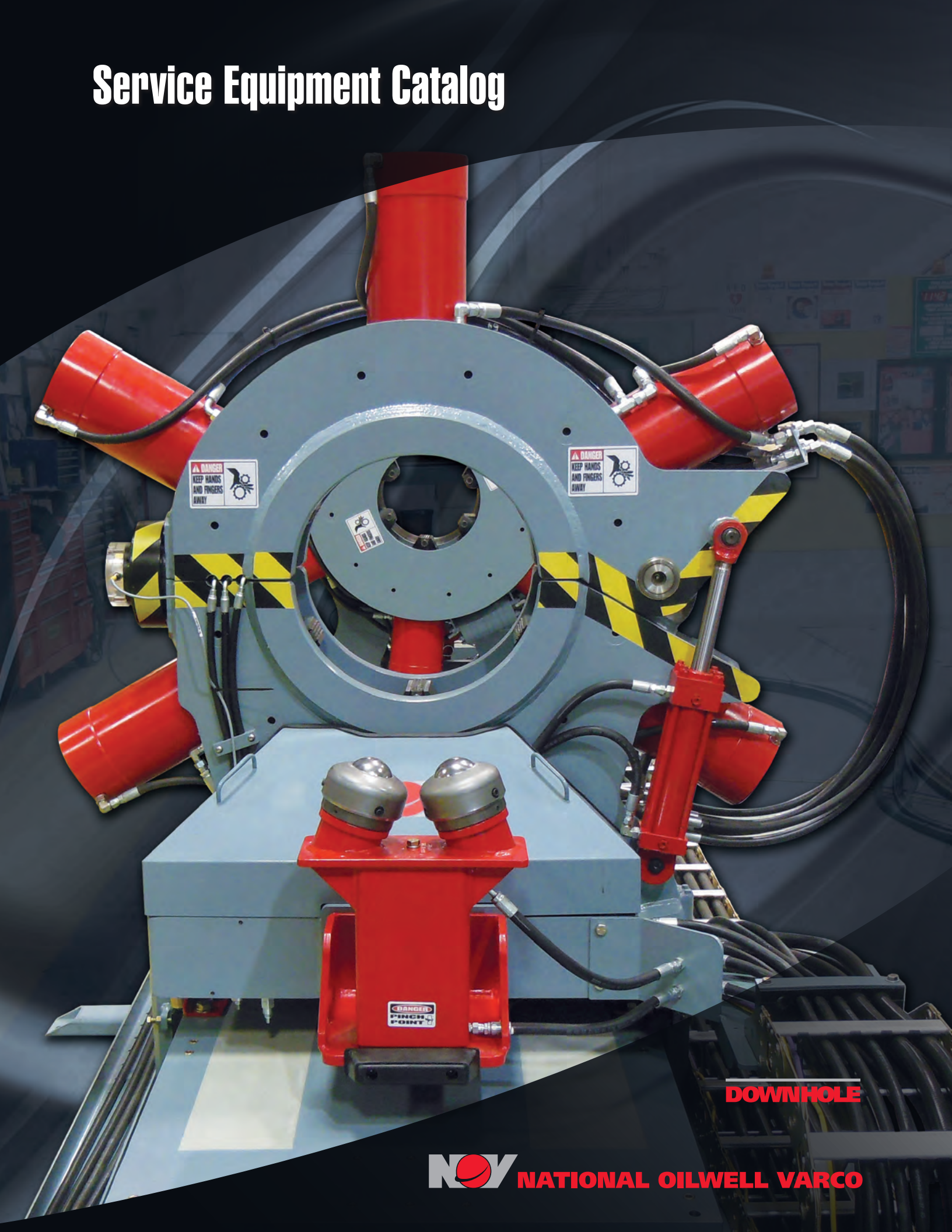
Service Equipment Catalog



DOWNHOLE

NATIONAL OILWELL VARCO

NOV's Downhole division is the largest independent downhole tool and equipment provider in the world. We provide the expertise to optimize BHA selection and performance, supporting over 150 locations in more than 80 countries.

Our complete range of solutions for the bottom hole assembly and related equipment includes:

- Drill Bits
- Drilling Motors
- Borehole Enlargement
- Drilling Tools and Products
- eTools
- Coring Services
- Fishing Tools
- Thru Tubing Tools
- Service Equipment
- Advanced Drilling Solutions

We take pride in delivering superior performance and reliability. Our objective is to become an integral part of our customer's strategies by providing solutions that exceed expectations while improving the economics of their operations.

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Service Equipment

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Contact

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Service Equipment Overview

NOV offers a wide range of service equipment that enables customers to conveniently service their downhole tools and equipment. We stand behind our service equipment with confidence, as it is exactly the same equipment we use to service our own tool fleet for customers around the globe. For ease of selection and ordering, NOV has categorized our Service Equipment offerings into four groups:

Connection Tools

Make-up and break-out tools for efficient maintenance

NOV connection tools are engineered for the fast, safe, and dependable maintenance of downhole tools in both workshop and wellsite locations. Our offering has expanded to include a wide variety of break-out machines that cover coil tubing, drilling, completions, rig applications, and much more.

This is broken into:

- *TorqueMaster*™ break-out machines
- *Peck-O-Matic*™ bucking units
- Mini service centers
- Field applications

Workshop Accessories

Utilized to maintain your downhole tools

NOV offers a wide selection of workshop accessories and vises. Each tool is manufactured to the highest standards and is built with dependability and ease of operation in mind. All tools, from portable service skids to complete service tool packages, are designed for wellsite and service shop safety, and are an inherently practical way of managing your tool fleet.

This is broken into:

- Rotor and stator measurement
- Safety pipe wrench
- Vises, skids, stands and cabinets

Product Testing

Rugged testing equipment to measure tool performance

The Downhole product testing range is designed to provide practical, rugged and dependable testing equipment to the users of its tools anywhere in the world. They have been designed to work fast and deliver the results expected of them, whatever the conditions. Our product testing range is the result of our technology, manufacturing and engineering discipline.

This is broken into:

- Motor test stands
- Jar Test stands

Global Support

Installation, commissioning, calibration, repairs, spare parts and preventative maintenance programs

At NOV, we understand the important role our equipment plays in our customers' business, as we use it every day in our own service operations. We are your Original Equipment Manufacturer (OEM) service and parts provider and are committed to standing by our products and our customers. Our service and inventory stocking locations are strategically placed around the world, enabling us to provide global support from over 30 specially trained technicians.

This is broken into:

- World Service Centers
- Custom Projects
- Mobile Service Solutions

Connection Tools

TorqueMaster™ Model 1689, 8025, 8026 and 8045 Make/Break Units

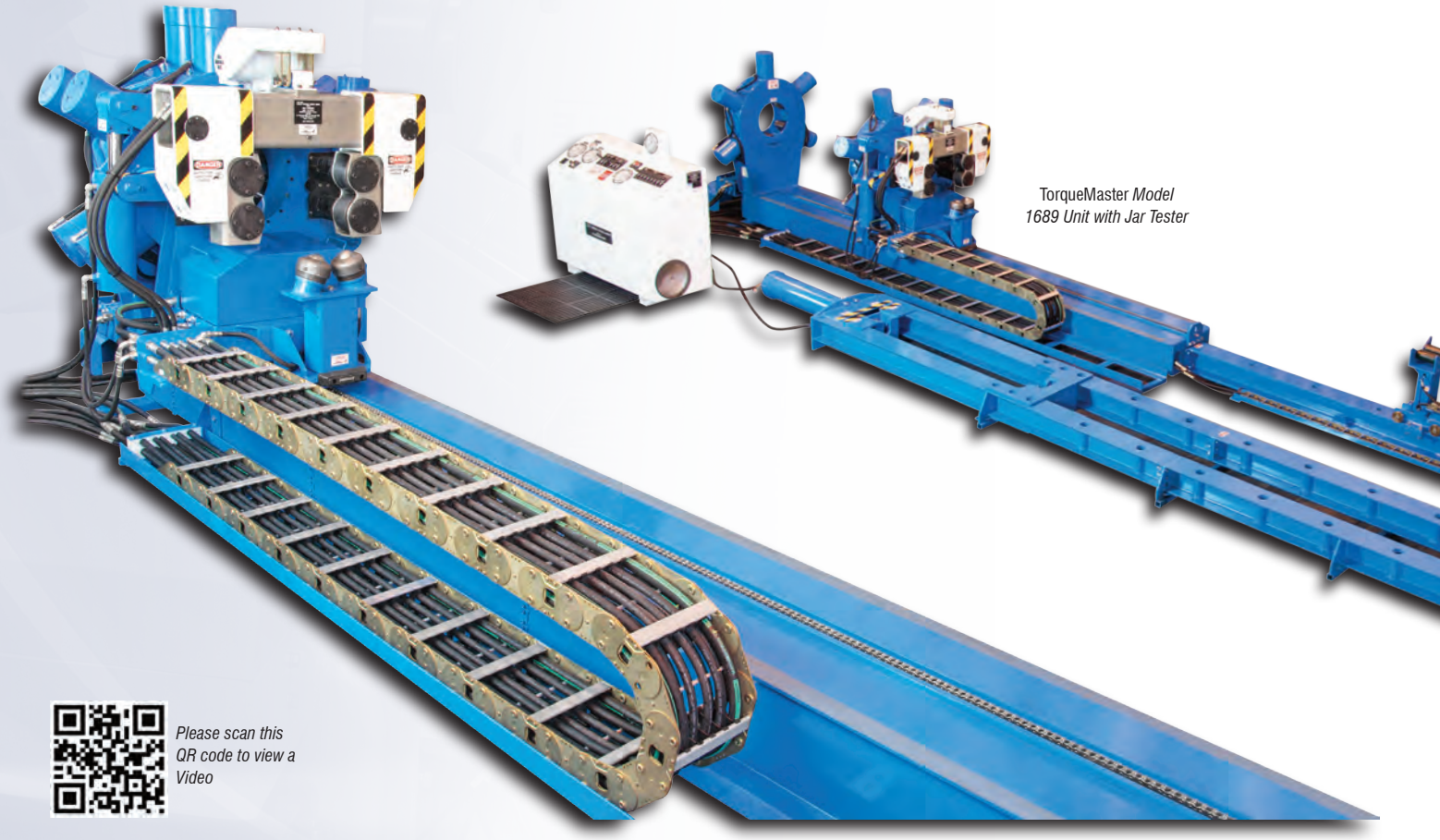
The *TorqueMaster*™ make/break unit is a ratchet-style horizontal torque unit designed to safely and efficiently make-up and break-out the threaded tubular tool joint connections used in downhole tools and equipment. These units are fully hydraulic and come standard with a fixed headstock bed assembly, a traversing tailstock, a hydraulic control console and a wide selection of options and accessories allowing for made-to-order configurations.

The 1689 and 8025 models incorporate fully closed headstocks while the 8026 model has a hinged headstock that opens and allows for the top-loading of work pieces into the headstock, eliminating the need to 'stab' tools into the unit and increasing workflow efficiency and productivity. The 8045 model offers a fully opened headstock and tailstock, allowing for top-loading of work pieces on both sides.

A single set of tong dies is used over the full Outer Diameter (OD) range of the unit, eliminating the need to constantly change dies as the work piece OD changes. The unit can be is safely and efficiently operated by one person from a low pressure, electric powered, standalone hydraulic control console that can be wired to suit any power supply. The console comes complete with auxiliary valves, control handles and outlets to accommodate additional accessories.

Features and Benefits

- **Safe and Easy to Use** – Can be operated by one person
- **Fully Customizable** – Accessories are chosen and configured to suit exact service requirements and can be added/removed at any time.
- **Increased Efficiency** – Provides fast and accurate make/break capabilities that will increase production
- **Power Traverse Tailstock w/ HD Suspension** – Controlled from the console, the tailstock is designed to carry a balanced load of 5,000 lbs and ensures safe handling of the work piece.
- **Clamp Force Proportional to Torque** – Clamp force increases with torque to reduce the risk of slippage during make/break operations
- **Self-Centering Synchronized Clamp Cylinders** – Torque is applied about the axial center line of the tool, ensuring accurate torque measurements and preventing thread damage.
- **Tong Dies** – One set for the full OD range of the unit and can be easily changed when worn



TorqueMaster *Model 1689 Unit with Jar Tester*

Please scan this QR code to view a Video

TorqueMaster™ Model 1689, 8025, 8026 and 8045 Make/Break Units

TorqueMaster Model 1689 Technical Specifications

Headstock Chucking Capacity	3½" to 14" diameter (with standard tong dies) 2½" to 13" diameter (with extra tall tong dies)
Tailstock Chucking Capacity	3½" to 14" diameter (with standard tong dies) 2½" to 13" diameter (with extra tall tong dies)
Torque Capacity - Minimum	4,000 ft-lb
Torque Capacity - Make-Up	150,000 ft-lb maximum
Torque Capacity - Break-Out	190,000 ft-lb maximum

TorqueMaster Model 8025 Technical Specifications

Headstock Chucking Capacity	3½" to 18" diameter (with standard tong dies) 2½" to 17" diameter (with extra tall tong dies)
Tailstock Chucking Capacity	3½" to 14" diameter (with standard tong dies) 2½" to 13" diameter (with extra tall tong dies)
Torque Capacity - Minimum	4,000 ft-lb
Torque Capacity - Make-Up	150,000 ft-lb maximum
Torque Capacity - Break-Out	190,000 ft-lb maximum

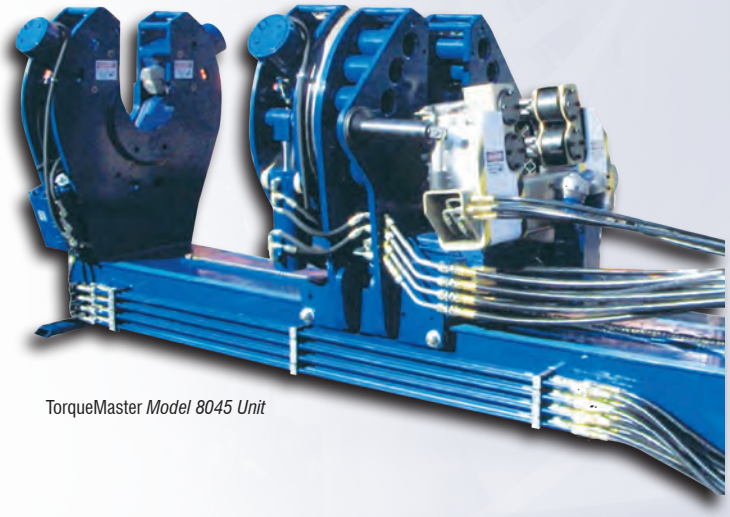
TorqueMaster Model 8026 Technical Specifications

Headstock Chucking Capacity	3½" to 18" diameter (with standard tong dies) 2½" to 17" diameter (with extra tall tong dies)
Tailstock Chucking Capacity	3½" to 14" diameter (with standard tong dies) 2½" to 13" diameter (with extra tall tong dies)
Torque Capacity - Minimum	4,000 ft-lb
Torque Capacity - Make-Up	150,000 ft-lb maximum
Torque Capacity - Break-Out	190,000 ft-lb maximum

TorqueMaster Model 8045 Technical Specifications

Headstock Chucking Capacity	3¾" to 11¾" diameter (with standard tong dies) 2¾" to 10¾" diameter (with extra tall tong dies)
Tailstock Chucking Capacity	3¾" to 11¾" diameter (with standard tong dies) 2¾" to 10¾" diameter (with extra tall tong dies)
Torque Capacity - Minimum	4,000 ft-lb
Torque Capacity - Make-Up	113,000 ft-lb maximum
Torque Capacity - Break-Out	113,000 ft-lb maximum

TorqueMaster *Model 8026 Unit Showing Hinged Headstock*



TorqueMaster *Model 8045 Unit*

TorqueMaster™ Model 1289 and 1387 Make/Break Units

TorqueMaster™ Jr. Model 1289 Make/Break Unit

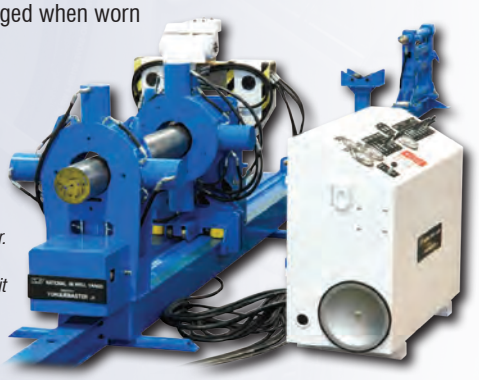
The *TorqueMaster*™ Jr. Model 1289 make/break unit provides a safe and easy way to make-up and break-out tubular tool joint connections. This fully hydraulic unit is designed for practicality and with service shop safety in mind.

Consisting of a standard fixed headstock and a traversing tailstock chuck, the unit can be custom configured to include various optional accessories, including extensions beams, rolling tool support jacks, a spinner assembly, a push/pull assembly and torque logging systems, all designed to increase the functionality of the unit. A single set of tong dies is used over the full 2⅝" to 8¼" OD range of the unit, eliminating the need to constantly change them as the tool OD changes.

The *TorqueMaster*™ Jr. make/break unit can be safely and efficiently operated by one person from a low pressure, electric powered, standalone hydraulic control console.

Features and Benefits

- **Operated by One Person** – Safe and easy to use
- **Fully Customizable** – Accessories can be chosen to suit the exact requirements of the shop.
- **Compact Design** – Ideal for shops where space is limited
- **Increased Shop Floor Efficiency** – Provides fast and accurate make/break capabilities that will increase shop production
- **Clamp Force Proportional to Torque** – Reduces risk of slippage during make/break operations
- **Self-Centering Clamp Cylinders** – Applies torque about axial center line of the tool, ensuring accurate torque measurements and preventing thread damage
- **Tong Dies** – One set for the full OD range of the unit that can be easily changed when worn



TorqueMaster *Jr. Model 1289 Make/Break Unit*

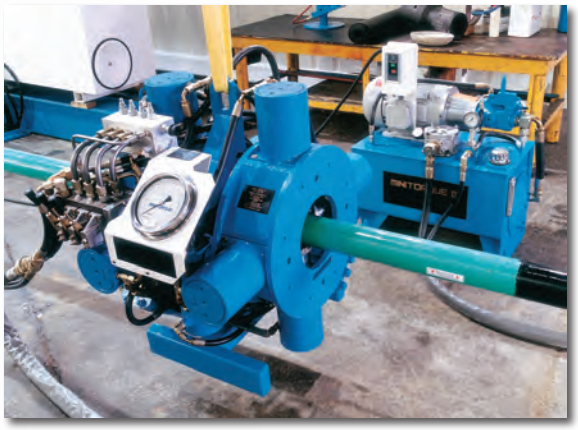
Mini-Torque II Model 1387 Make/Break Unit

The compact, self-contained design incorporates a fixed headstock and tailstock and offers fully integrated controls allowing for safe and efficient operation by one person. A single set of tong dies is used over the full 2⅝" to 8¼" OD range of the unit, eliminating the need to constantly change them as the tool OD changes.

The Mini-Torque II make/break unit operates at a low working pressure and comes complete with a standalone electric driven Hydraulic Power Unit (HPU).

Features and Benefits

- **Operated by One Person** – Safe and easy to use
- **Rigid, Compact Design** – Easily maneuverable and operable while suspended from a crane or resting on the ground
- **Clamp Force Proportional to Torque** – Reduces the risk of slippage during make/break operations
- **Self-Centering Clamp Cylinders** – Ensures torque is applied about the axial center line of the tool, ensuring accurate torque measurements and preventing thread damage
- **Tong Dies** – One set for entire OD range which can be easily changed when worn



Mini-Torque II Model 1387 Make/Break Unit

TorqueMaster Jr. Model 1289 Unit Technical Specifications

Headstock Chucking Capacity	2⅝" to 8¼" diameter (with standard tong dies) 1⅝" to 7¾" diameter (with extra tall tong dies)
Tailstock Chucking Capacity	2⅝" to 8¼" diameter (with standard tong dies) 1⅝" to 7¾" diameter (with extra tall tong dies)
Torque Capacity - Minimum	3,000 ft-lb
Torque Capacity - Make-Up	56,000 ft-lb maximum
Torque Capacity - Break-Out	70,000 ft-lb maximum

Mini-Torque II Model 1387 Unit Technical Specifications

Headstock Chucking Capacity	2⅝" to 8¼" diameter (with standard tong dies) 1⅝" to 7¾" diameter (with extra tall tong dies)
Tailstock Chucking Capacity	2⅝" to 8¼" diameter (with standard tong dies) 1⅝" to 7¾" diameter (with extra tall tong dies)
Torque Capacity - Minimum	3,000 ft-lb
Torque Capacity - Make-Up	56,000 ft-lb maximum
Torque Capacity - Break-Out	70,000 ft-lb maximum

Log Master Units

Log Master II Model 8090 Torque Logger Unit

National Oilwell Varco is pleased to present the Log Master II logger units. These automated data logging devices are designed to operate in the harsh environment of a workshop.

Log Master II units may be safely and efficiently operated by one person from the hydraulic console on the Jar Tester Machine or *TorqueMaster*™ units. All functions of the Log Master II logger are easily accessed through the use of an industrial grade touch screen.

Log Master II logger can also be used to log on NOV's Jar Testers. It is available for both stand-alone Jar Testers (model 8090-B-57) and for Jar Testers with a *TorqueMaster* unit (model 8090-B-51).

The Log Master II controller/logger displays and records torque and automatically creates a tool report in PDF that includes connection specific information and a Torque vs. Time plot. The Log Master II unit features enhanced operator usability with a customizable graphic user interface to match workflows.

The supervisory software used with the Log Master II controller/logger takes advantage of an office computer to handle the many functions associated with the creation of tools, job files, and data management of logged jobs.

- Allows rapid creation of the component and tool libraries, used to create job files.
- Tools are displayed graphically and component icons are user customizable.
- Log Master II unit can download selected job files created on an office computer (PC).
- Logged jobs in Log Master II, which are uploaded to a PC or network, can be imported into software for review and archiving. This software can generate reports with graphic display of the logged torque for tool joint.

Optional Accessories

- Supervisory software for the Log Master II controller/logger, which allows for advanced data management of logged jobs.
- Software features include:
  - Create / Edit Tools menu (Brand, Tool Type, Size, Series)
  - Create / Edit Tubular Connections menu
  - Create / Review Jobs
  - Assign Jobs to specific operators
  - Easy to use calibration procedure for *TorqueMaster* unit

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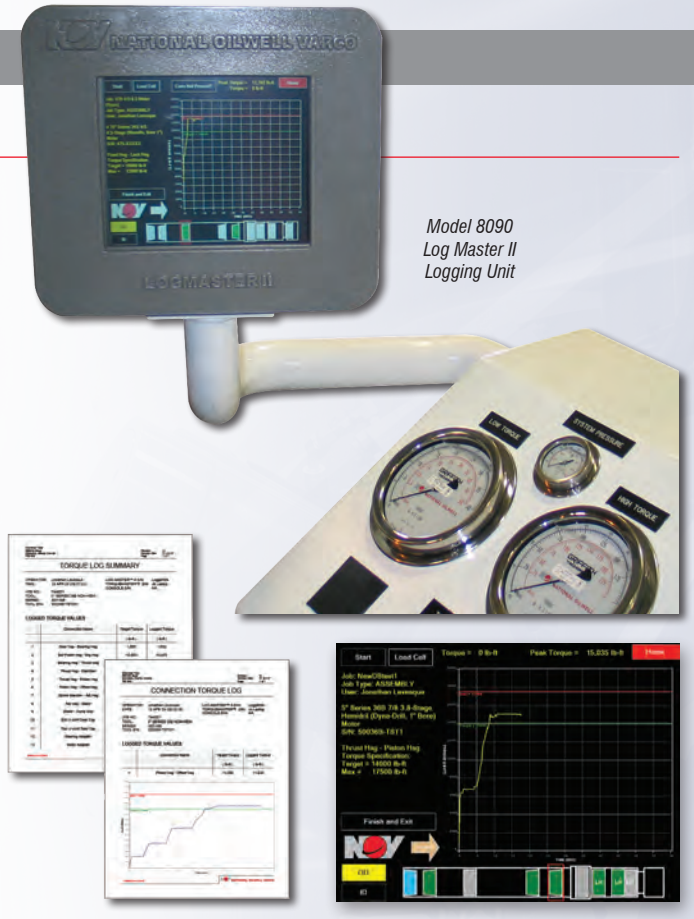


Model 8090 Log Master II Logging Unit

Features

- Automated data-logging and PDF reporting tools
- Displays and records applied torque
- Logs both external and internal connections
- Customer specific connections and notes can be added to connections database.
- Local and remote database storage
- Common tools and connection templates
- Administrative features to organize and assign tasks
- Wireless remote control from tablet or laptop PC
- Custom, in-house hardware and software design
- Fully sealed, thick aluminum case with *Lexan*™* screen panel for extended protection
- 12" color display touchscreen
- Optional over-torque protection valve

Benefits

- Designed to operate in the harsh workshop environment
- Can be operated safely and efficiently by a single user
- Database fully searchable by tool serial number, date of operation or operator name
- Tool and Connection reports saved in PDF for easy transfer and viewing
- Changes to the torque value's and work flows can be made automatically inside the database

Log Master Units

Log Master I Model 8089 Torque Logger Unit

The Log Master I model 8089 torque logger unit is an automated data-logging device, which has been specifically designed to operate in the harsh environment of a workshop. All functions of this unit are accessed through the use of an industrial grade touch screen, which ensures an extremely user-friendly product.

During make-up and break-out operations, the unit will record the value of torque being applied. A report is created and can be printed on the integral printer at the time, or stored and printed at a later date. Software and interconnect cables are also included allowing the data stored on the Log Master I torque logger unit to be downloaded and transferred to a PC.

The Log Master I torque logger unit is compatible with all NOV break-out machines.

Log Master I Model 8089 Torque Logger Unit

TrueTorque™ Digital Gauge

The *TrueTorque*™ digital torque gauge is designed to retro-fit into the console of your existing *TorqueMaster*™ unit to provide reliable, calibrated torque measurements for the machine.

The internal calibration of the gauge eliminates the need to have a calibration sheet on hand to correct the readings of an existing mechanical gauge, leading to more efficient operation and fewer errors during servicing. The gauge automatically adjusts for low-torque and high-torque ranges and for make and break directions, so only one scale is needed on the gauge face. A built-in LCD screen displays the numeric value, and a needle displays an analog value of the torque during operation. The gauge also includes a high resolution menu system to display other features, such as, calibration history, torque history, date/time, *TorqueMaster* unit usage and console temperature.

Features

- 2 pressure transducers for make and break directions
- Integrated LCD display
- Integrated electronic memory
- Glass touch button controls
- Imperial or metric unit setting
- Safety glass shield
- Fully environmentally sealed
- Retro-fits high and low torque gauges
- Digital and analog torque readout
- Service and calibration schedule
- Over-temperature alarm
- Six languages
- Usage intensity and time display
- Saves last 100 connections in memory
- Comes with hydraulic components necessary for installation/retrofit

Options

- Power supplies available for standalone use or in conjunction with the Log Master I torque logger unit.
- Back-up 0-4000 psi analog gauge

TrueTorque Digital Gauge Technical Specifications

Pressure Transducers (Range)	0 to 5,000 psi (0 to 34.5 MPa) 0 to 300,000 ft-lb (0 to 400,000 Nm)
Pressure Transducers (Accuracy)	±0.5 %
Pressure Transducers (Burst Capacity)	10,000 psi (69 MPa)
Temperature (Storage)	-40 to 85 °C (-40 to 185 °F)
Temperature (Operating)	-20 to 70 °C (0 to 160 °F)
Diameter	7.63" (194 mm)
Depth	2.90" (74 mm)
Weight	5.8 lb (2.6 kg)

TorqueMaster™ Unit Optional Accessories

Bed Length

The most common bed length is 16', but other lengths are available to suit space and tool handling requirements.

Headstock and Tailstock Extension Beams

Extension beams can be bolted on either side of the bed and used to accommodate hydraulic support jacks and a push/pull assembly. Use of these beams and accessories reduces the need for additional handling equipment once the tool is in the machine. The beams are of heavy duty construction to resist wear and withstand all possible forces. These beams are available in 6', 10', 12' and 19' lengths and can be combined to achieve any length required.

Hydraulic Support Jacks

Operated from the console, these jacks can be raised and lowered to assist with handling the work piece. The jacks are on rollers that enable them to move back and forth along the extension beam and have a placement pin that holds the jack in place once its desired location is found. A maximum of four (4) support jacks are included per unit for models 1689, 8025, 8026 and 8045 and three (3) are included for the model 1289 unit.

Hydraulic Push/Pull Assembly

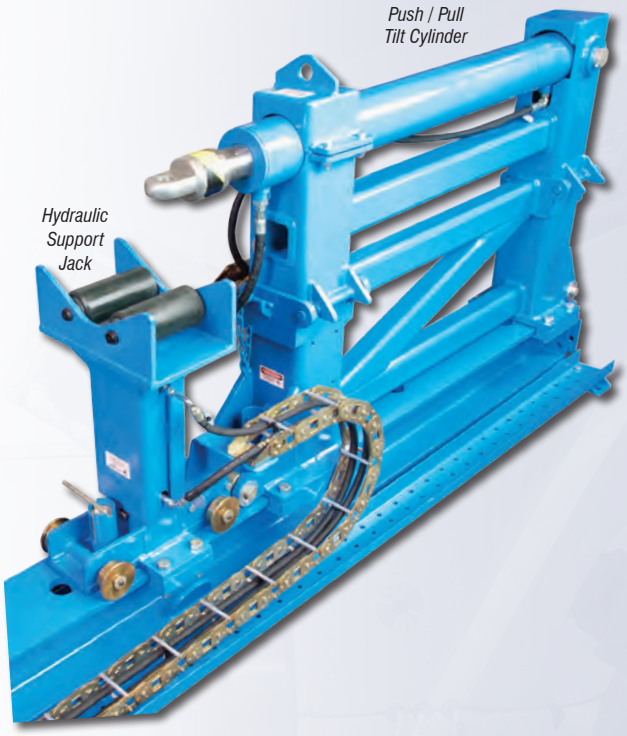
Operated from the console, this assembly is used to insert or remove rotors from stators or for any other application where push/pull force is required. A large 48" stroke push/pull cylinder capable of 63,000 lbf pushing and 40,000 lbf pulling is used on the 1689, 8025, 8026 and 8045 units and a smaller 36" stroke cylinder capable of 20,000 lbf pushing and 12,000 lbf pulling is used on the 1289 unit. Both can be tilted out of the way when not in use. The force applied is measured on a hydraulic gauge on the console. Maximum one (1) push/pull assembly per *TorqueMaster* unit.

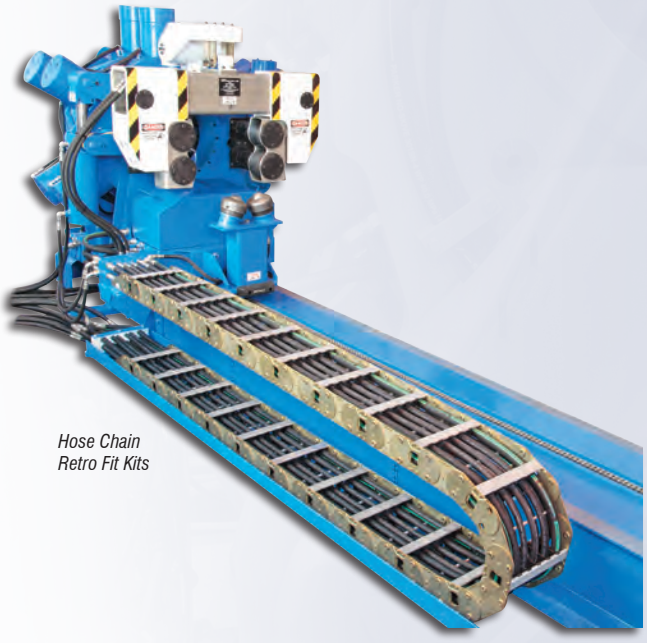
Push/Pull Tilt Cylinder

Operated from the console, this cylinder allows the operator to raise the push/pull assembly into a working position when in use and lower it out of the way when it is not required, without leaving the control console or requiring the assistance of an overhead crane.

Hose Chain

Available in either metal or plastic, the hose chain is used to enclose and protect the hydraulic hoses that run along the bed and extension beams. Adding an aesthetic appeal, the hose chain eliminates the problem of premature wear on hydraulic hoses and increases safety by reducing the tripping hazard caused by loose hoses that surround the machine. A hose chain on the bed is standard on any bed longer than 16'.





TorqueMaster™ Unit Optional Accessories

Heavy Duty Spinner

Operated from the console, this hydraulic spinning tool can handle tools spanning the full OD range of the unit and allows the operator to quickly spin up or spin out of low torque shouldered connections. The spinner can be mounted on either the headstock or tailstock of the 1289, 1689, 8025 and 8045 models but only the tailstock of the 8026 model. Maximum of one spinner is available per *TorqueMaster* unit.

Spinner End Covers Kit

The purpose of the covers is to block access to potential pinch points when the clamp arms are extending. A slot on the stationary inner tube of the frame allows the rod end of the cylinder to attach to the outer clamp arm assembly. Although employees working on or around the machine are required to maintain a 3 foot minimum distance when in use, the potential for serious injury during extension remains. The spinner end covers kits greatly reduces risk.

Independent Clamp Control

Available as an additional control on the console for the 1689, 8025, 8026 and 8045 models, this option allows the operator to increase the clamp force independently when handling hardened material, reducing tong die slippage during torque application.

Safety Shield

This polycarbonate safety shield mounts to the control console and provides a transparent safety barrier between the *TorqueMaster* unit and the operator. This protects the operator from any errant debris that may be thrown in the user's direction, and offers high optical visibility while featuring significant impact, UV and fire resistance.

Operation Light and Actuator Pin Sensor

Providing a higher level of safety, the operation light alerts those around the machine when the unit is in operation. In addition, the *TorqueMaster* 8026 unit has an actuator pin sensor that informs the operator when the hinged headstock is fully locked and ready for clamping.

Hose Bridge

The hose bridge is designed to bridge over and eliminate the tripping hazard created by the hoses that connect the console to the main unit.

TorqueMaster Unit Drip Pan Assembly

The drip pan contains all fluids around the *TorqueMaster* unit. It can eliminate the need to install expensive drainage systems in the area surrounding the unit and slip hazards due to spillage or accumulation of water, hydraulic oil, or drilling mud around the machine, helping to keep the work area clean and tidy.

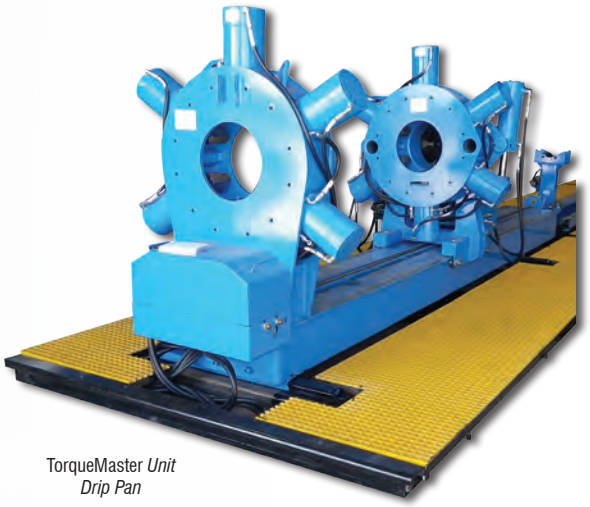
Jar Tester Control

The Jar Tester can be controlled from the 1689 and 8025 *TorqueMaster* unit console and eliminates the need for a separate Jar Tester control console.

Spinner End Covers Kit

Heavy Duty Spinner

Hose Bridge and Platforms



TorqueMaster *Unit Drip Pan*

TorqueMaster™ Continuous Rotation Units

TorqueMaster™ Model 8107 Continuous Rotation Unit

The Model 8107 is a self-contained, freestanding, hydraulically powered unit designed for fast and accurate make-up or break-out of threaded connections on completion strings.

The unit consists of a fixed headstock backup (for up to a 12½" O.D. tool), and a traveling continuous rotation tailstock chuck (8⅝" bore for up to a 8¼" O.D. tool) that provides the torque.

A flow dividing circuit in both the headstock and tailstock units synchronizes the movement of their respective sets of cylinders (6 for the headstock, 4 for the tailstock) and 4 cylinders (for the tailstock) to provide positive centering of even the heaviest work pieces. This circuit realigns the cylinders each time they are retracted and prevents possible damage to the flow divider.

The *TorqueMaster*™ Model 8107 Continuous Rotation Unit operates at a low working pressure (3,200 psi max.), which eliminates the need for high-pressure hoses and fittings. Standard tong dies (extra tall for the headstock and regular height for the tailstock) and standard seals are used in all cylinders.

Features and Benefits

- Fixed headstock back up with 2½" to 12¼" diameter capacity using extra tall tong dies
- Traveling tailstock chuck 2⅝" to 8¼" diameter capacity
- No jaws or inserts to change for different work piece diameters
- Self-centering cylinders extend evenly
- 25,000 ft-lb breaking force on freestanding base skid
- Standard tong dies ensure easy replacement
- Operates on 3,200 psi hydraulic pressure
- Torque-Turn system available upon request
- Parts largely interchangeable with standard *TorqueMaster* units

TorqueMaster™ Model 8111 Continuous Rotation Unit

The *TorqueMaster*™ continuous rotation unit is a self-contained freestanding continuous rotation torque unit designed for fast and accurate make-up and break-out of premium threaded connections and multi-connection tools with various diameters.

Powered by an independent Hydraulic Power Unit (HPU), the *TorqueMaster* continuous rotation unit is ideally suited for completion tool applications or other applications where continuous turn capability is desired.

The *TorqueMaster*™ continuous rotation unit consists of a continuous rotation headstock and a hinged, traversing, non-rotating, tailstock. The hinged tailstock is an industry first that allows the operator to drop tools into the tailstock as opposed to having to stab them in. The unit is capable of handling both concentric and eccentric connections and our unique soft shoe jaw design provides wide grip size flexibility within each jaw set and requires fewer jaw sets to handle the same OD range as competitor's products. Maximum jaw ranges means minimal jaw changes.

Features and Benefits

- 14" continuous turn fixed headstock
- 18" hinged traversing tailstock
- Fully enclosed hydraulic power unit
- Electronic touch screen control console complete with safety shield
- Torque/turns data logging system
- Fixed tool support jack attached to the tailstock
- Fixed tool support jack attached to the bed on the headstock side
- Metal hose chain on the bed

TorqueMaster Continuous Rotation Unit Technical Specifications

Model	8107	8111
Chucking Capacity	2½" to 12½" Headstock OD Range 2⅝" to 8¼" Tailstock OD Range	2⅜" to 14" Headstock OD Range 2⅜" to 18" Tailstock OD Range
Minimum Torque Capacity	1,000 ft-lb	1,500 ft-lb Low Torque Option - 1,700 ft-lb High Torque Option
Make Up Torque Capacity	25,000 ft-lb maximum	64,000 ft-lb Low Torque Option - 80,000 ft-lb High Torque Option
Break Out Torque Capacity	25,000 ft-lb maximum	64,000 ft-lb Low Torque Option - 80,000 ft-lb High Torque Option
Width	57¼"	63" Operational, 71" w/ Tailstock Open
Height	73¼"	76" Operational, 93" w/ Tailstock Open
Length	Various bed lengths available	Various bed lengths available

As with all *TorqueMaster* units, continuous rotation models are available in various bed lengths, extension beams, push/pulls, jacks, digital logging, and other accessories.

TorqueMaster™ Model 8111 Continuous Rotation Unit Design Features

Headstock and Tailstock Design Features

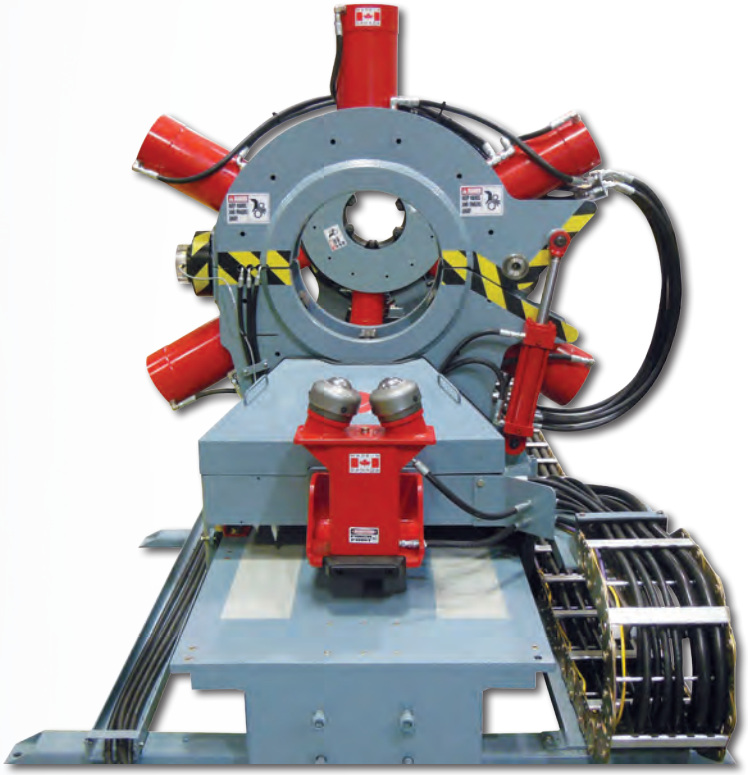
Tailstock Bias Mechanism
As the tailstock senses a side load, a hydraulic lock is released and permits the tailstock to move in the direction of the force. The ability of the tailstock to move while a connection is being made/broken allows for smooth thread engagement and disengagement and minimizes the risk of damaging the threads.

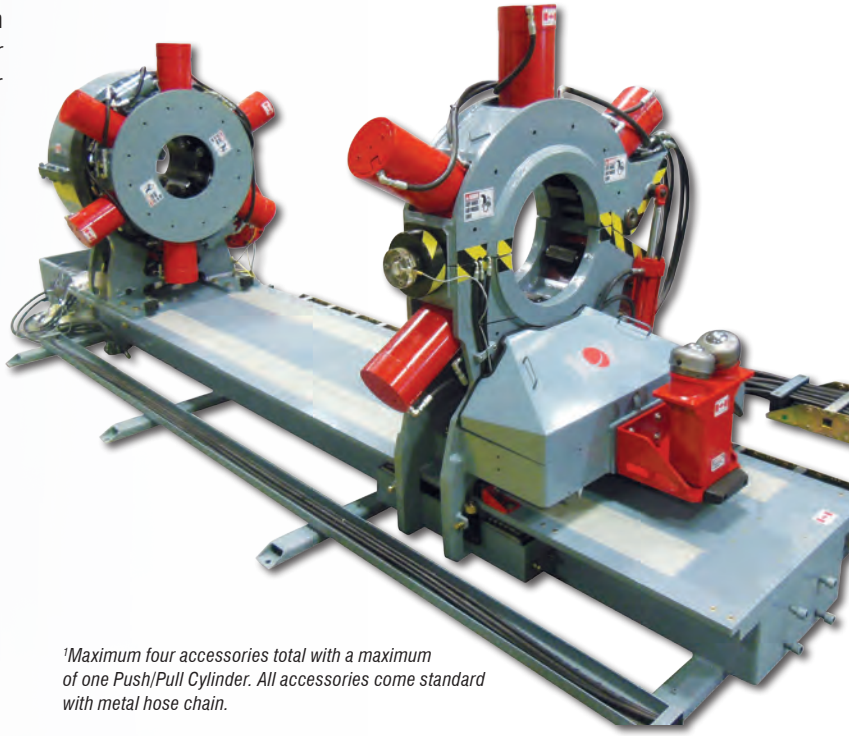
Precision Machined Headstock Bed
The bed assembly is precision machined to allow the headstock and tailstock to be fully aligned and minimizes any risk of thread damage during make/break operations of premium thread connections.

Hinged Tailstock
Fully opening tailstock allows the operator to quickly and easily drop tools into the tailstock as opposed to “stabbing” them into the unit.

Concentric and Eccentric Gripping
A flow-dividing circuit controls the clamp cylinders on both the headstock and tailstock, enabling concentric gripping in three or six cylinder clamping configurations. Independent top and bottom clamp control on the tailstock enables two-cylinder clamping of eccentric connections.

Gripping Mechanisms
Our unique non-marking soft shoe jaw design provides the flexibility of a wide range of grip sizes within each jaw set and requires only four different jaw sets to cover the entire OD range of the unit. Less down time spent changing jaws means increased productivity. *TorqueMaster* unit standard and extra tall tong dies can also be used for gripping over the entire OD range.





Tailstock View of Two-Cylinder Gripping of an Eccentric Connection with Soft Shoe Jaws

[1]Maximum four accessories total with a maximum of one Push/Pull Cylinder. All accessories come standard with metal hose chain.

TorqueMaster™ Model 8111 Continuous Rotation Unit Design Features

Control Console and Hydraulic Power Unit (HPU) Design Features

Fully Electronic Control Console
Software user interface allows for complete electrohydraulic control and easy operation of the numerous functionalities of the unit including make-up/break-out connection notification, clamp force warning and independent full clamp force control for both the headstock and tailstock.

Data Logging Software and Job Reporting
Records torque, turns and RPM during makeup, as well as displaying min/max shoulder window and min/max torque window. Job data can be printed or downloaded via USB interface.

Max Torque Interrupt System, and Torque and Hold System
The control system will accurately reach and maintain the desired torque until the operator releases the valve, enabling an accurate torque record. Other functions of the unit will not be effected until the operator places the valve in neutral. The system also has the option to hold the torque in the target torque range to ensure that unmeasured over-torque does not occur. The system may also dump automatically at target torque as standard units do if desired.

RPM and Torque Measurement
RPM is accurately measured via a shaft mounted encoder. Torque is measured via a tension/compression load cell.

Oil Cooler/Low Oil Alarm/Temperature Alarm
Allows for extended operation without risk of overheating the oil and automatically alerts the operator of low oil levels and high temperatures. Also, a filter monitoring system feature notifies the operator when filters are in need of replacement.

Hydraulic Power Unit (HPU)
The HPU utilizes a Baldor Electric Company Super-E™* high efficiency, electric motor that minimizes noise and heat. The hydraulic pumps are fully pressure compensated and include torque limiters.

Fully Electronic Control Console

**CompactRIO and LabVIEW are trademarks of National Instruments Corporation.*
**Super-E is a trademark of Baldor Electric Company.*

Peck-O-Matic™ Model 637, 640, 814 and 821 Bucking Units

Peck-O-Matic™ bucking units, tubing tongs and sucker rod tongs are world renowned for their durability and reliability in providing continuous turn make and break operations. Used in a shop environment, on the rig floor or anywhere in between, these units are built for speed and efficiency, and can be relied upon to perform in the most demanding conditions.

NOV offers a complete line of continuous turn bucking units that provide the most precise and efficient means of achieving proper connection make-up and break-out for drill floor crew operations.

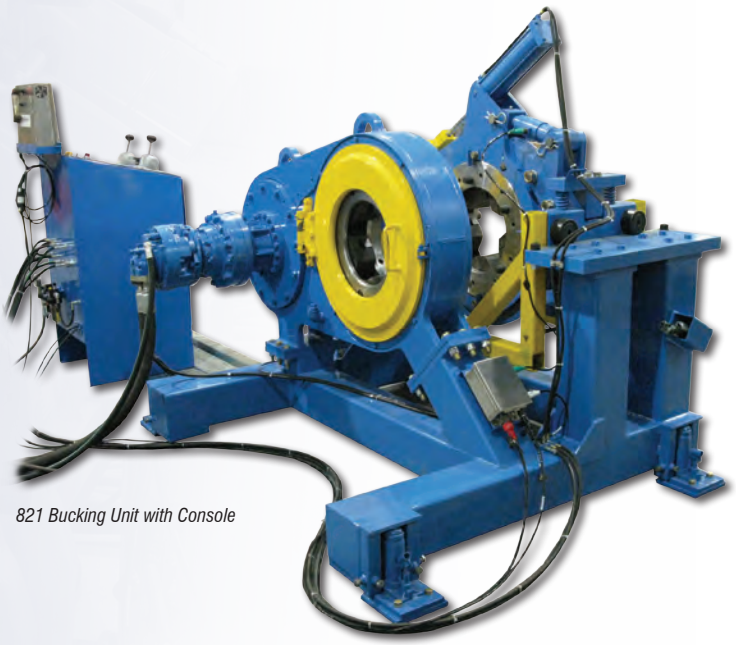
Peck-O-Matic bucking units cover the entire range of pipe and couplings from 1 5/16" – 21" OD. All units feature an efficient closed head design, a contamination-free oil bath lubrication system and precise torque control. Standard units are available in either skid or frame mounted varieties, and come complete with a hydraulic power unit and control console enabling safe and efficient operation by one person.

Torque monitoring is available in three options with varying levels of system control:

1. Hydraulic Torque Gauge complete with Torque Link – Offers torque measurement via a hydraulic torque gauge. All system rotation and torque control is performed by the operator.

2. Digital Gauge complete with a Load Cell – Offers accurate torque measurement through a load cell and digital gauge combination. All system rotation and control performed by the operator.

3. Computer Analyzed Torque/Turn/Time System complete with a Load Cell – Offers accurate torque measurement and the most precise monitoring, controlling and recording of the bucking process. The computer enables the operator to set the min/max and desired torque for each connection. When the desired torque is reached, a dump-valve will activate and stop the unit from turning. The computer will generate torque/turn/time graph for each connection and can be stored for future reference.



821 Bucking Unit with Console

Peck-O-Matic™ Model 637, 640, 814 and 821 Bucking Units

Features and Benefits

- **Safe and Easy to Use** – Can be safely and efficiently operated by one person.
- **Increased Efficiency** – Provides fast and accurate make/break capabilities that will increase production.
- **Precise Control** – High and low gear settings offer precise control of RPM and torque to minimize the potential of thread damage.
- **Reliable** – Tough yet simple design has been field proven through more than 40 years of use in the most demanding conditions.
- **Adjustable Height** – Adjustable jacks are available on all skids and frame mounted units to accommodate for varying pipe sizes, leveling the unit on uneven terrain and ensuring proper alignment with the pipe handling systems.
- **Modular and Customizable** – Can be supplied with a selection of torque monitoring options and is offered in customizable configurations to meet the unique requirements of our customers.
- **Multiple Grip Options** – Jaw and insert combinations are available in standard or fine diamond point faces.

Peck-O-Matic Bucking Unit Technical Specifications

Model Number	Model 637	Model 640	Model 821	Model 814
OD Range	1 5/16" to 7 5/8"	1 5/16" to 7 5/8"	2 3/8" to 17"	3 1/8" to 21"
Min Torque	300 ft-lb	300 ft-lb	4,000 ft-lb	5,000 ft-lb
Max Torque	11,000 ft-lb	16,000 ft-lb	75,000 ft-lb	100,000 ft-lb
Max RPM - High Gear	166 RPM	48 RPM	20 RPM	15 RPM
Max RPM - Low Gear	13 RPM	15 RPM	10 RPM	8 RPM

640 Skid Mounted Bucking Unit

Model 8079 Mini Service Center

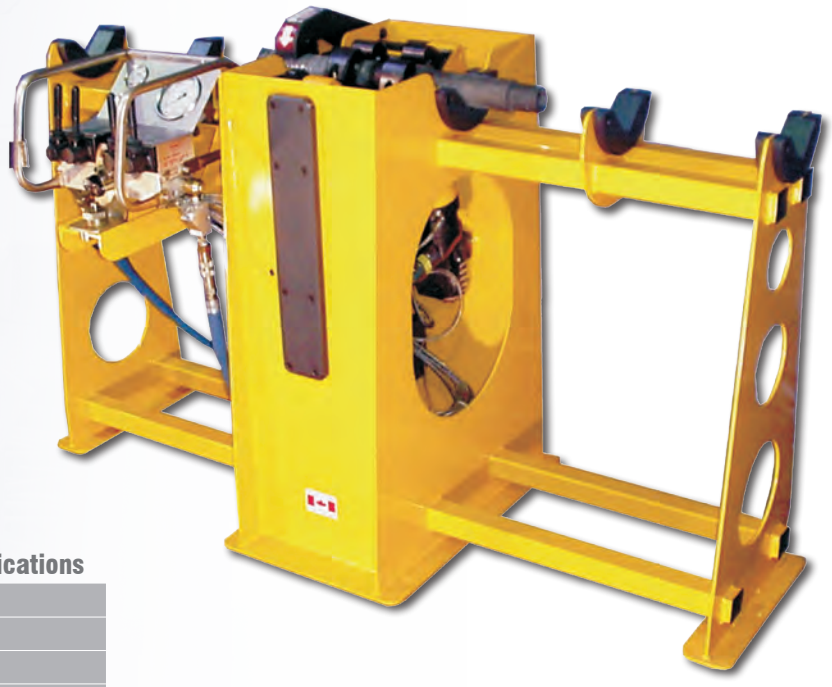
The 8079 Mini Service Center provides a safe and easy way to make/break tool joint connections on small OD tools and pipes. This fully hydraulic system is designed for practicality and with service shop safety in mind.

The back-up and tong are mounted into a compact, rigid, frame that integrates the unit controls, making it easy for a single operator to handle. A single set of jaws can grip the full 1 1⁄16" to 3½" OD range, and the unit can accommodate a different OD on either side of the connection.

The Mini Service Center operates at a low working pressure and can be powered by a variety of power sources.

Features and Benefits

- **Operated by One Person** – Safe and easy to use
- **Open Mouth Design** – Allows for easy loading and unloading of the work piece
- **Rigid, Compact Design** – Easily maneuvered to accommodate various shop layouts
- **Adjustable Clamp Force** – Reduces the risk of crushing thin walled tools
- **Clamp Force Proportional to Torque** – Reduces the risk of slippage during make/break operations
- **Clamp Arm** – Secures work piece into service center
- **Tong Dies** – One set for entire OD range and can be easily changed when worn



Model 8079 Mini Service Center Technical Specifications

Tool OD Range	1 1⁄16" to 3½"
Distance Between Jaws	3"
Minimum Torque	400 ft-lb
Maximum Torque	5,000 ft-lb
Operating Pressure	2,900 psi
Required Flow	3.9 GPM

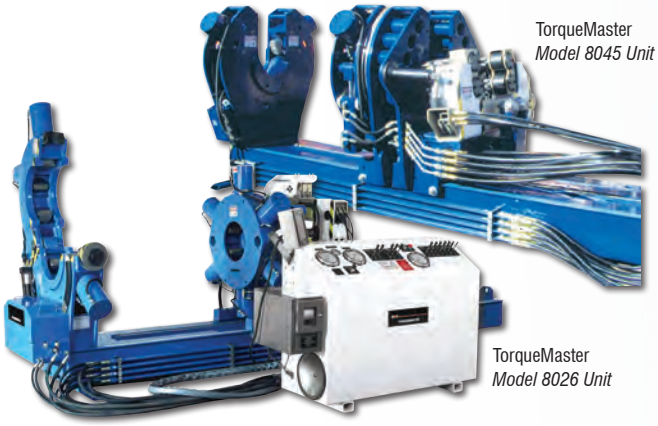
Field Applications

TorqueMaster™ Model 8026 and 8045 Offshore Units

The *TorqueMaster*™ 8045 and 8026 units are self-contained freestanding hydraulically powered units designed for fast and accurate make-up or break-out of threaded connections on drilling tools, tubular goods, and related equipment. The units have the ability to greatly increase efficiency of offshore drilling operations: they provide fast and accurate make/break capabilities that will increase production offline from the drill floor. This way, the rig will spend more time doing what it does best – drilling.

Features and Benefits

- **Safe, Easy to Use, and Self Contained** – an industry recognized safe practice for the making and breaking tubular tool joint connections. Running off their own HPU, these units can be operated by one person.
- **Fully Customizable** – the full line of accessories for the *TorqueMaster* unit can be chosen and configured to suit the customer's service and space requirements.
- **Skid-Mounted** – The *TorqueMaster* unit has the option of being mounted on a lifting-certified skid, so they can be easily moved around the pipedeck with a crane to accommodate other equipment and operations.
- **Flexibility** – adjusting BHA and/or tool configurations on-the-fly allows the rig to respond more quickly and more effectively to changes occurring downhole.
- **Accuracy** – The *TorqueMaster* unit ensures that critical connections are torqued to their required value and minimizing the possibility of a connection backing off downhole.



TorqueMaster
Model 8045 Unit

TorqueMaster
Model 8026 Unit

TorqueMaster Model 8026 & 8045 Units Technical Specifications

	8045 *TorqueMaster* Unit	8026 *TorqueMaster* Unit
Headstock Design	Fully Open	Hinged Closed
Tailstock Design	Fully Open	Fully Closed
Headstock Clamp OD Range	3¾" - 11¾" (standard tong die) 2¾" - 10¾" (extra tall tong die)	3½" - 18" (standard tong die) 2½" - 17" (extra tall tong die)
Tailstock Clamp OD Range	3¾" - 11¾" (standard tong die) 2¾" - 10¾" (extra tall tong die)	3½" - 14" (standard tong die) 2½" - 13" (extra tall tong die)
Make-Up Torque	4,000 ft-lb - 113,000 ft-lb	4,000 ft-lb - 150,000 ft-lb
Breakout Torque (max)	113,000 ft-lb	190,000 ft-lb
Console Operating Pressure	3,200 psi	3,200 psi
Console Noise Rating	80 dB (A)	80 dB (A)
Base Unit Dimensions (L x W x H)	192" x 58" x 74"	192" x 61" x 78" (Closed) - 192" x 75" x 93" (Open)
Base Unit Weight (16' bed w/o accessories)	9,000 lb	10,750 lb
Console Dimensions (L x W x H)	60" x 24" x 45"	60" x 24" x 45"
Console Weight	1,500 lb	1,500 lb

Field Applications

Little Jerk™ II Model 8071 Mini-Tong

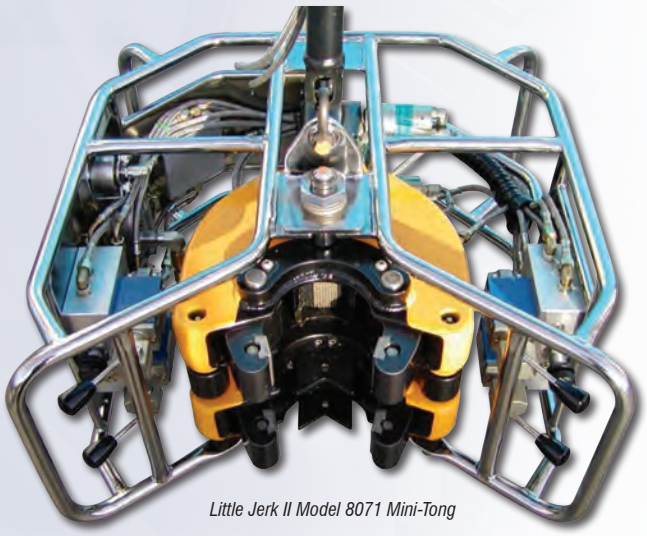
The *Little Jerk* II Model 8071 Mini-Tong provides a safe and easy way to make-up and break-out tool joint connections on small OD tools and pipes. This portable compact service tool offers a fully hydraulic system designed for practicality and with rig floor and service shop safety in mind.

The back-up and tong are mounted into a durable crash frame that integrates the unit controls, making it easily handled and operated by one person. A single set of jaws can grip the full 1 1⁄16" to 3½" OD range and the unit can accommodate a different OD on either side of the connection.

The *Little Jerk* II mini-tong operates at a low working pressure and can be powered by a variety of power sources.

Little Jerk II Model 8071 Mini-Tong Technical Specifications

Tool OD Range	1 1⁄16" to 3½"
Distance Between Jaws	3"
Minimum Torque	400 ft-lb
Maximum Torque	5,000 ft-lb
Operating Pressure	2,900 PSI
Required Flow	3.9 GPM
Dimensions (L x W x H)	22.5" x 20.5" x 23"
Weight	250 lb



Little Jerk II Model 8071 Mini-Tong

Features and Benefits

- **Operated by One Person** – Safe and easy to use
- **Open Mouth Design** – Allows for easy loading and unloading of the work piece
- **Rigid, Compact Design** – Easily maneuverable and operable in various horizontal or vertical positions
- **Hydraulic Lifting Cylinder** – Hydraulically adjust the vertical position of the tong when operated from a suspended position
- **Adjustable Clamp Force** – Reduces risk of crushing thin walled tools
- **Clamp Force Proportional to Torque** – Reduces risk of slippage during make-up and break-out
- **Tong Dies** – One set for entire OD range and can be easily changed when worn

Little Jerk™ II Mini-Tong Safety Features

Effortless Torque

Slips, trips, overexertion and strains constitute 21% of all oil and gas extraction injuries. Many of these injuries occur when torqueing connections. The *Little Jerk* II 8071 mini-tong greatly reduces these risks when handling pipes and tools. The lightweight unit is equipped with a hydraulic lifting cylinder to lift the mini-tong to the ideal location, and a built-in control panel and a set of powered tongs to safely make and break tubular connections. This simplified connection process greatly reduces the risk of slips, trips, overexertion and strain.

Enable Safe Practice

The area around the wellhead is the most dangerous. Workers can be struck by moving equipment or suspended loads, caught between machinery and moving parts, or trip on uneven or slippery surfaces. The 8071 enables an efficient connection, requiring less time and fewer people to complete, which minimizes the time employees spend in close proximity to the wellhead and therefore decreases risk of an incident.

Hands-Off Approach

Constituting 34% of the industry's recordable injuries, hands and fingers are the part of a worker's body most vulnerable to injury. The 8071 reduces this risk by controlling the connection process, using integrated hydraulic control knobs in place of the traditional pipe wrench connection method.

Integrated Safety

Every feature of the 8071 was designed with safety and practicality in mind. The open-mouth design reduces the risk of being caught in pinch points and allows easy tool loading. A single set of tong dies for the entire OD range means minimal tool adjustment. With flexible operating positions, the operator can tailor the tool's orientation to suit the job and maximize safety. The low 2900 psi working pressure limits the risk of high pressure fluid injuries.

Jar Testers

Drilling and Fishing Jar Tester

NOV jar tester units are rugged, self-contained units designed to test the operation condition of fishing jars, drilling jars and other downhole drilling tools. The horizontal main frame and attached hydraulic cylinder efficiently applies tension and compression forces in direct axial alignment with the test piece.

Each jar tester unit is designed for safe and efficient operation by a single operator using a low pressure, electric powered, standalone hydraulic control console. These test units may also be operated as an accessory to the NOV *TorqueMaster*™ Model 1689 and 8025 make-up/break-out unit consoles.

Test nubbins are needed to connect the test piece to the unit are sold separately and should be specified with size and connection type at time of inquiry.

Drilling and Fishing Jar Tester

Features and Benefits

- **Operated by One Person** – Safe and easy to use
- **Simple and Clean Design** – Simple frame design and control options can accommodate any shop space.
- **Adjustable** – Head and tail carriages can be adjusted to accommodate varying tool lengths. Frame extensions are available to accommodate longer tools.
- **Full Function Testing** – Capable of testing in both tension and compression
- **Variable Force Control** – Test force can be adjusted to attain desired force for proper testing
- **Recordable Test Results** – Log II or standard chart recorder

Drilling and Fishing Jar Tester Technical Specifications

Series	1360-0001	1361-0001	1767-0001	1786-0001
Max Force - Tension	206,000 lbs	206,000 lbs	130,000 lbs	130,000 lbs
Max Force - Compression	235,000 lbs	235,000 lbs	150,000 lbs	150,000 lbs
Stroke	30”	30”	32”	32”
Operating pressure (max)	3,200 psi	3,200 psi	3,200 psi	3,200 psi
Max Tool Diameter	14”	14”	12”	12”
Max Tool Length	30’	34’	24’	16’
Frame Type	2-pc fixed	2-pc fixed	2-pc fixed	Telescoping
Frame Length	39’-8”	43’-8”	31’	22’-9” Extended - 14’-10” Collapsed
Frame Width	48”	48”	38”	30”
Frame Height	19”	19”	15”	17”
Frame Weight	6,000 lbs	6,300 lbs	4,100 lbs	1,700 lbs
Console 8067-0100 - Dims (L x W x H)	30” x 24¼” x 48”	The same console is used for all models shown. Max one console per unit		
Console 8067-0100 - Weight	980 lbs	980 lbs	980 lbs	980 lbs

Jar Testers

Coiled Tubing Jar Tester

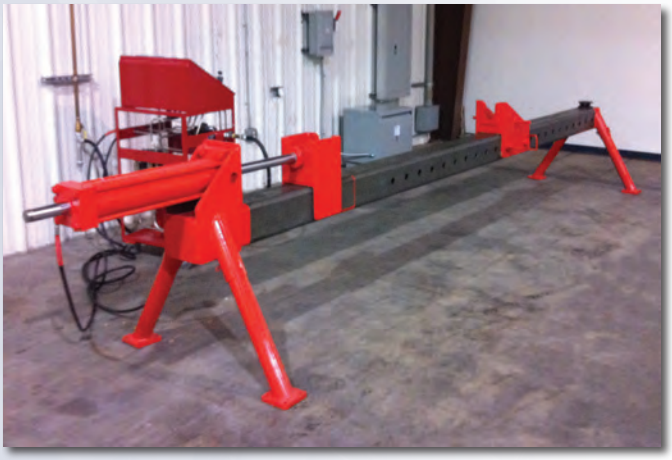
The coiled tubing jar tester is a rugged, self-contained unit designed to test the operation of coiled tubing drilling jars. The horizontal main frame includes a hydraulic cylinder that applies tension and compression forces in direct axial alignment with the test piece.

The cylinder is balanced and applies the same force in both tension and compression. This allows for use with an optional chart recorder or digital logging tool to record the load applied by the cylinder.

The coiled tubing jar tester may be safely and efficiently operated by one person from a low pressure, electric powered, standalone hydraulic control console.

Features and Benefits

- **Operated by One Person** – Safe and easy to use
- **Compact Design** – Simple frame design and standalone console can accommodate any shop space
- **Recordable Test Results** – Log II or standard chart recorder



Coiled Tubing Jar Tester

Coiled Tubing Jar Tester Technical Specifications

Maximum Force Tension	50,000 lbs
Maximum Force Compression	50,000 lbs
Stroke	24”
Maximum Operating Pressure	3,000 PSI
Tool Diameter Capacity	1 1⁄16” to 12”
Tool Length Capacity	24” to 132”
Frame Length (Including Cylinder)	18’ - 8”
Dimensions (W x H)	46” x 36”
Weight	1,340 lbs

Motor Test Stands

DuraTester™ Motor Test Stand

The *DuraTester*™ motor test stand is a drilling motor dynamometer test bench designed to be operated safely and efficiently by one person. The *DuraTester* motor test stand offers easy clamping and support systems for either straight or bent motors. In addition, the *DuraTester* stand offers a fast and simple means to couple the motor to a high pressure fluid supply and easily connect the motor output shaft to the dynamometer. Floor to floor time is therefore very short, so the unit offers a rapid turnaround on any test.

The *DuraTester* motor test stand is operated from a free standing electronic control console that includes touch screen operated controls for torque, weight on bit and speed. Real-time feedback on the pressures, torque, flow and RPM are displayed graphically on a PC based Human Machine Interface (HMI) display, which also stores the data for review or representation on evaluation forms. In addition the HMI monitors the status of all critical operational parameters to ensure that all components of the system are operating at peak performance and alerts the operator of any problems.

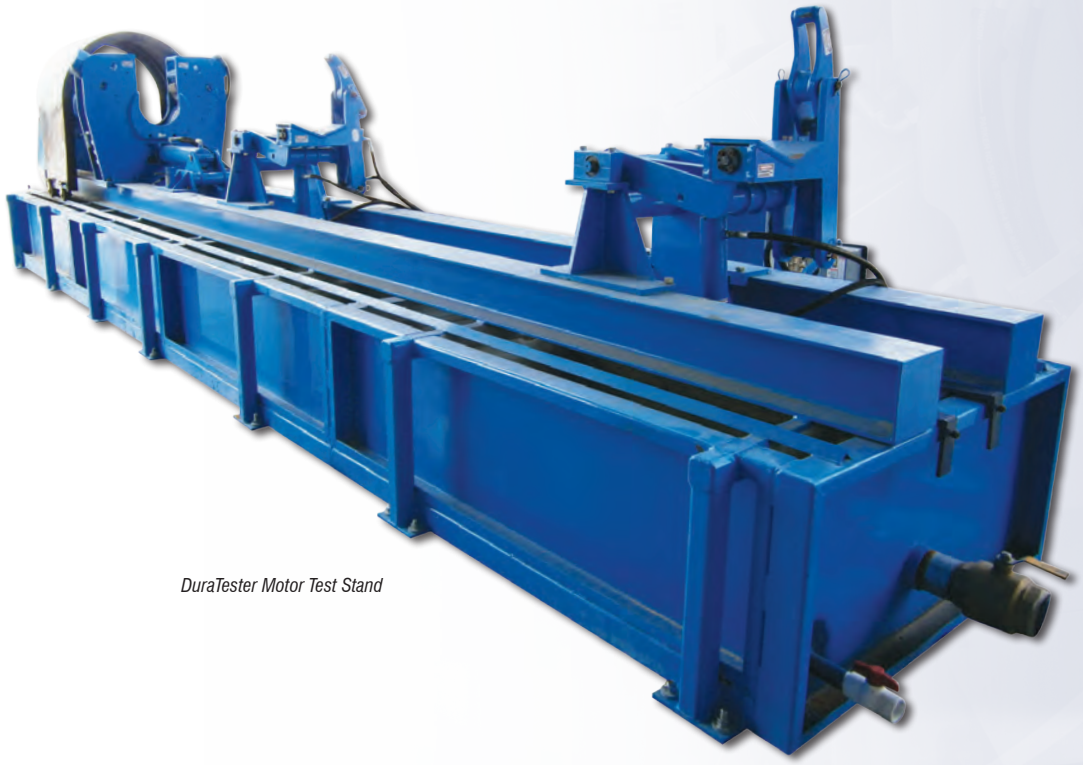
The water cooled multiple disk braking system provides accurate and repeatable load application. Operation of the unit is intuitive, with flow rate and torque controlled independently. The optional cooling package extends the continuous run time of the brake, allowing for long term duration and performance testing.

The *DuraTester* motor test stand is capable of testing motors ranging from 3¾" to 11¼" OD, with all operations being performed from a free standing control console. A self-centering clamping head grips the motor and a positioning cylinder is extended or retracted to move the clamp head to the desired location. This cylinder also provides smooth operation during braking and thrust loading.

The water cooled multiple disk brake assembly provides the desired braking torque and comes standard with its own cooling system designed to dissipate the heat generated during intermittent testing. Optional modifications are available to accommodate more frequent or prolonged tests.

The motor is supported by two hydraulic saddles that can be raised or lowered to support bent motors and can be easily repositioned along the test bed to accommodate various motor lengths. A hydraulic retaining arm on each saddle is used to secure the motor to the saddle.

Please contact DH-ServiceEquipment@nov.com for further information on the *DuraTester*.



DuraTester Motor Test Stand

Motor Test Stands

Model 8118 Coiled Tubing Motor Test Stand

The 8118 coiled tubing drilling motor test stand is a motor dynamometer test unit used to verify the performance of new coiled tubing motors as well as evaluate the performance of used motors being returned from the field.

The complete unit is designed to be operated safely and efficiently by one person. Its modular design allows the flexibility to place the frame, control console, Hydraulic Power Unit (HPU) and fluid tank to accommodate your shop space.

The frame and brake system utilizes three clamps for securing the test piece, coupled with a fast and simple means to connect the motor to both the brake system and the fluid supply line. A pneumatically modulated disc brake provides accurate, repeatable load application and the precise control required to evaluate small diameter motors at low torque and slow speed.

The high pressure pump is capable of producing 124 GPM @ 2,500 PSI and is powered by a 200 hp, 460V 3 PH 1800 RPM TEFC electric motor with a variable frequency drive. The pump unit includes a suction strainer that removes any contaminants entering the test loop to prevent damage to the pump. An accumulator reduces flow pulsation created by the pump, allowing for more accuracy during testing.

The control console of the 8118 motor test stand incorporates a custom designed touchscreen data acquisition system. The system compiles operator and motor information, records and stores the motor test results in a searchable database and provides the option to print the test results in both imperial and metric units.

Features and Benefits

- **Safe and Easy to Use** – Can be operated by one person
- **Modular Design** – Component orientation can be altered to best suit your shop space.
- **Accurate and Reliable** – Return line suction strainer removes fluid contaminants and an accumulator reduces flow pulsations, producing more accurate test results.
- **Fully Electronic Control Console** – Touchscreen system provides precise control of system flow and torque.
- **Custom Designed Software** – Captures test results and stores in a searchable database for future reference
- **Verified Motor Performance** – Instant test results confirm the performance of the motor.

Model 8118 CT Motor Stand Technical Specifications

Tool OD Range	1 1⁄16” to 3½”
Torque Capacity	0 to 2,500 ft-lb
Fluid Capacity (at max flow)	124 US gpm @ 2,500 psi
Fluid Capacity (at max pressure)	100 US gpm @ 3,000 psi
Electrical	200 hp, 460V, 3PH, 245 Amp
Tank Capacity	550 US Gallon
Frame Dims	180” x 30” x 48”
HPU Dims	84” x 48” x 36”
Console Dims	21” x 18” x 48”
Tank Dims	48” x 48” x 77”

Model 8118 Coiled Tubing Motor Test Stand

Workshop Accessories

Safety Pipe Wrench

The NOV Safety Pipe Wrench provides a safe and effective means to manually make and break tool joint connections on Downhole tools. The wrench is designed using a lightweight, ductile material and eliminates the risk of unexpected catastrophic wrench failure that can occur while torqueing with other brand pipe wrenches. The balanced aluminum alloy carry-handle has been ergonomically designed and features four gripping locations for easy handling.

To further enhance the safety and reliability of the NOV Safety Pipe Wrench, NOV recommends the use of a digital alarmed load scale to measure the force applied to the wrench while applying torque to a connection. The scale has an 80db audible alarm that sounds once a pre-programmed force has been reached and will reduce the risk of overloading the wrench when tightening tool joint connections.

Features and Benefits

- **Lightweight Aluminum Alloy Handle** – Almost 5 lbs lighter than a standard 60" Pipe Wrench
- **Up To 8" Outside Diameter (O.D.) Tong Areas** – Completely replaces the need for standard wrenches
- **No Critical Load Bearing Cast Parts** – Tool yield is predictable
- **Only Ductile Alloy Materials Used** – Brittle failures are no longer a concern
- **Industry Leading Load Rating** – 8,500 ft-lb (3" - 8" O.D. Parts), 6,500 ft-lb (0 - 3" O.D. Parts)
- **Easily Inspected** – Tool designed for easy disassembly and inspection
- **Balanced Carry Handle** – Oriented for use with load scale and crane
- **Fewer Pinch Points Than Competition**

Safety Pipe Wrench

Alarm Scale

Workshop Accessories

Model 1609 Service Vise

The 1609 Service Vise is a floor mounted vise designed to hold a variety of tubular components while service work is carried out. The work piece rests on a "V" shaped tool support plate containing a series of tong dies and is secured to the vise by a heavy duty leaf chain. A floor mounted air-over-hydraulic pump controls a hydraulic cylinder that is used to engage the chain latch and secures the work piece.

Features and Benefits

- **Operated by One Person** – Safe and easy to use
- **Simple and Robust Design** – Allows for easy loading and unloading of the work piece and requires minimal maintenance
- **Air Over Hydraulic Operation** – No external Hydraulic Power Unit (HPU) is required

Model 1609 Service Vise Technical Specifications

Tool OD Range	3¾" to 12"
Torque Capacity	20,000 ft-lb
Working Height	36"
Length x Width	29" x 18¼"
Weight	460 lb (no mount)

Model 1609 Service Vise

Complete Tool Packages

For service work, including full hand tool packages, wrenches and tongs, MPI equipment, pressure washing equipment, and oil pumps to fill drilling tools and motors.

Complete Tool Packages

Workshop Accessories

Stator and Rotor Measurement Tools

Regular monitoring of rotor and stator measurements provides valuable information on stator and rotor wear resulting in reduced downhole power section failure and increased confidence in power section performance.

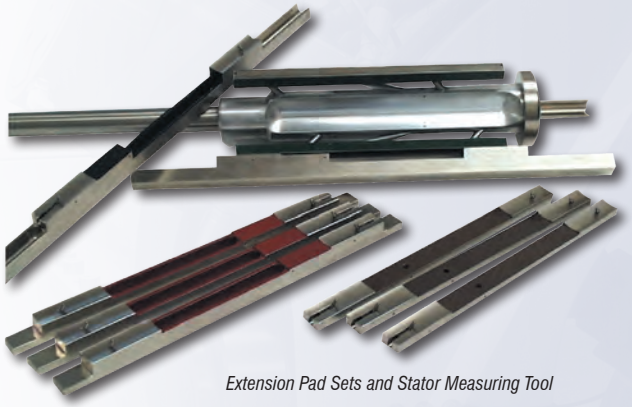
Stator Measurement Tools

The NOV Stator Measurement Tools (SMT) provide an easy and accurate method to measure downhole motor stator sizes. These tools are manufactured to a tight tolerance and offer precise measurement to an accuracy of +/- 0.002" with a very high rate of repeatability.

Accurately measuring rotor and stator clearance to adjust interference for elevated hole temperatures greatly increases stator life. Adequate temperature compensation can even result in successful motor performance at temperatures which exceed manufacturer recommendations.

Features and Benefits

- **Easy to Use** – Measurements can be taken easily by one person
- **Compact Design** – Can be collapsed for quick and easy storage to prevent damage when not in use
- **Precise Measurements** – Not only determine initial stator and rotor interference for quality assurance but also assist operators in evaluating the need for interference adjustments for hot-hole conditions
- **Reliable Performance** – Enable monitoring of stator wear life with successive measurements between field runs



Extension Pad Sets and Stator Measuring Tool

Stator Measurement Tools and Kits

Part Number	Description	Tool Length	Tool Measurement Range
77-SMT2-0[1]	Kit – Standard	63.5"	0.770" - 1.550"
77-SMT2-2[3]	Tool Only – Standard	63.5"	0.770" - 1.550"
150-SMT1-0[1]	Kit – Standard	73.5"	1.500" - 3.335"
150-SMT1-1[1]	Kit – Extended	144.5"	1.500" - 3.335"
150-SMT1-2[3]	Tool Only – Standard	73.5"	1.500" - 3.335"
150-SMT1-3[3]	Tool Only – Extended	144.5"	1.500" - 3.335"
300-SMT1-0[2]	Kit - Standard	90.5"	3.000" - 7.300"
300-SMT1-1[2]	Kit – Extended	156.5"	3.000" - 7.300"
300-SMT1-2[3]	Tool Only – Standard	90.5"	3.000" - 7.300"
300-SMT1-3[3]	Tool Only – Extended	156.5"	3.000" - 7.300"

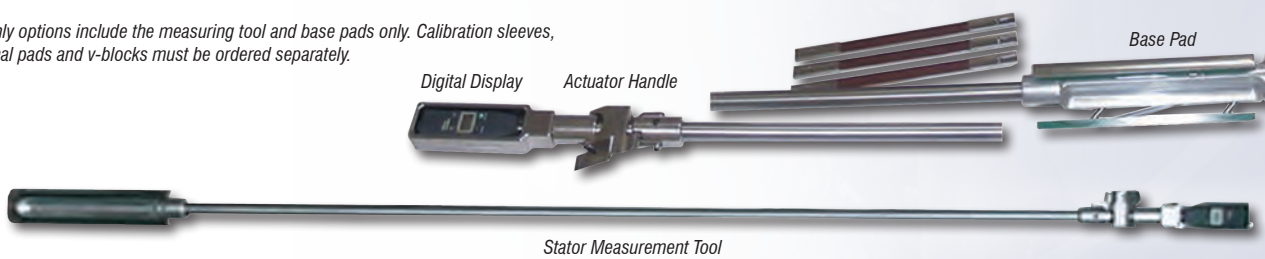
[1]Series 77 and 150 kits include extension pads (3 per size range), calibration sleeves (1 per size range) and a v-block (1 total) to measure over the entire tool range.

[2]Series 300 kit includes extension pads, calibration sleeves and a v-block to cover the 3.000" – 5.900" measurement range. Pads and calibration sleeves to measure 5.800" – 7.300" must be ordered separately.

[3]Tool Only options include the measuring tool and base pads only. Calibration sleeves, additional pads and v-blocks must be ordered separately.

Digital Display and Base Ends of Stator Measuring Tool

Extension Pad Sets



Stator Measurement Tool

Stator Measurement Tool Accessories

Stator Measurement Tool Accessories

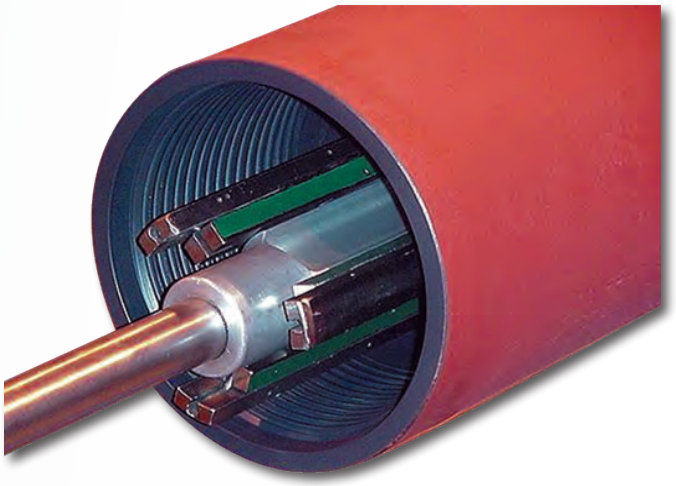
Tool Series	V-Block Part Number	Calibration Sleeve		Extension Pad[4]			Color
		Part Number	Sleeve ID	Part Number	Length	Measureable Range	
77-SMT2	150-SMT1-027	77-SMT2-028	0.800"	Base Pad	7.25"	0.770" – 1.110"	White
		77-SMT2-029	1.120"	77-SMT2-039	7.25"	1.100" – 1.445"	Yellow
		77-SMT2-030	1.220"	77-SMT2-040	7.25"	1.200" – 1.545"	Blue
150-SMT1	150-SMT1-027	150-SMT1-028	1.500"	Base Pad	9.50"	1.500" – 2.150"	White
		150-SMT1-029	2.100"	150-SMT1-039	9.50"	2.100" – 2.750"	Yellow
		150-SMT1-030	2.700"	150-SMT1-040	9.50"	2.700" – 3.335"	Blue
300-SMT1	300-SMT1-027	300-SMT1-028	3.000"	Base Pad	10.50"	3.000" – 3.800"	Green
		300-SMT1-029	3.700"	300-SMT1-039	12.00"	3.700" – 4.500"	Brown
		300-SMT1-030	4.400"	300-SMT1-040	14.00"	4.400" – 5.200"	Red
		300-SMT1-031	5.100"	300-SMT1-041	18.50"	5.100" – 5.900"	Black
		300-SMT1-032	5.800"	300-SMT1-042	20.00"	5.800" – 6.600"	Orange
		300-SMT1-033	6.500"	300-SMT1-043	20.00"	6.500" – 7.300"	Yellow

[4]Three extension pads required per set.

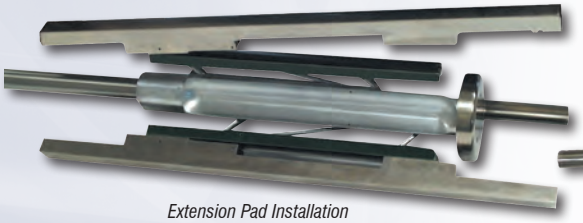
Rotor Measurement and Comparator Tools

The NOV Rotor Measurement and Comparator Tools have been designed as a simple and accurate way to measure the rotor dimensions of downhole motors. A single Rotor Measurement Tool provides direct measurement of rotor major diameters for downhole motors ranging from 2⅞" OD to 11¼" OD while a series of Rotor Comparator Tools provide direct measurement of the rotor lobe height over the same range.

Part Number	Description	Size Range
5241	Rotor Measurement Tool	2⅞" – 11¼"
5232	Rotor Comparator Tool	9⅝" – 11¼"
5233	Rotor Comparator Tool	8"
5234	Rotor Comparator Tool	6¾"
5235	Rotor Comparator Tool	6¼"
5236	Rotor Comparator Tool	4¾"
5239	Rotor Comparator Tool	2⅞" – 3⅜"



Stator Measurement Tool in use



Extension Pad Installation

Stator Measurement Tool Calibration

NOV Downhole Division Service Centers

Dependable Product Support Worldwide

National Oilwell Varco is the world's largest manufacturer of torque equipment used for servicing the threaded tubular tool joint connections of downhole tools and equipment. With more than 1,100 *TorqueMaster*™ units being used by over 165 companies in more than 70 countries, the Service Equipment group at NOV is dedicated to helping our customers get the most out of their equipment.

At NOV, we understand the important role this equipment plays in our customers' business as we are the only supplier that uses our tools in our own service operations. We are your Original Equipment Manufacturer (OEM) service and parts provider and are committed to standing by our products and our customers. Our service and inventory stocking locations are strategically placed around the world, enabling us to provide global support through over 30 specially trained technicians.

The NOV Downhole Division Global Field Service Group offers installation and commissioning services for new units; calibration, repairs, and preventative maintenance packages for existing units; and repair and refurbishment of aging and worn out units. Contact us for more information on how we can help you get the most of your Service Equipment.

Installation and Commissioning

Our commitment to providing the highest quality product to our customers does not end when it's delivered to your door. We also offer our expertise in the proper installation and commissioning of new or relocated units.

Calibration Services

Regular calibration is the only way to ensure your connection equipment is consistent in applying the proper torque to your connections. NOV uses calibrated reaction torque meters with NIST traceable standards for connection tool calibrations. These calibration meters and procedures provide NOV with the ability to calibrate your connection equipment to a high degree of accuracy and precision NOV recommends that all connection equipment be calibrated and serviced at least once a year.

Repairs and Spare Parts

From the simplest to the most challenging repair job, NOV's specially trained technicians have the knowledge and experience to provide the highest level of technical support. We offer OEM spare parts to ensure you machines maintain strict adherence to the optimal operational specifications of the equipment. Whether you've had your machine for one year or 20, making NOV part of your regular maintenance schedule will ensure the maximum performance of your equipment.

Preventative Maintenance Programs

NOV can provide preventative maintenance that will allow for the safe and efficient operation of your connection equipment. A regular maintenance schedule is critical for safe operation in order to prevent equipment failure and prolong the life of each unit. We will work with you to create a preventative maintenance program that has been specially designed to account for your equipment usage and your shop schedule, and will minimize unscheduled downtime and maximize your production.

Training

NOV offers training programs developed to ensure safe operation and proper maintenance of the *TorqueMaster*™ product series. These training programs are multilevel and are taught by Master Service Technicians on-sight at our NOV training facilities. Select courses are also available for onsite instruction at customer locations.

Global Support

Refurbishment and Rebuilds

With our ability to refurbish and rebuild worn out and aging units back to original OEM specifications, NOV can dramatically increase the life of your equipment. All of our major service centers provide refurbishment services, performed by certified NOV technicians and using only NOV original components.

Before Refurbishment

After Refurbishment

Mobile Solutions

NOV offers a number of mobile service equipment options for use in remote locations. With immediate on-site access to the *TorqueMaster* unit and related service equipment, our Mobile Service Solutions increase drilling efficiency by:

- Ensuring that critical connections are torqued to their required value and minimizing the possibility of a connection backing off downhole
- Enabling adjustment of the BHA and/or tool configurations offline and on-the-fly, allowing the rig to respond more quickly and effectively to events occurring downhole
- Eliminating transport time and the cost of transporting tools to and from service centers
- Enabling direct supervision and communication with service personnel for accurate connections and better time management

To ensure that your company gets everything you need and nothing you don't, NOV presents a tiered product offering of Mobile Service Solutions.

Containerized *TorqueMaster* Units

The Compact and Mobile Solution

NOV offers Containerized *TorqueMaster* units for use in remote locations. Any *TorqueMaster* unit can be custom-fitted to a single wide container that is compact and easy to transport. This allows companies reduce costs by utilizing their own on-site lifting and handling equipment.

The Containerized *TorqueMaster* unit can be placed anywhere on-site and utilizes a pass-thru system:

- Tool supports are placed on either side of the containerized *TorqueMaster* unit
- The tool string passes through the container, where it is efficiently connected to the required torque value

Mobile Solutions and Custom Projects

Mobile Maintenance Units

The Complete On-Site Service Solution

The NOV Downhole Division Double-Wide Mobile Service Center is a completely self-contained drilling tool service shop. It is a skid mounted structure that comes standard with:

- *TorqueMaster* Model 1689 unit or *TorqueMaster* Model 8111 continuous rotation unit (accessories and options to be specified by customer)
- Air Conditioners, 4 Window Type
- Compressor
- Sump Pump
- Steel work bench, cabinets and shelving
- Lights and receptacles - 110 / 220 power outlets
- One 5-ton interior single girder overhead crane
- Four 2-ton interior / exterior jib cranes
- Main breaker panel for tying into an external power source
- Circuits for major equipment and accessories
- Heater

Additional options and accessories are available that will allow you to configure the Double-Wide Mobile Service Center to meet your requirement for servicing tools: Jar Tester, model 1609 Service Vise, Generator Set, Pressure Washer and Hand Tool Kit.

Custom Projects

NOV's Service Equipment group is always willing to entertain custom projects to help facilitate your business interests. These include projects such as:

- Downhole tool pressure testers
- Coil Tubing containerized workshops
- Offshore pipedeck pipe-handling solutions
- Downhole service center integrated solutions
- Custom motor test dyno's
- Other containerized applications
- *TorqueMaster* unit upgrades
- Shop tool and pipe handling equipment
- Many others…

Please contact an NOV Service Equipment sales representative near you or email: **DH-ServiceEquipment@nov.com** to inquire about a custom project for your business.

Downhole Solutions

Drilling Solutions

Engineering and Project Management Solutions

Corporate Headquarters
7909 Parkwood Circle Drive
Houston, Texas 77036
United States
Phone: 713 375 3700
Fax: 713 346 7687

Industrial Solutions

For a complete list of NOV Downhole locations, visit us online:

www.nov.com/downholelocations

Lifting and Handling Solutions

Production Solutions

Supply Chain Solutions

Tubular and Corrosion Control Solutions

Well Service and Completion Solutions

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D391000202-MKT-001 Rev.06