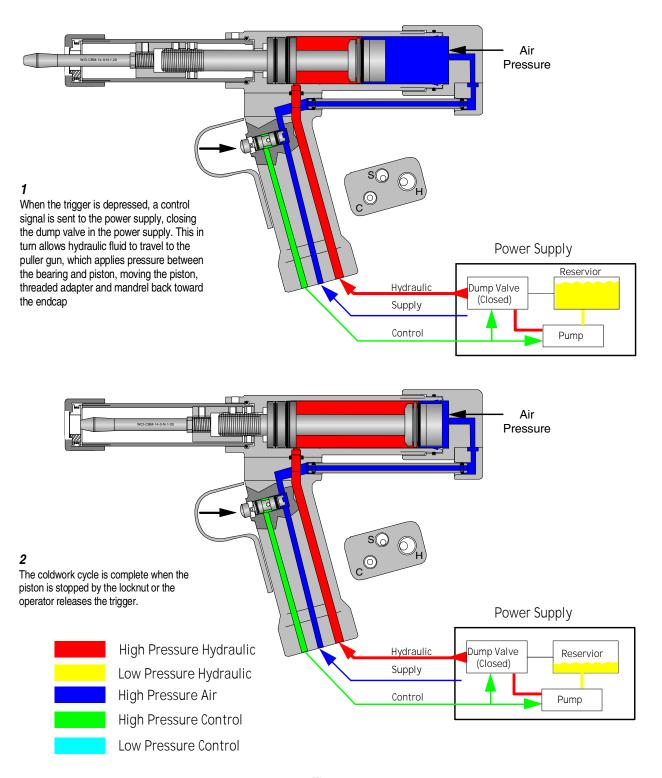


Figure 3-01

WCI-1700/1800/1900 Puller Gun-Theory of Operation (cont.)

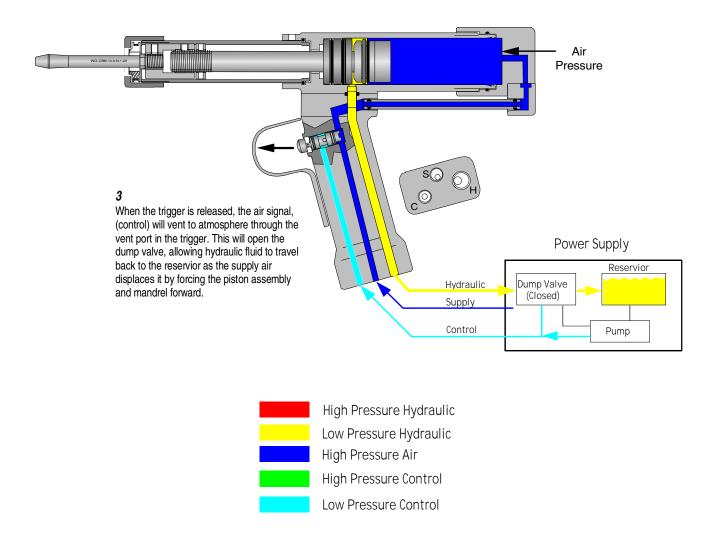
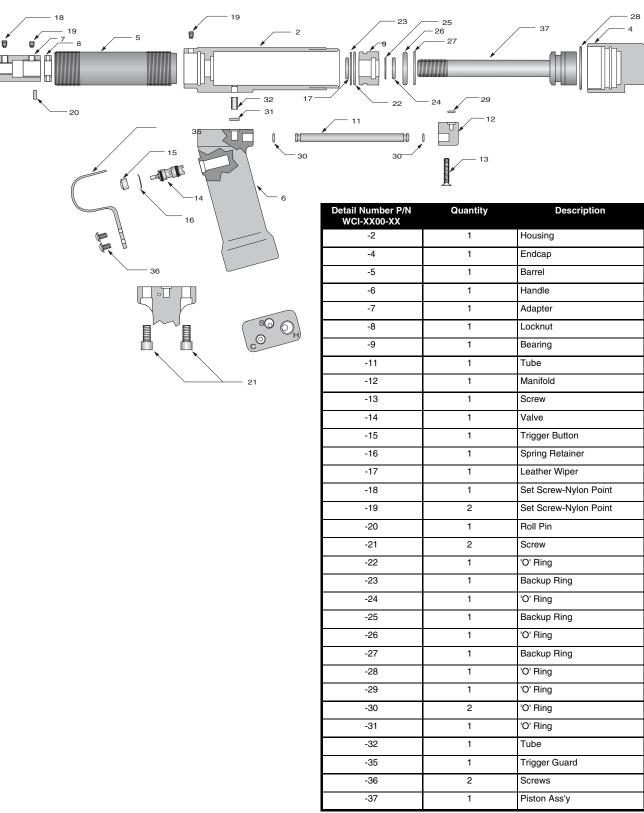


Figure 3-01 (cont.)



The above detail numbers are added to the basic puller part number, ie., WCI-1700-30-5 is a barrel for a WCI-1700 puller with a 3" stackup capacity.

Figure 3-02



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3.3 Disassembly

3.3.1 Refer to Figure 3-02. If complete disassembly is required, perform the following steps in order. If complete disassembly is not required, perform the steps in the appropriate section.

3.3.2 Hose Assembly Removal

- 3.3.2.1 The removal of the hose assembly is normally not recommended unless a leak has developed in one of the lines. Skip to 3.3.3 if removal of the hose is not necessary.
- 3.3.2.2 Remove the hose assembly from the fittings at the bottom of the handle (6), by first removing both of the polyurethane hoses (C & S) from the compression fittings, then removing the hydraulic hose (H).

3.3.3 Manifold/Tube/Handle

- 3.3.3.1 Remove manifold (12) from endcap (4), by removing screw (13). Pull the manifold slightly down and back, to remove the manifold from the tube (11). (Note 'o' ring (29) may drop from it's position in manifold (12)).
- 3.3.3.2 Remove tube (11) from handle (6).
- 3.3.3.3 Remove handle (6) from housing (2) by removing cap screws (21). Note the position of 'o' ring (31) in the recess in handle to housing mating surfaces. Tube (32) is pressed into the housing (2).

3.3.4 Trigger Valve

- 3.3.4.1 Removal of two screws (36) will allow the removal of trigger guard (35).
- 3.3.4.2 Remove the trigger button (15) by removal of the set screw in the side of the trigger button.
- 3.3.4.3 Using a scribe, carefully, remove the retainer (16) which holds the valve (14) in place.

Warning

Extreme caution should be exercised when using the scribe, since carelessness may result in operator injury.

3.3.4.4 Grab stem on the valve (14) and remove from handle (6).

3.3.5 Barrel/Threaded Adapter

3.3.5.1 Removing the set screw (19) will allow removal of barrel (5) from housing (2).

3.3.6 Housing/Endcap/Piston Assembly

- 3.3.6.1 Removing set screws (19) will allow the removal of threaded adapter (7) from piston assembly (37).
- 3.3.6.2 Removal of the locknut (8) may be accomplished by removal of a dowel pin, then unthreading the locknut (8) from the piston assembly (37). Note that the locknut has one side that has a polished finish which faces the bearing end of the piston assembly.
- 3.3.6.3 Removal of the end cap (4) is rather simple once the manifold (12) has been removed *(ref. para. 3.3.3)*. Unthread the end cap from the housing (2).
- 3.3.6.4 Removal of the piston assembly can then be accomplished by pushing on the threaded end of the piston rod (37).
- 3.3.6.5 Removal of the bearing (9) can be accomplished by using a long scribe with a hook on the end. Once the scribe has been inserted from the backside of the housing (2), hook onto the leather collar (17) and bearing (9). Gently pull out the bearing using care to prevent the scribe from damaging the bearing surface or scratching the bore of the housing.
- 3.3.6.6 After disassembly of the puller unit, remove and discard all 'o' rings, backup rings, and leather collar, in order to allow cleaning and complete inspection of all parts, check for wear or damage.



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3.4 Assembly

Note

All 'o' rings, backup rings and leather wipers should be replaced when re-assembling the puller unit. These are available from WCI as a set, WCI-1700-ORK, WCI-1800-ORK or WCI-1900-ORK for the model 1700, 1800, and 1900 respectively

- 3.4.1 All parts should be pre-lubricated where noted. Use 'o'-ring lubrication grease for all 'o'-rings and backup rings, and general purpose grease for all other moving parts.
- 3.4.2 Inspect all hydraulic passages, and thoroughly clean all passages and bores to ensure no metal debris or other contaminates are present.

3.4.3 Bearing

3.4.3.1 After pre-lubrication, install backup ring (23) onto the *outside* groove on the bearing (9). 'O' ring (22) must be installed on the pressure side of the backup ring (*ref. fig 3-03*). The backup ring has a radius which must face the adjoining 'o' ring (22).

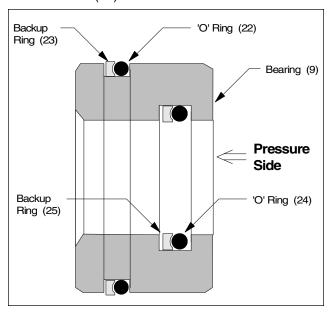


Figure 3-03

3.4.3.2 After pre-lubrication, install backup ring (25) and 'o' ring (24) on the *inside* groove of the bearing, as outlined previously in step 3.4.3.1.

- 3.4.3.3 Install leather wiper (17) into the housing (2).
- 3.4.3.4 Pre-lubricate the bore of the housing (Bearing OD & ID) (2) using general purpose grease prior to bearing (9) installation.
- 3.4.3.5 Install the bearing (9) into the housing, backup ring side first, using a plastic mallet and piston rod assembly (37). As the bearing reaches the end of the housing, align the leather ring (17) into position.

3.4.4 Piston/Barrel

3.4.4.1 Deburr the threaded end of piston assembly (37) and apply grease on the threads in order to prevent damage to 'o' rings in the bearing (9) during the insertion of the piston assembly into the housing. Install backup ring (27) and 'o' ring (26) using procedures previously outlined in step 3.4.3.1. Please note the backup ring will be installed to the short end of the piston rod assembly (ref. fig. 3-04).

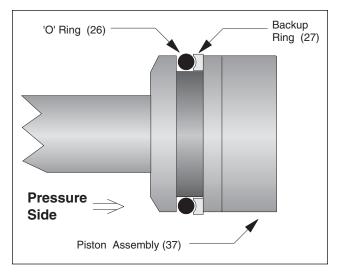


Figure 3-04

3.4.4.2 Insert piston assembly (threaded end first) into the rear of the housing into the ID bore of the bearing. Inspect rod threads for rubber 'o' ring material torn during installation. If 'o' ring material is present on the threads, remove piston assembly and bearing and replace the 'o' ring and re-install.



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3.4.4.3 Install lock nut (8) onto piston rod (shiny side toward housing). Align locknut to hole in piston, and install pin (20) to secure locknut to piston.

Note

The shiny side of the locknut must face toward housing, as it and the piston are match drilled to maintain a particular linear dimension

- 3.4.4.4 Install threaded adapter (7) onto piston assembly until seated against locknut. Tighten set screw (19) to lock in place.
- 3.4.4.5 Grease threads on housing prior to end cap (4) installation. Insert 'o' ring (28) into end cap, pre-lubing the end cap assembly. Thread end cap onto housing completely, then back up until alignment is made between the bottom of the end cap and manifold to be installed in steps 3.4.6.1 and 3.4.6.2.
- 3.4.4.6 Install barrel (5) into housing and tighten set screw (19).

3.4.5 **Handle**

- 3.4.5.1 Grease 'o' ring on three-way valve (14) prior to installation. Insert 3-way valve into handle (6) and secure with retainer (16).
- 3.4.5.2 Install trigger button (15). Tighten screw.
- 3.4.5.3 Install trigger guard (35) with screws (36).
- 3.4.5.4 If the hose assembly was previously removed, coat the hydraulic hose threads with removeable Lok-Tite and connect to handle. Teflon tape is not acceptable due to vibration! The black banded polyurethane supply hose is connected to 'S' on the handle, while the non banded hose control line is connected to 'C'.
- 3.4.5.5 Insert 'o' ring (31) into passage recess in handle (6) assembly (*ref. fig. 3-05*). Polish tube end (32), approximately ¹/₈", to facilitate insertion into housing. Gease

- lightly. Insert tube (32) seating firmly in place.
- 3.4.5.6 Install handle to housing using a modified capscrew (21) and 'o' ring (31).

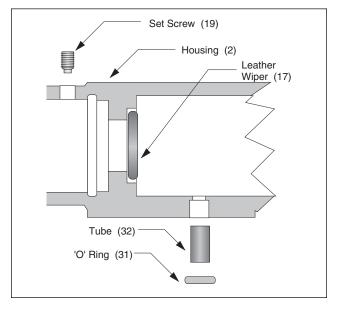


Figure 3-05

3.4.6 Manifold/Endcap/Tube

- 3.4.6.1 Install 'o' rings (30) onto both ends of return tube (11), grease 'o' rings, and insert one end of tube into handle.
- 3.4.6.2 Install 'o' ring (29) into manifold (12) using grease to hold in place. Install the manifold (12) onto the other end of the return tube (11).
- 3.4.6.3 Align endcap (4) and manifold (12). Secure in place using screw (13).



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Table 3-01 Puller Gun Troubleshooting Guide

Problem	Cause	Solution
Puller Gun is connected to the Power Unit but will not operate.	1. Supply air not connected to the Puller Gun.	Disconnect the Supply air line from the handle of the Puller Gun (the poly line with the black band around it). If the Power Unit is connected to supply air and the Puller Gun hoses are connected to the Power Unit, air will discharge from the disconnected Supply air line. Also, check the condition of the poly lines for cuts or punctures.
	2. Control air not activating the Power Unit.	Disconnect the Control air line from the handle of the Puller Gun. Squeeze the trigger on the Puller Gun. Air should discharge from the fitting. If it does, re-connect the line to the Puller Gun and disconnect the quick disconnect fitting at the Power Unit. Again, squeeze the trigger on the Puller Gun, air should discharge from the hose end quick disconnect fitting. If it does the problem is in the Power Unit.
	3. Power Unit	See Power Unit manual
Hydraulic fluid leaking or discharging from the trigger button on the Puller Gun handle.	Seals on the hydraulic piston are damaged or worn	Disassemble the Puller Gun and replace the seals.
Hydraulic fluid leaking or discharging from the front of the Puller Gun.	Seals on the hydraulic bearing are damaged or worn.	Disassemble the Puller Gun and replace the seals.
An audible discharging of air from the trigger of the Puller Gun handle.	Leaking or damaged trigger valve.	Remove and replace trigger valve.



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Section 4—Nosecaps

4.1 Introduction

The West Coast Industries nosecap assemblies, flush or extension, are tools used to hold the split sleeve in position during the coldworking process. As the mandrel is drawn through the sleeve during the coldworking process, the mandrel attempts to pull the sleeve through the hole. Sleeve slippage during coldworking must be avoided since any slipping action will cause damage to the hole bore. The flush nosecap assembly is composed of a nosecap, a three-piece jawset retained by three O-rings, and a retainer (*ref. fig. 4-01*), while the extension nosecap uses a one piece slotted nose extension in place of the jawset (*ref. fig. 4-02*).

Due to the high stresses generated during the coldworking process, it is highly recommended, where possible, that complete nosecap assemblies be procured when replacing broken parts since unseen damage may have occurred. It should be noted that the retainer and nosecap are interchangeable where noted in the applicable tooling tables.

4.2 Flush Nosecap

4.2.1 Disassembly

- 4.2.1.1 Perform the following operations while referring to Figure 4-01.
- 4.2.1.2 Using the appropriate nosecap wrench, WCI-1700-NW, WCI-1800-NW or WCI-1900-NW, remove the retainer by unthreading in a counter-clockwise manner. The jawset can then be removed from the nosecap. The O-rings can then be removed from the jawset which will free the individual jaw segments.

4.2.2 Assembly:

4.2.2.1 Perform the following operations while referring to Figure 4-01.

NOTE

Inspect jaw segments for burrs and or any other damage prior to assembly. Inspect O-rings for cuts, cracks, and or any other damage prior to installation.

4.2.2.2 Place the jaw segments into final assembly position. Slide the O-rings over the circumference of the jaw segments in the groove. Place the assembled jawset into the nosecap. Thread the retainer into the nosecap and tighten the retainer utilizing the nosecap wrench.

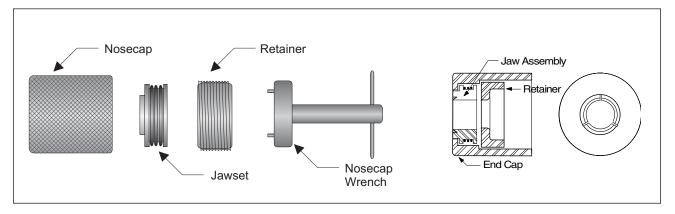


Figure 4-01



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4.3 Extension Nosecap

4.3.1 Disassembly

- 4.3.1.1 Perform the following operations while referring to Figure 4-02.
- 4.3.1.2 Using the appropriate nosecap wrench, WCI-1700-NW, WCI-1800-NW or WCI-1900-NW, remove the retainer by unthreading in a counter-clockwise manner. The nose extension can then be removed from the nosecap.

4.3.2 Assembly:

- 4.3.2.1 Perform the following operations while referring to Figure 4-02.
- 4.3.2.2 Slide the nose extension into the nosecap. Thread the retainer into the nosecap and tighten the retainer utilizing the nosecap wrench.

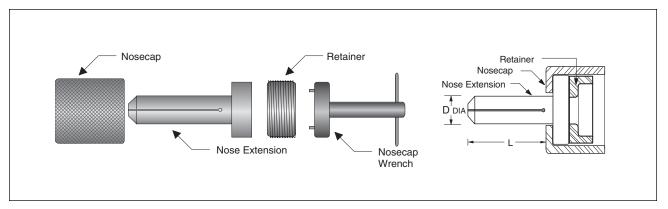


Figure 4-02



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Section 5—Offset Adapter

5.1 Introduction

The West Coast Industries series of offset adapters, the WCI-1700-OA and WCI-1800-OA for the Model 1700 and 1800 puller guns respectively, are designed to aid in the coldworking of holes which have an access restriction. The Offset Adapter unit threads into the front of the respective puller unit, allowing the mandrel axis to be offset parallel to the axis of the puller unit, thereby facilitating access to the hole. This design is rather simple, in that it contains a minimal number of moving parts.

5.2 Assembly of Offset Adapter to Puller

- 5.2.1 Remove the threaded barrel from the puller unit. Remove the threaded adapter from the piston rod *(ref. fig. 2-02)*.
- 5.2.2 Remove screws (19) from guard (18). Remove guard from the assembly *(ref fig 5-01).*
- 5.2.3 Slide moveable arm (3) rearward until brass portion of the moveable arm is exposed beyond the threaded portion of the stationary arm (2). Thread the moveable arm (3), onto the puller unit piston rod (ref. figs. 5-01, 5-02), until seated against the locknut (8).

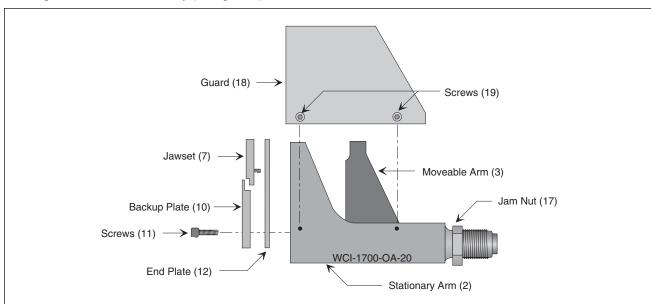


Figure 5-01

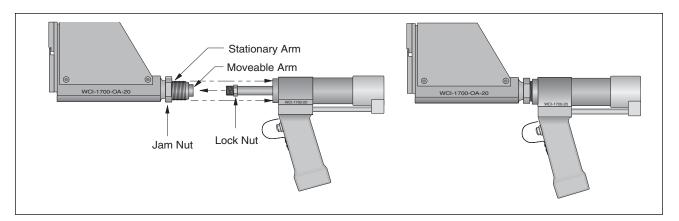


Figure 5-02



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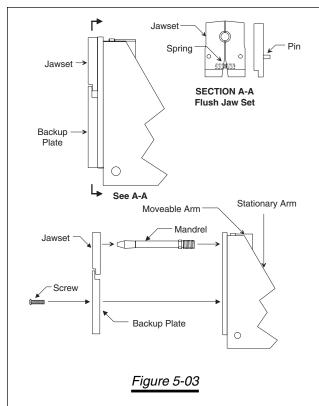
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- 5.2.4 After ensuring that the offset adapter is properly installed onto the piston rod, thread the stationary arm (2) into the puller unit until seated. Back off the stationary arm within one revolution, to the desired position, and lock in place with the jam nut (17).
- 5.2.5 Remove the two screws (11) holding the backup plate (10) onto the stationary arm (*ref. fig. 5-01*).
- 5.2.6 Thread the mandrel completely into the moveable arm (3).
- 5.2.7 Slide the *corresponding* jawset onto the mandrel, inserting pins (16) into the matching hole in the stationary arm.

NOTE

Make sure spring (15) is installed between the jaw sections before assembling onto the stationary arm (2).

5.2.8 Reinstall the backup plate (10) using the two screws previously removed.



WARNING

With the cover removed, moving parts present a hazardous condition. Keep hands, fingers, and objects free of this area. **Do not operate tool with cover removed**. After tool has been checked for proper operation, reinstall guard (18) with screws (19).

- 5.2.9 Examine the puller unit, hose assembly and power-pak for loose fittings, leaks, etc., before connecting puller unit to hydraulic power-pak.
 - 5.2.9.1 Cycle the puller unit, drawing the mandrel completely into the nosecap. A mandrel not drawing into the nosecap sufficiently, may be caused by a failure to thread the mandrel completely into the puller unit, or failure to correctly install the moveable arm assembly (3) onto the piston rod.

5.3 Disassembly of Offset Adapter:

- 5.3.1 Perform the disassembly operation while referring to Figures 5-01 and 5-02.
- 5.3.2 Removal from Puller Gun:
 - 5.3.2.1 Loosen jam nut (17).
 - 5.3.2.2 Rotate offset adapter assembly counterclockwise to remove stationary arm from puller gun housing.
 - 5.3.2.3 Continue to rotate to remove moveable arm from piston assembly.
- 5.3.3 Remove the guard (18) by removing the four screws (19). This will expose the moveable arm (3). Removal of the backup plate (10) can then be accomplished by removing the two cap screws (11). Removing these screws, allows the removal of the backup plate (10), end plate (12) and jawset (7) from the stationary arm/ housing (2). This will facilitate the removal of the moveable arm (3) as it is free to slide out of the housing (2).

5.4 Assembly of Offset Adapter:

- 5.4.1 Perform the assembly operation while referring to *Figure 5-01*.
- 5.4.2 Grease the bronze rod on the moveable arm assembly (3) with general purpose grease. Slide



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Tel: (206) 365-7513 Fax: (206) 365-7483 the moveable arm (3) into the stationary arm (2). Place the end plate (12) into position at the end of the stationary housing (2). Screw mandrel into moveable arm. Install jawset assembly (7) (insuring spring (15) is installed between the jaw sections) onto the endplate (12) by pressing the dowels on the jaw assembly into the holes provided in the endplate (12). Using the two screws (11), install the backup plate (10) onto the endplate (12). Place the guard into position on the Stationary Arm (2), and install the four screws (19).

WARNING

The Guard is a protective device. Failure to utilize the guard, may allow the operator to get hands or fingers into the area of moving parts, leading to serious operator injury!

5.4.3 Repeat assembly instructions defined in Section 5.2 to attach offset adapter to puller gun.

- 5.5.1 Inspect all parts for wear and damage.
- 5.5.2 Clean all parts with a cleaning solution.
- 5.5.3 If parts are useable, lubricate the inside bore of the the stationary arm and the bronze portion of the moveable arm.
- 5.5.4 Reassemble the parts per Section 5.4.
- 5.5.5 If parts are badly worn or broken, order replacement parts from West Coast Industries.
- 5.5.6 Lightly oil all surfaces with a shop towel to prevent tool from rusting.

5.5 Repair and Maintenance

Detail Number P/N WCI-XX00-OA-XX	Quantity	Description
-2	1	Stationary Arm
-3	1	Moveable Arm Ass'y
-7	As Req'd	Jaw Ass'y
-10	1	Backup Plate
-11	2	Screw
-12	1	End Plate
-17	1	Jam Nut
-18	1	Guard
-19	4	Screw

The above detail numbers are added to the basic offset adapter part number, ie., WCI-1700-OA-20-3 would be the moveable arm assembly for a 1700-OA with a 2" (-20) stackup capacity.



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Section 6—Accessories

Numerous accessories are available for the equipment listed in this manual. Please refer to WCI's *ColdworkTooling Catalog* for specific information and ordering information and/or contact West Coast Industries' Technical Engineering Department with your specific applications.

6.1 Other Capital Equipment

6.1.1 WCI manufacturers several Hydraulic Offsets, special puller units designed for restricted access situations

6.2 Power Supplies

6.2.1 One hand operated pump, one small, portable hydraulic unit and three factory oriented supplies are available.

6.3 Expendable Tooling

6.3.1 Sleeves, Mandrels, Nosecaps, Jaw Assemblies, Drills, Reamers, Backup Blocks and Gages.

6.4 Hose Assemblies

6.4.1 Two basic types of hydraulic hoses are available: Kevlar and steel braid. They are available in standard 10, 15 and 20' lengths, with other lengths available by special order. Quick disconncet fittings on the puller end of the hose are also available.



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