MAN-CO

MAN-CO MFG., INC.

2725 19th Street S.E. • P.O. Box 13114 • Salem, OR 97309 U.S.A. • (503) 362-2341

BULLETIN: BU-136 MC

NOTICE: THIS BULLETIN SUPERCEDES BU-131 MC DATED 1/5/82

DATE: 9/8/88

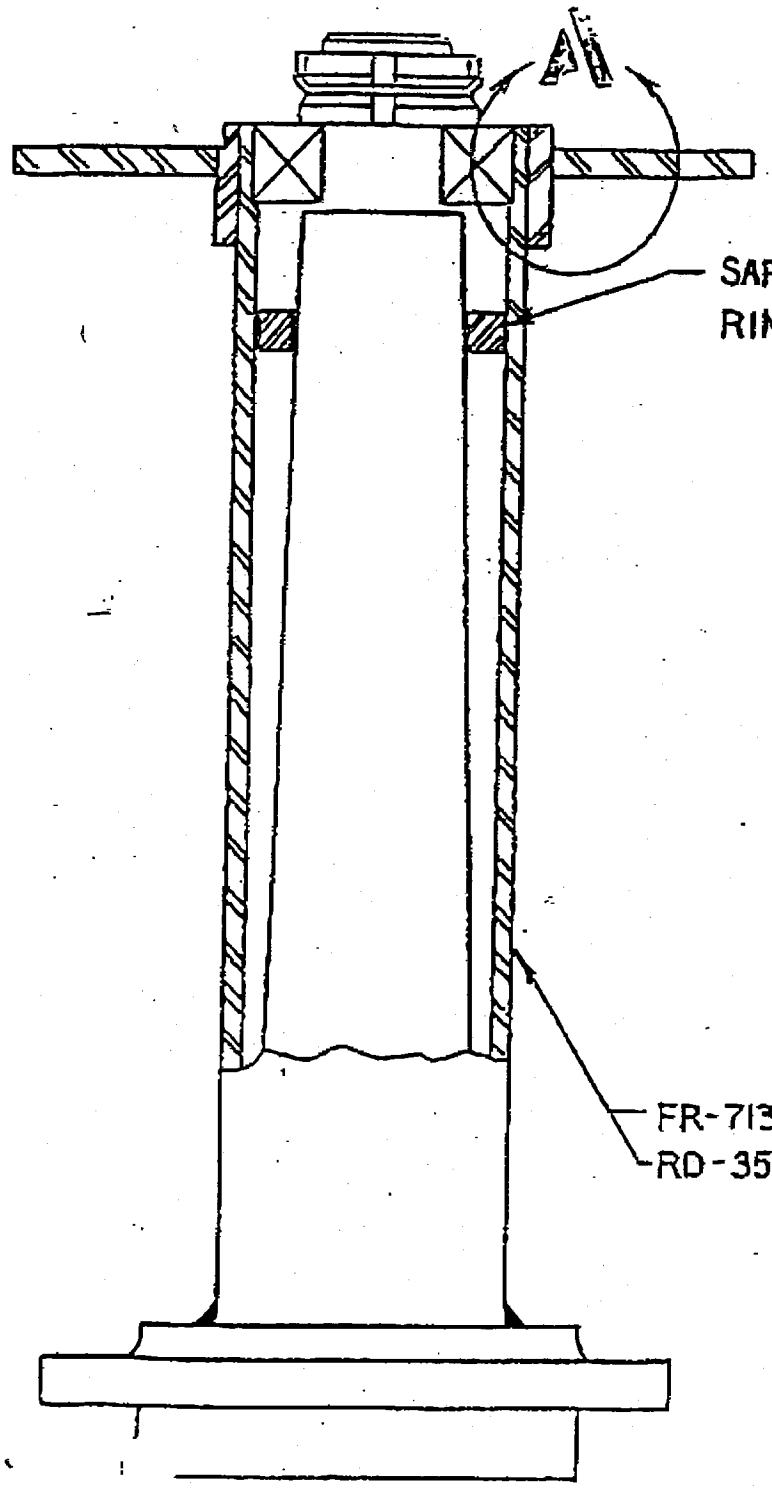
ROUND-UP/PARATROOPER HUB INSPECTION

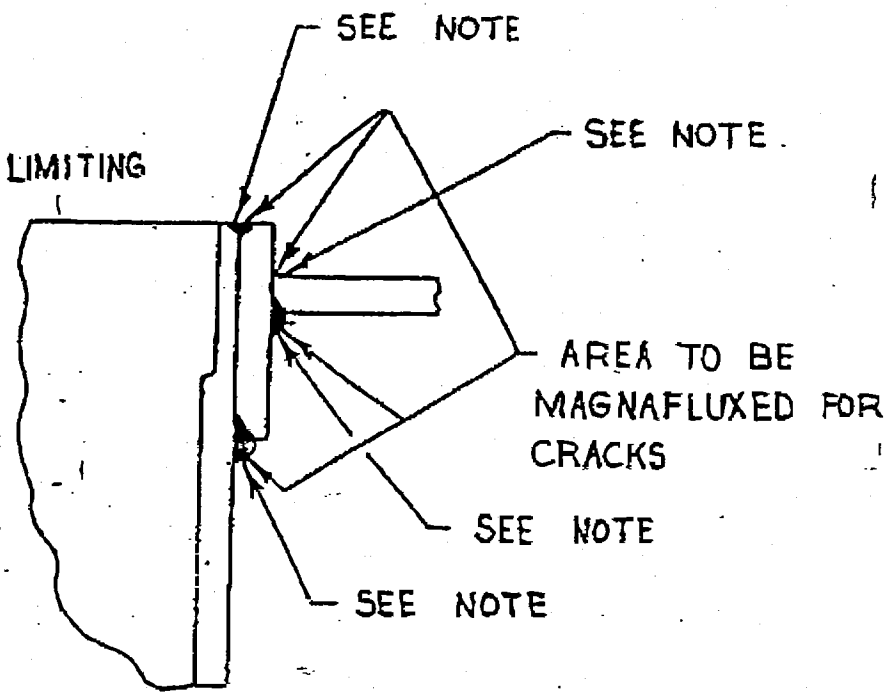
The main spindle shaft hub housing on the Round-Up and Paratrooper amusement rides that were manufactured by Frank Hrubetz Co., and Kilinski Mfg. Co. (KMC) have shown some sign of fatigue cracks in the weld areas of the hub assemblies.

We at Man-Co feel that this is something that should be inspected on a more regular basis and so we are recommending that the welds shown in the attached drawing (BU-136-MC) be inspected annually. If any sign of stress or cracks are noted, then we recommend that the entire hub assembly be replaced for the safety of the ride owners and customers.

Although Man-Co Mfg., Inc. is not responsible for the manufacturing of Hrubetz or KMC rides, we are the exclusive manufacturer of replacement parts. We feel that it is in the best safety of your customers that this preventive inspection is adhered to.

Man-Co Manufacturing, Inc.
QC-MI-1-Rev 0
2-28-89





DETAIL A

NOTE:

IF CRACK IS NOTED IN THIS AREA, CENTER HUB SHOULD BE REPLACED

MAN-CO. MFG. INC.

P.O. BOX 13114
SALEM, OR 97309

DRAWN BY:	DATE:	SCALE:
SWJ	9-1-88	NONE

CENTER HUB - INSPECTION OF WELD
ROUND-UPS & PARATROOPERS

ULTRASONIC INSPECTION OF STEEL MAIN SPINDLE SHAFTS

1. METHOD

1.1 Scope

This procedure establishes the minimum requirements for the pulse echo ultrasonic inspection of steel main spindle shafts by the contact longitudinal beam techniques for the detection of inservice stress cracking.

1.2 Principle

High frequency sound waves are induced into the material under test with the reflected sound wave forms being displayed on a cathode-ray tube. The soundness of the material is determined by analyzing the reflection patterns on the cathode ray tube.

2. APPARATUS

2.1 Electronic Apparatus

An ultrasonic, pulsed, reflection type of instrument shall be used for this inspection. The system shall have a range capability for testing at frequencies of 1 to 5 MHz.

2.2 Search Units

Contact type search units shall be used for the inspection. Search units shall be utilized at their rated frequencies. The maximum search unit dimension shall not exceed 1 inch, with a minimum frequency of 2.25 MHz.

2.3 Couplant

A couplant, liquid or paste, having sufficient wetting properties to transmit sound waves from the transducer to the test surface such as, oil, glycerin, water, grease, or equivalent, shall be used.

2.4 Reference Standards

Reference standards made from acoustically similar material shall be used to establish a suitable base for determining the adjustment of the instrument used.

2.4.1 Reference blocks used as standards for the longitudinal beam examination shall contain flat bottom holes no larger than 8/64 inch diameter at approximate metal paths of 1/4T - 1/2T and 3/4T. (T = Thickness)

2.4.2 When it is impractical to have reference blocks per paragraph 2.4.1, it is acceptable to calibrate on the test material itself, as described in Figure 1.

2.5 Personnel Qualification

Personnel performing the test shall be certified to ASNT-TC-1A. Personnel who read, interpret and evaluate indications shall be certified to ASNT-TC-1A Level II or equivalent.

3. GENERAL PROCEDURE

3.1 The procedure to be used is that of hand scanning the material by the contact longitudinal beam method and introducing into it a beam of ultrasonic sound waves. Reflections of a portion of this energy will occur at the interface of materials having different acoustical properties. The reflections are displayed on a cathode ray tube and can be evaluated against a predetermined standard. Areas with indications are noted on each piece and tabulated on the inspection report.

3.2 Surface Condition of Test Material

The beam entry surface of the material shall be free of scale, dirt, grease, paint, or other foreign materials. The surface to be scanned shall be uniform with a surface finish adequate to permit ultrasonic inspection at the required sensitivity.

3.3 Instrument Calibration

3.3.1 Longitudinal Beam Examination

When calibrating the instrument using a reference block, the indication amplitude of all defects shall be adjusted to obtain a pulse height on the instrument screen of at least 70 percent of full scale.

When calibration is performed using the test material, the instrument adjustment shall be as described in Figure 1.

3.3.2 After final instrument calibration and the test is initiated, further adjustment of the instrument shall not be permitted without recalibration.

3.4 Scanning Surfaces

3.4.1 Longitudinal beam examination shall be performed on the test material as described in Figure 2.

3.4.2 The instrument calibration shall be checked using a reference standard prior to and after each piece is tested or at intervals not exceeding 1 hour.

3.5 Interpretation of Results

Test part is unacceptable if longitudinal examination results show one or more reflections greater in amplitude than the indication from the calibration defect or reference line and are not associated with the geometric configuration.

3.6 Test Report

Test records shall be maintained by the testing organization for a minimum of three years following completion of order. The following data shall be recorded on the test report.

3.6.1 Specific written test procedure and revision utilized for performing the test.

3.6.2 Transducer description, instrument and ultrasonic frequency employed.

3.6.3 Reference standard description.

3.6.4 Location and identification of rejectable indication in material. (Sketch to be included)

3.6.5. Customer identification and location of material and equipment serial number.

3.6.6 Name and location of testing organization.

3.6.7 Date of Test

3.6.8 Signature of operator and level of certification.

3.6.9 Signature of interpreter and level of certification.

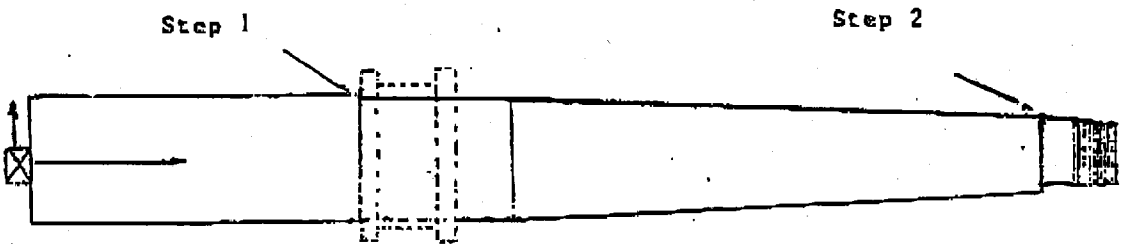


Figure 1

Calibration on test piece for Longitudinal Beam examination

Notes for Figure 1:

1. A 3/4" Diameter - 5 MHZ Transducer is recommended.
2. The search unit shall be placed on center of shaft area (A) and adjust second back reflection to 100%.
3. Move transducer towards edge of shaft (A)
   - 3.1 Step 1 should appear to be approximately 25%.
   - 3.2 If not, scan the perimeter and adjust to the average.

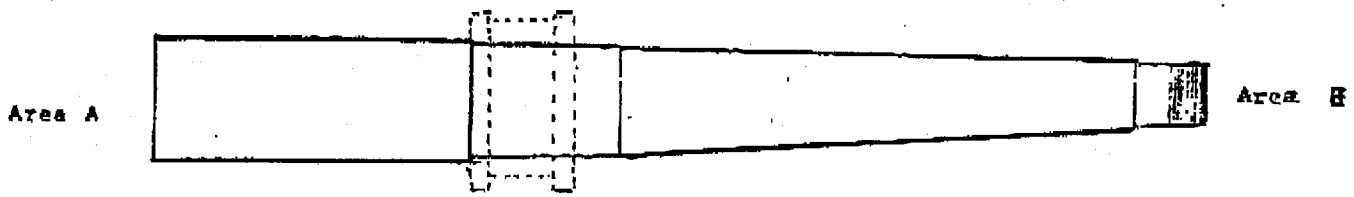


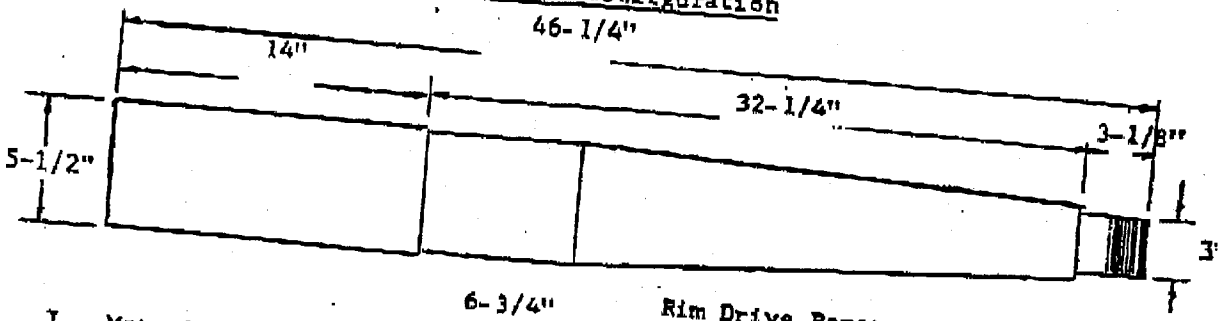
Figure 2

1. Longitudinal Beam Examination

   A. After calibration per Figure 1, areas (A) and (B) shall be scanned 100%.

Useful Information :

Basic Shaft Configuration

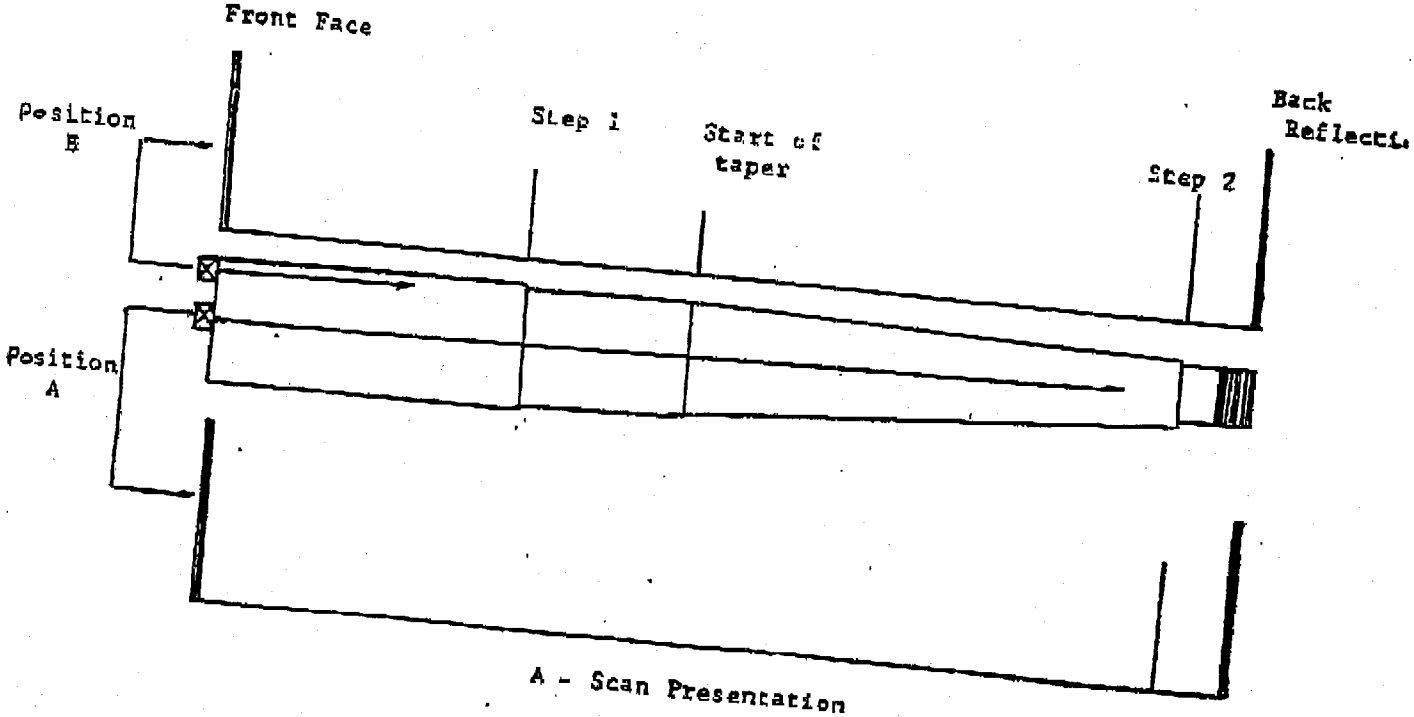


Rim Drive Paratrooper
Serial No. 300 & on.

I. Material: Carralloy Steel
Longitudinal Velocity: 2.31" per second x 10^5

II. Transducer Beam Divergence in Steel:

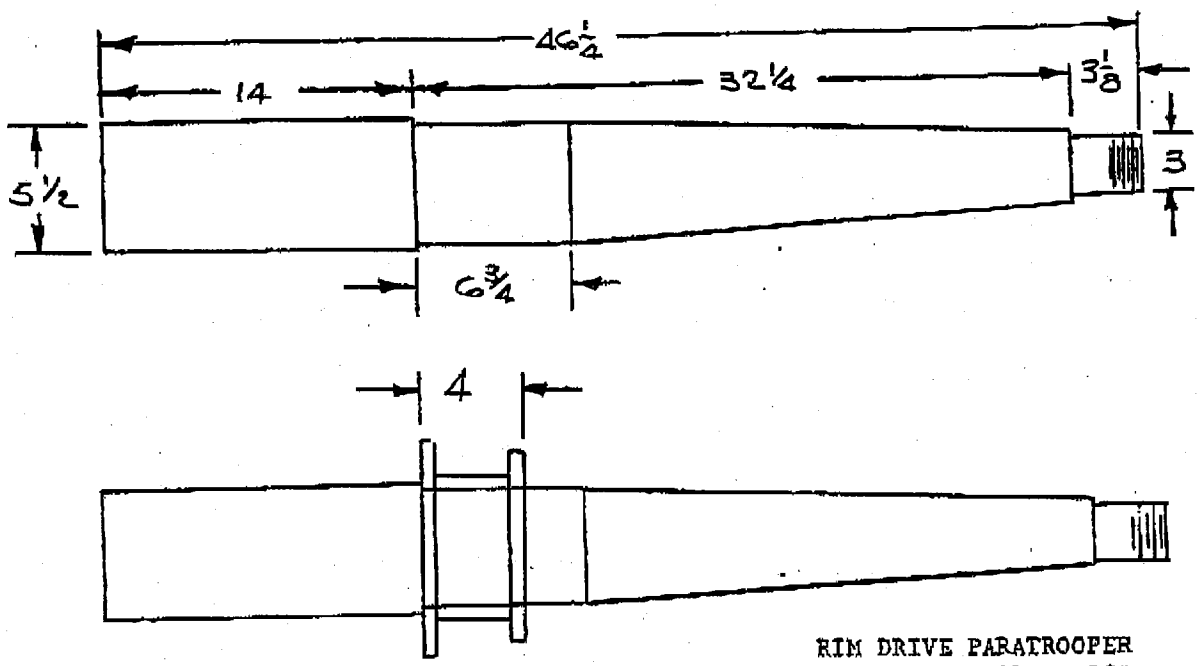
1" Dia.	Transducer	@ 1 MHz	= 30° or 3" per ft.
1" Dia.	"	@ 2.25 MHz	= 14° or 1-1/2" per ft.
1" Dia.	"	@ 5.0 MHz	= 6° or 5/8" per ft.
.750" Dia.	"	@ 1 MHz	= 45° or 4-1/2" per ft.
.750" Dia.	"	@ 2.25 MHz	= 20° or 2-1/8" per ft.
.750" Dia.	"	@ 5.0 MHz	= 9° or 7/8" per ft.



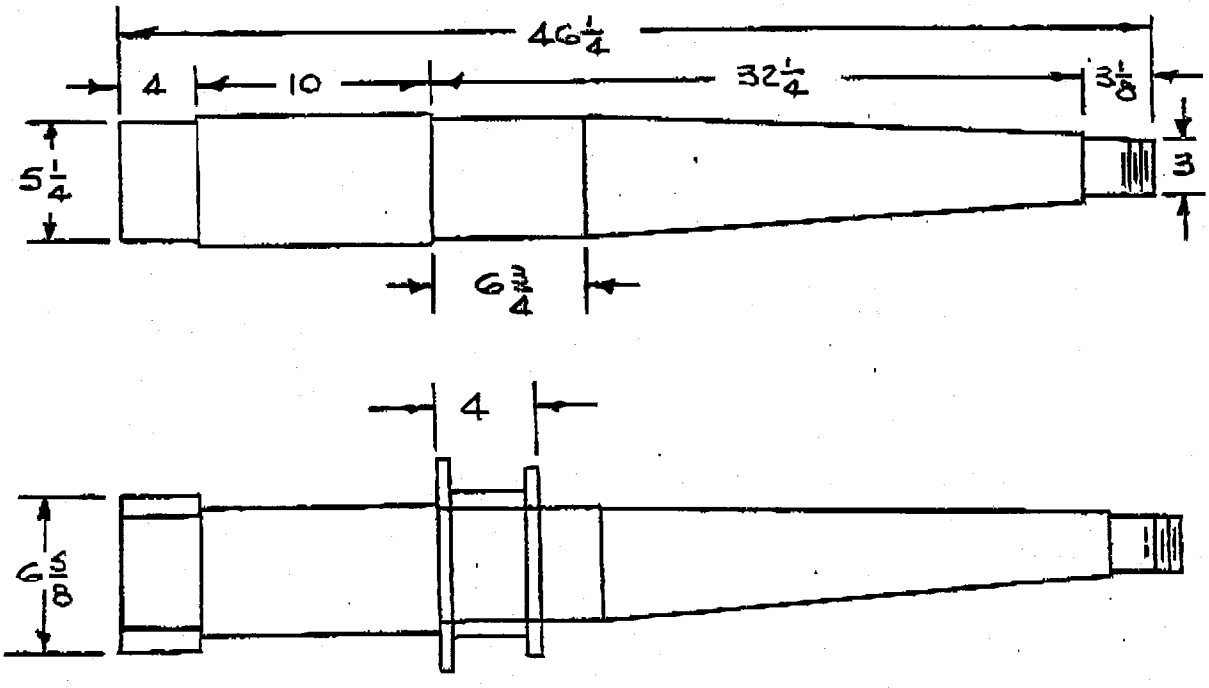
A - Scan Presentation

Useful Information:

BASIC SHAFT CONFIGURATIONS



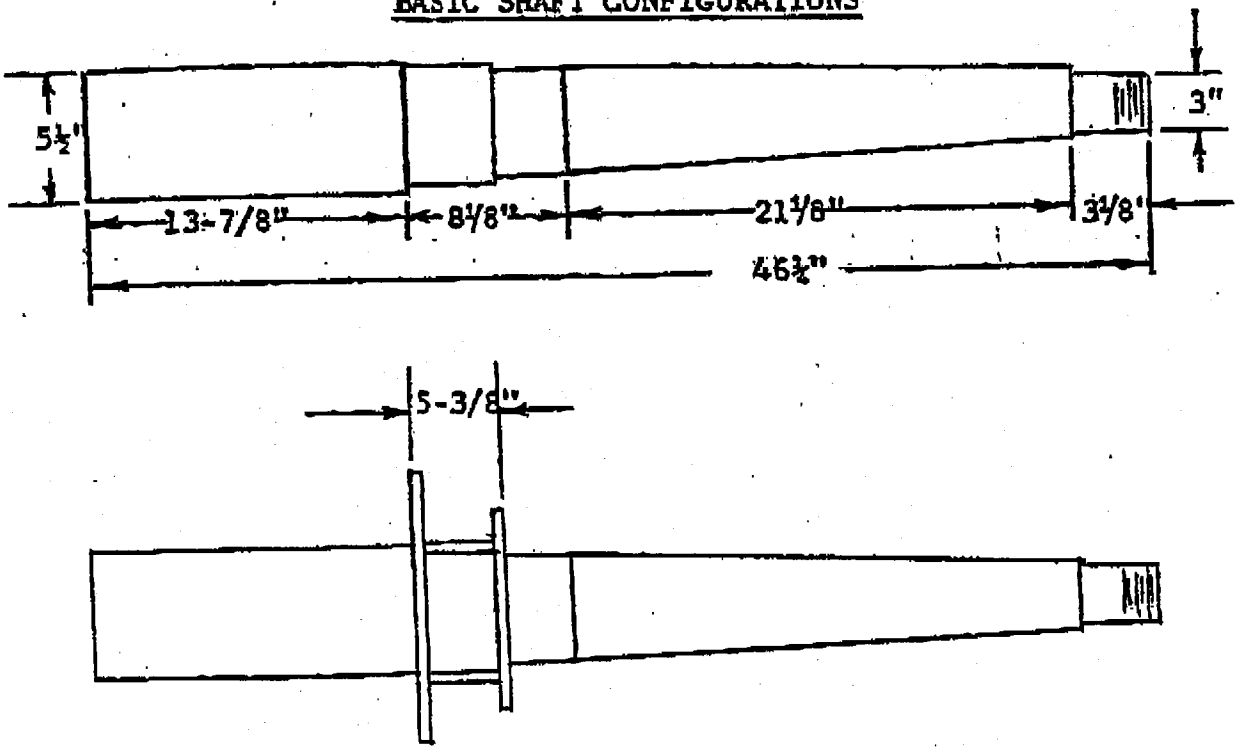
RIM DRIVE PARATROOPER
SERIAL NO. 301 to 396



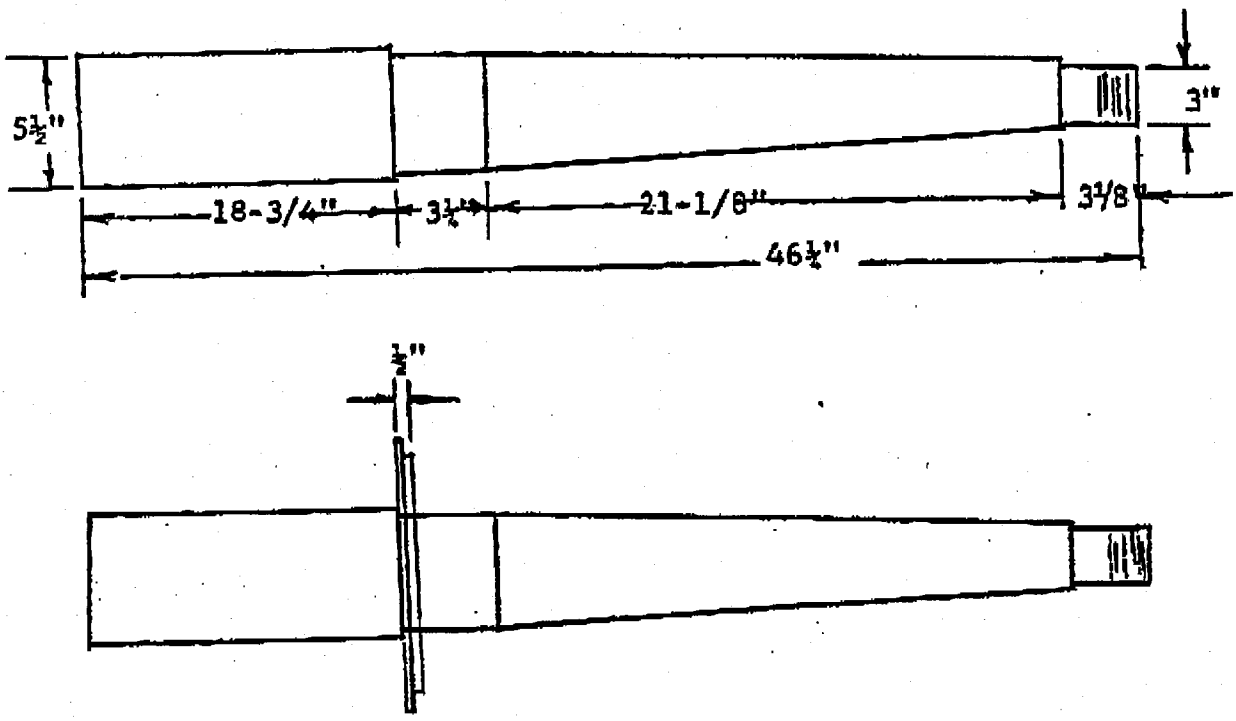
RIM DRIVE PARATROOPER
SERIAL NO. 397 on up

Useful Information:

BASIC SHAFT CONFIGURATIONS



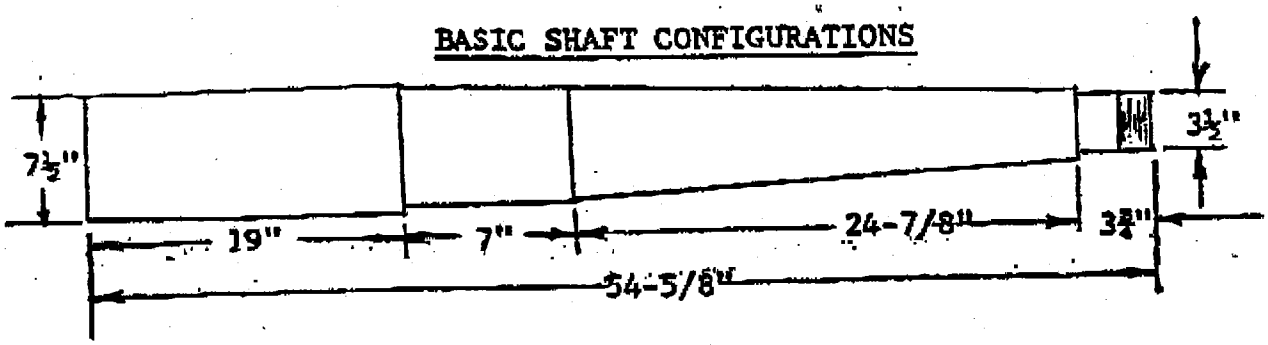
STANDARD PARATROOPERS
SERIAL NO. 500 and on

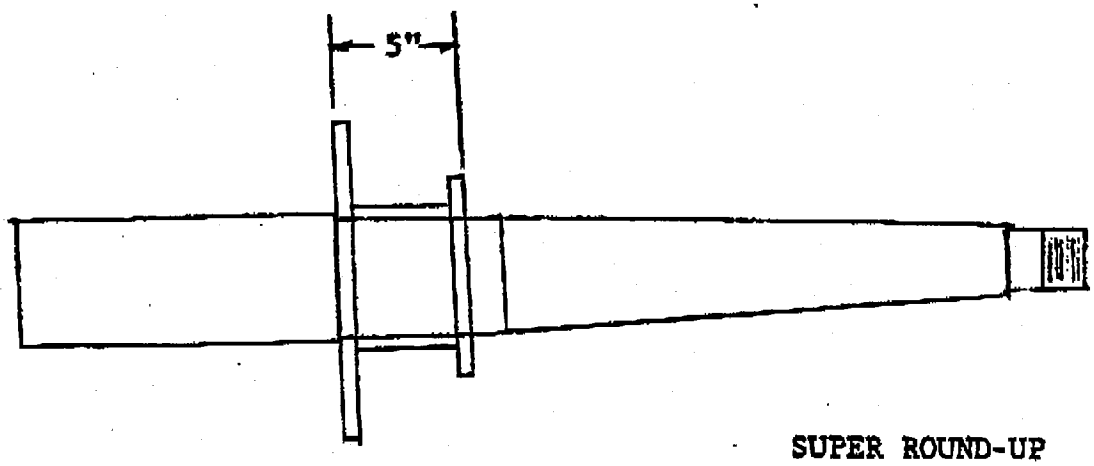


SPITFIRE AND
STANDARD PARATROOPERS
PRIOR TO 1960

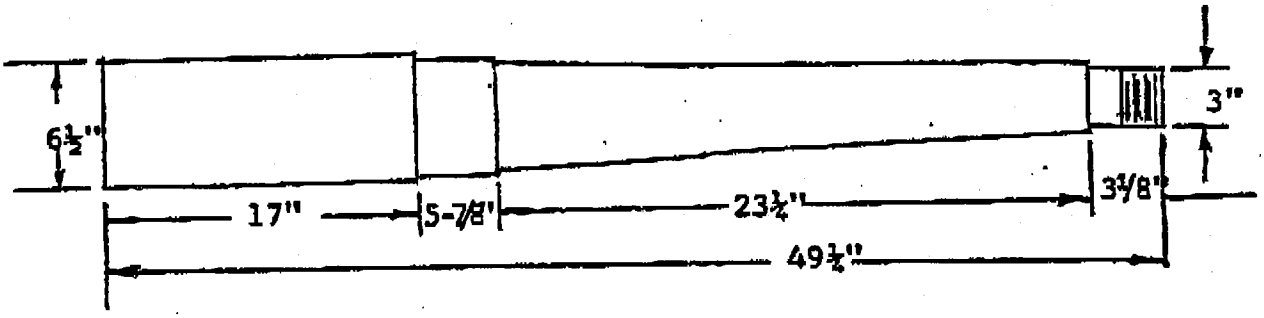
Useful Information:

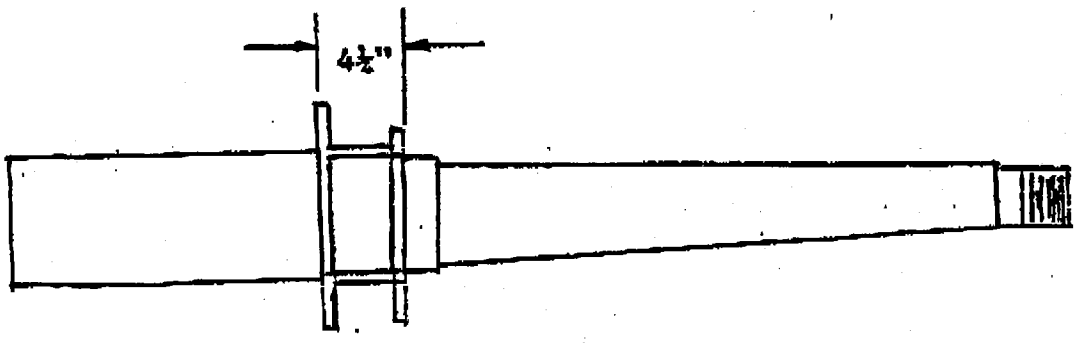
BASIC SHAFT CONFIGURATIONS





SUPER ROUND-UP
SERIAL NO. 200S & UP



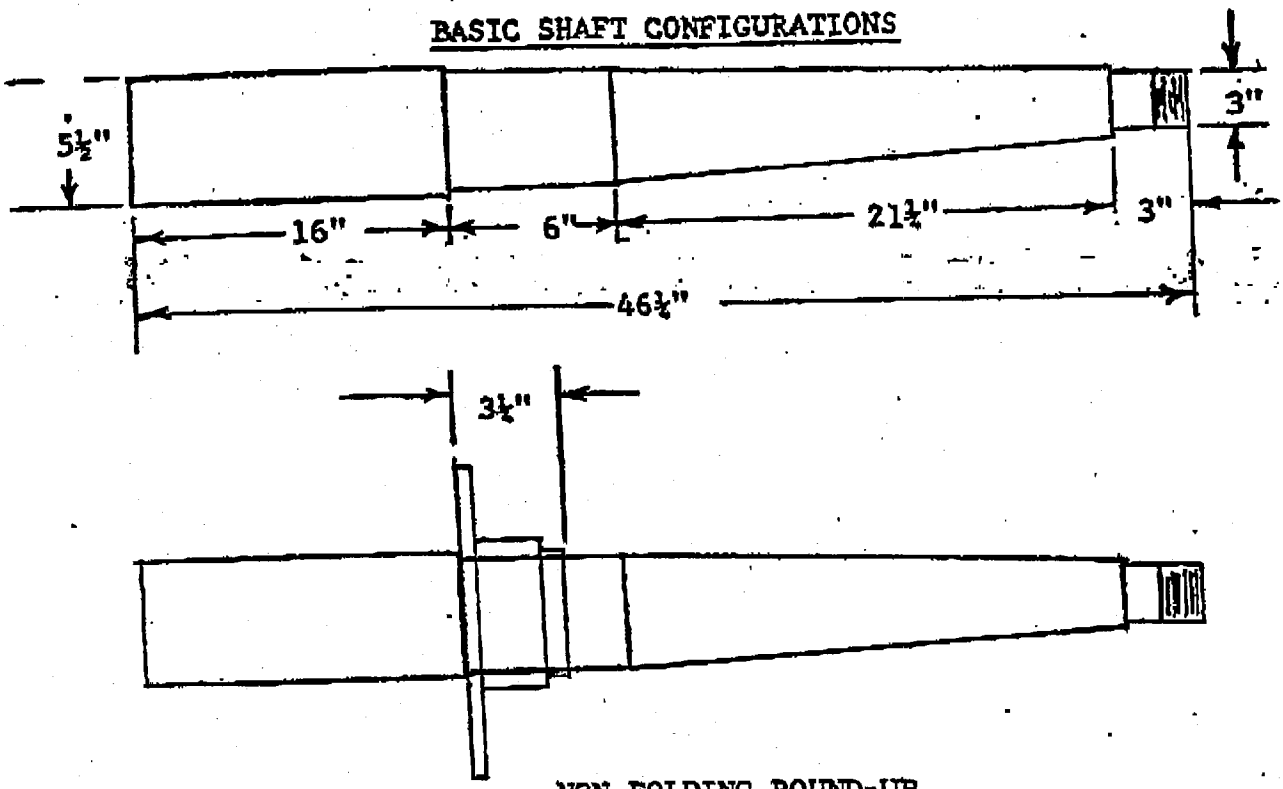


FIREBALL - SERIAL NO. F70I
AND UP

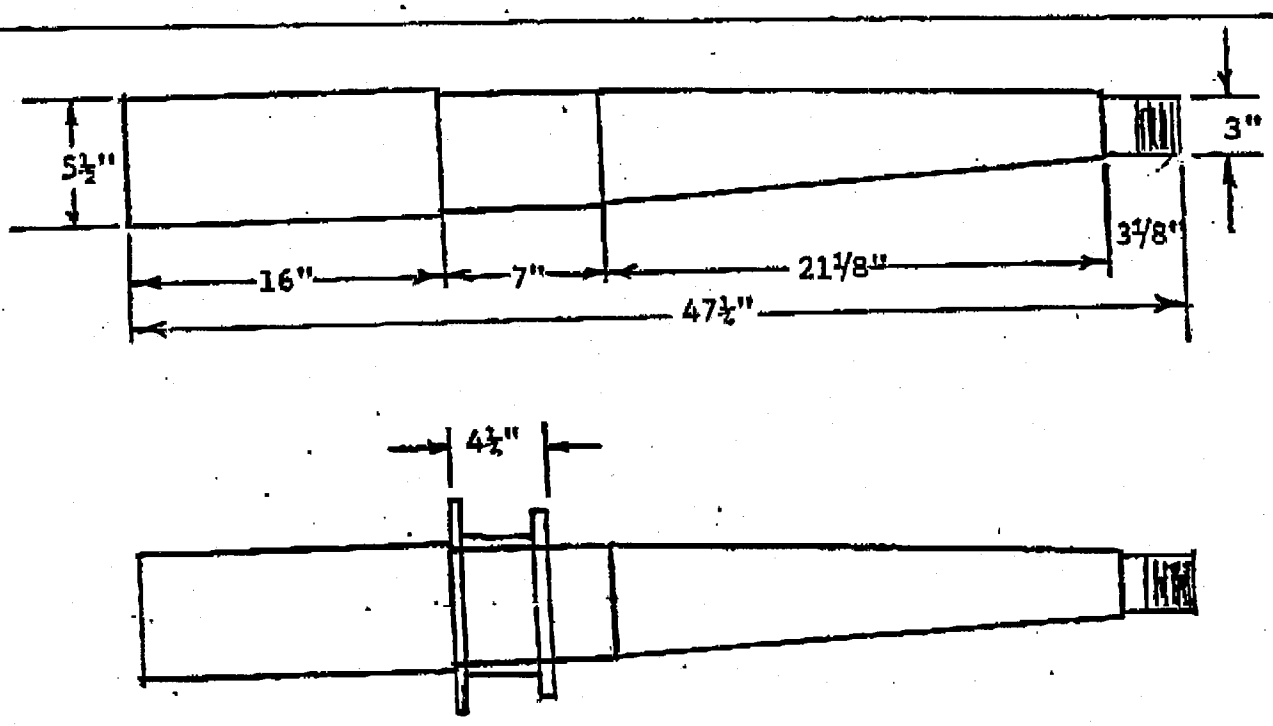
HYDRAULIC PARATROOPER
SERIAL NO. 800 & UP

Useful Information:

BASIC SHAFT CONFIGURATIONS

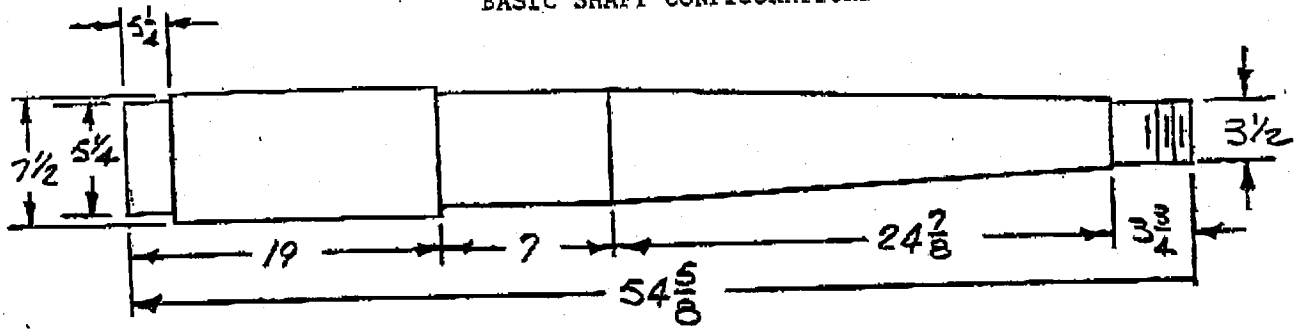


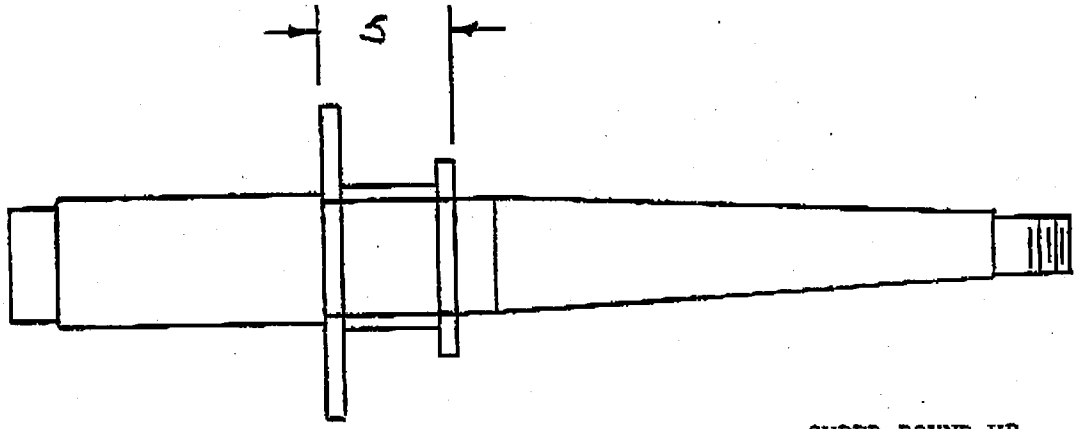
NON-FOLDING ROUND-UP
SERIAL NO. 400 & 4400



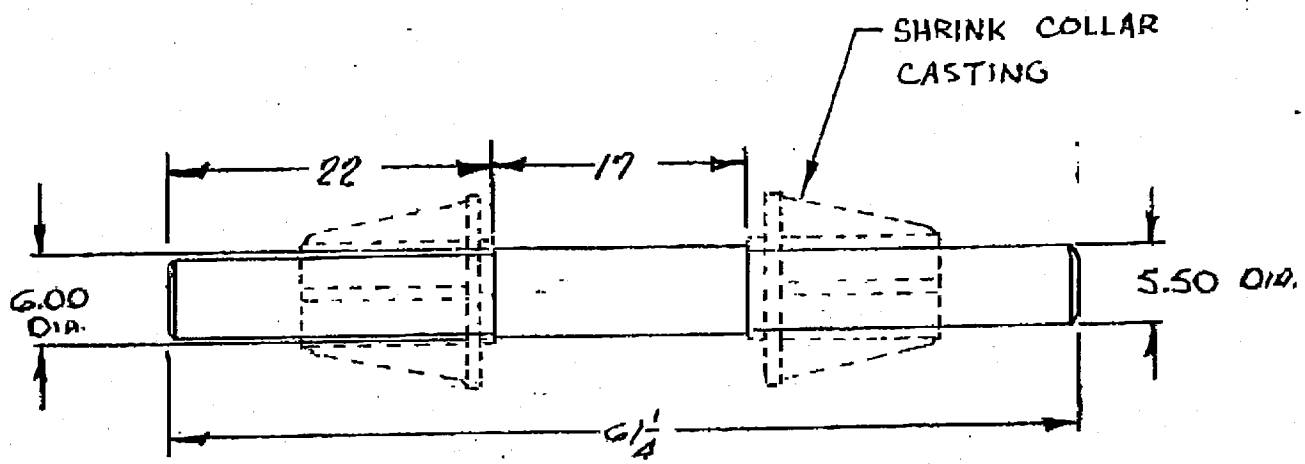
FOLDING ROUND-UP
SERIAL NO. 200 & 2200

BASIC SHAFT CONFIGURATIONS





SUPER ROUND-UP
SERIAL NO. 220 & UP



MAN-CO. MFG. INC.

P.O. BOX 12114
SALEM, OR 97309

PIVOT SHAFT - 40FT EQUIP-UP

DATE 4-12-85
DRAWN BY M.D.Z.
SCALE ——

NO. SK-41285

REV	DATE	DESCRIPTION
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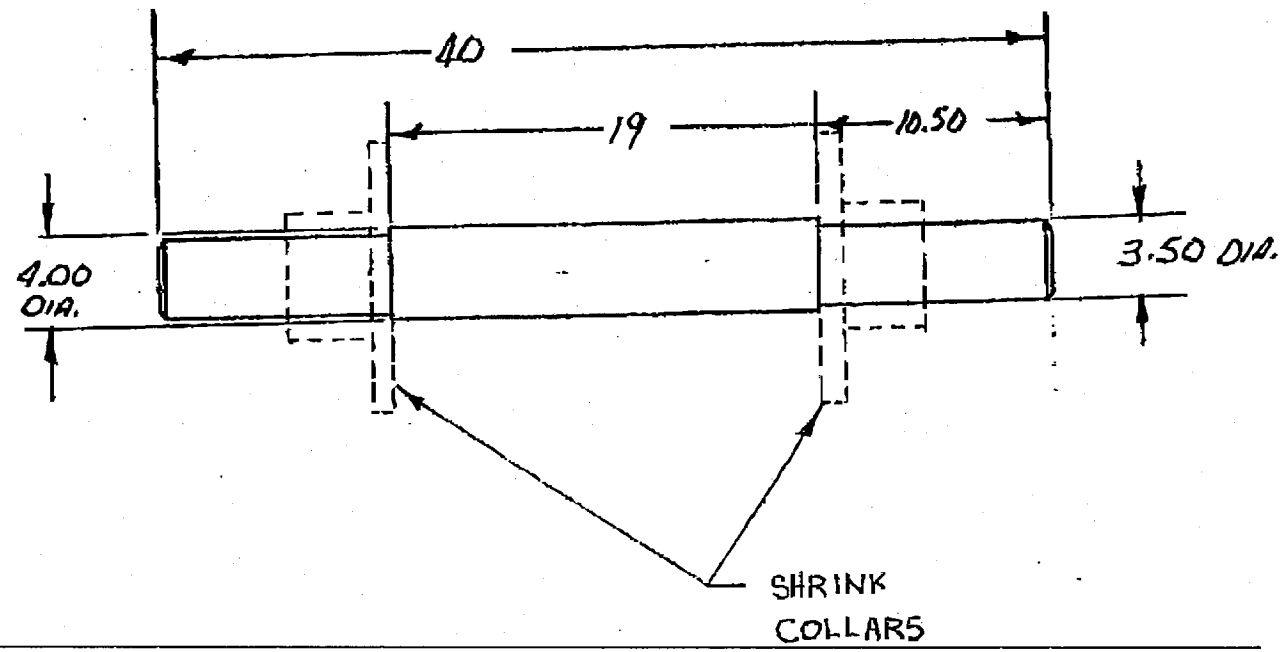
COMMERCIAL DOOR STORE, SALEM, OREGON



MAN-CO. MFG. INC. P.O. BOX 13114 SALEM, OR 97309

ANCHOR-SHAFT 40 Ft. ROUND-UP

DATE 4-12-95
DRAWN BY M.D.Z.
SCALE ——

NO. SE-4585

REV	DATE	DESCRIPTION
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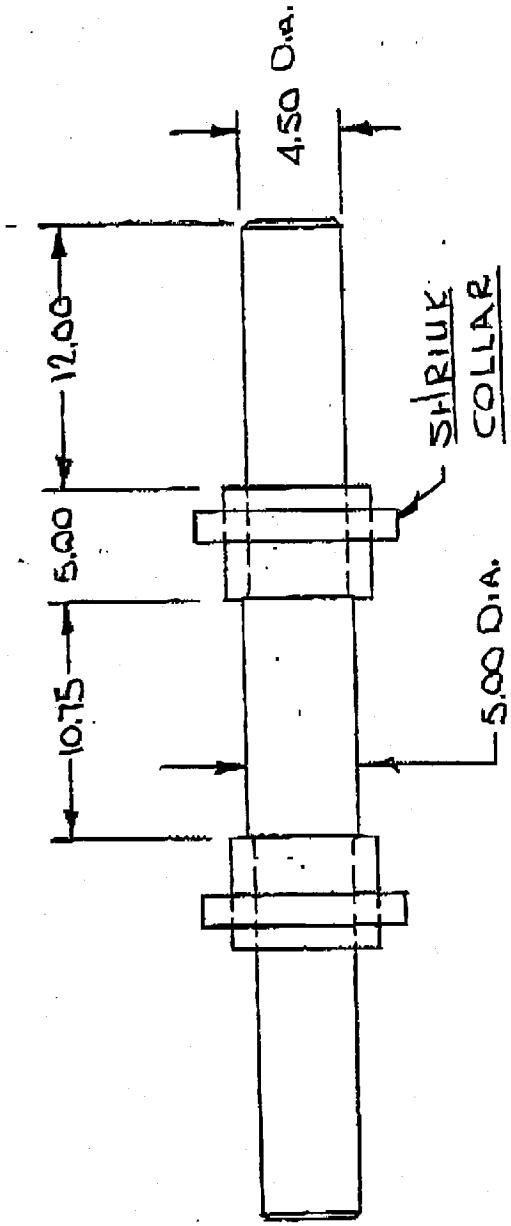
COMMERCIAL BOOK STORE, SALEM, OREGON

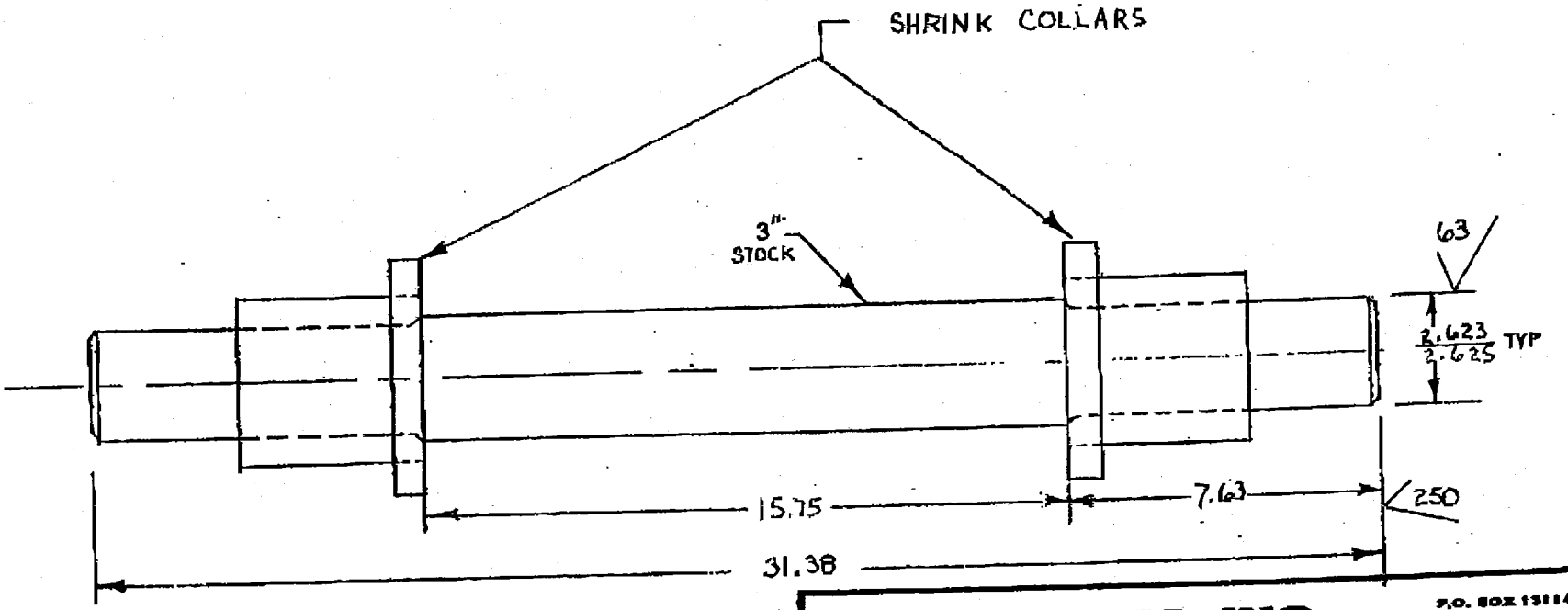


MAN-CO. MFG. INC.
P.O. BOX 15114 SALEM, OR 97309

30' Folding Rotary Rocker Shaft w/Shrink Collar

DATE 3-2-94
DRAWN BY M.O.Z
SCALE

NO. SK-3784



MAN-CO. MFG. INC.

P.O. BOX 13114
SALEM, OR 97309

TOLERANCES: UNLESS NOTED			DRAWN BY. SWJ
DECIMALS	FRACTIONS	ANGLES	DATE. 3-14-89
XX ± .010 XXX ± .005			SCALE. 3" = 1'-0"

30' ROUND UP ANCHOR SHAFT

REV.	DATE	DESCRIPTION
REVISIONS		

NEXT ASSEMBLY	REVISION	DRAWING NO.	
		SK 314893	A

MAN-CO

MAN-CO MFG., INC.

2725 19th Street S.E. • P.O. Box 13114 • Salem, OR 97309 U.S.A. • (503) 362-2341

BULLETIN: BU-135 MC

DATE: 9/20/88

ANNUAL INSPECTION OF MAIN SPINDLE SHAFTS, ROCKER SHAFTS, CYLINDER ANCHOR SHAFTS

ATTENTION ALL ROUND-UP, PARATROOPER AND FIREBALL OWNERS

Due to recent failures in the spindle and rocker shafts of the Round-Up, and since the Paratrooper and Fireball rides manufactured by Frank Hrubetz Co. and Kilinski Mfg. (KMC) use the same shafts, Man-Co Manufacturing in cooperation with the recommendations of the Consumer Products Safety Commiasion feel the following steps should be taken.

These shafts need to be tested annually before the start of each season. Please see the Change Notice of the quality control procedures enclosed. (QC-UI-I-Rev. 3)

If any cracks are found, then the shafts are to be replaced immediately.

Maintenance records should be maintained and reviewed to determine the level of maintenance and frequency of the inspections of the individual ride. This is to insure that the rides are periodically inspected and safe.

Man-Co Manufacturing, as an exclusive manufacturer of replacement parts for the original Frank Hrubetz, and Kilinski Mfg. rides, can recommend but not mandate that these procedures be adhered to. However, we feel that this is a most important step for the protection of the ride owners and customers.

ULTRASONIC TEST REQUIREMENTS

Ultrasonic testing shall be performed once every year on the following rides built by Frank Hrubetz & Co., Kilinski Mfg. Co., and Man-Co Manufacturing, Inc.

Non-Folding Round-Up

1. Rocker shaft - see dwg. BU-133MC sht. 2 of 3
2. Cylinder anchor shaft - see Dwg. BU-133 sht. 3 of 3
3. Spindle shaft

Folding Round-Up

1. Rocker shaft - see Dwg. BU-133MC sht. 2 of 3
2. Cylinder anchor shaft - see Dwg. BU-133MC sht. 3 of 3
3. Spindle shaft

Super Round-Up

1. Rocker shaft
2. Cylinder anchor shaft
3. Spindle shaft

Hydraulic Paratrooper - park and portable

1. Spindle shaft

Rim Drive Paratrooper - park and portable

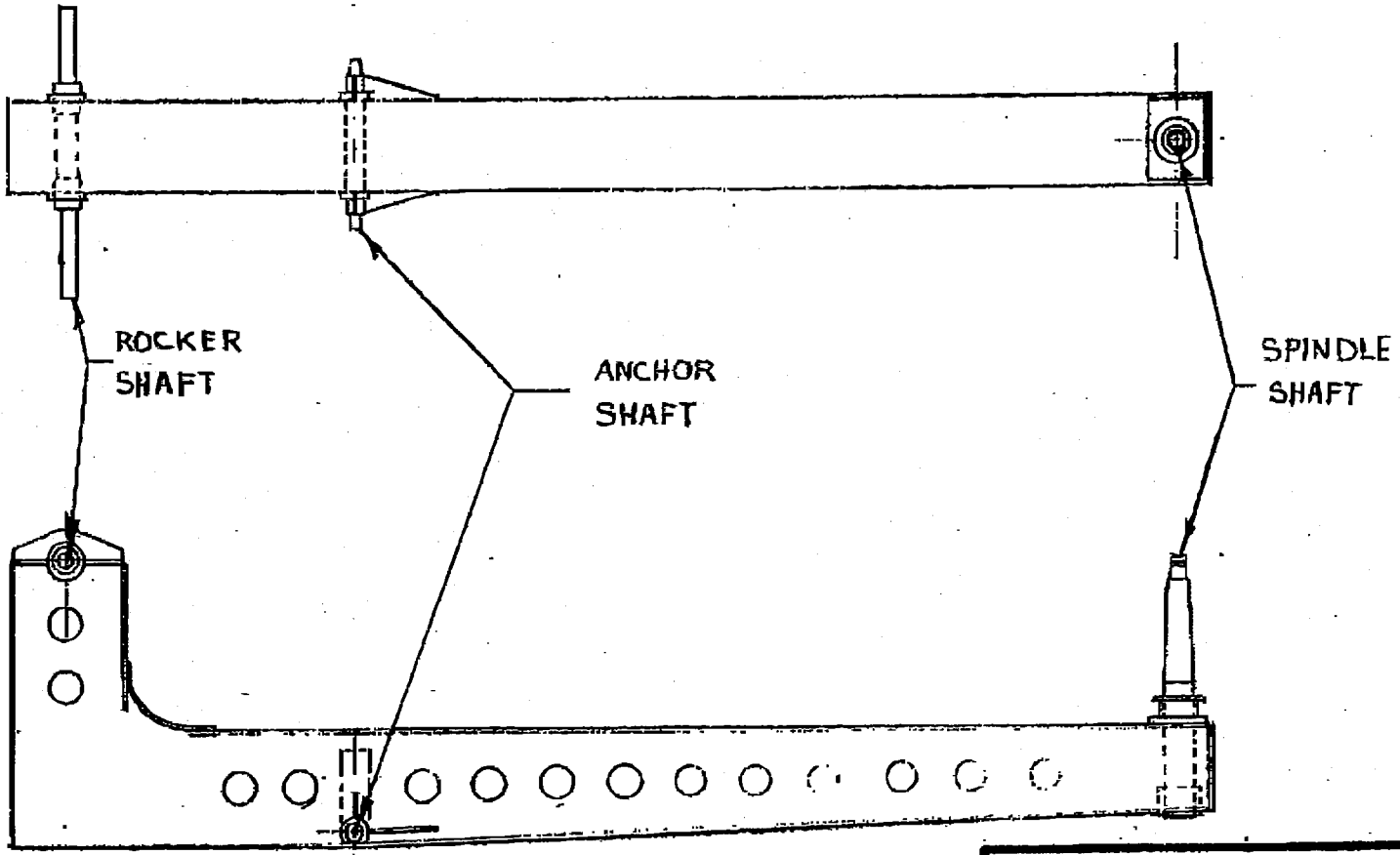
1. Spindle shaft

Standard Paratrooper - park and portable

1. Spindle shaft

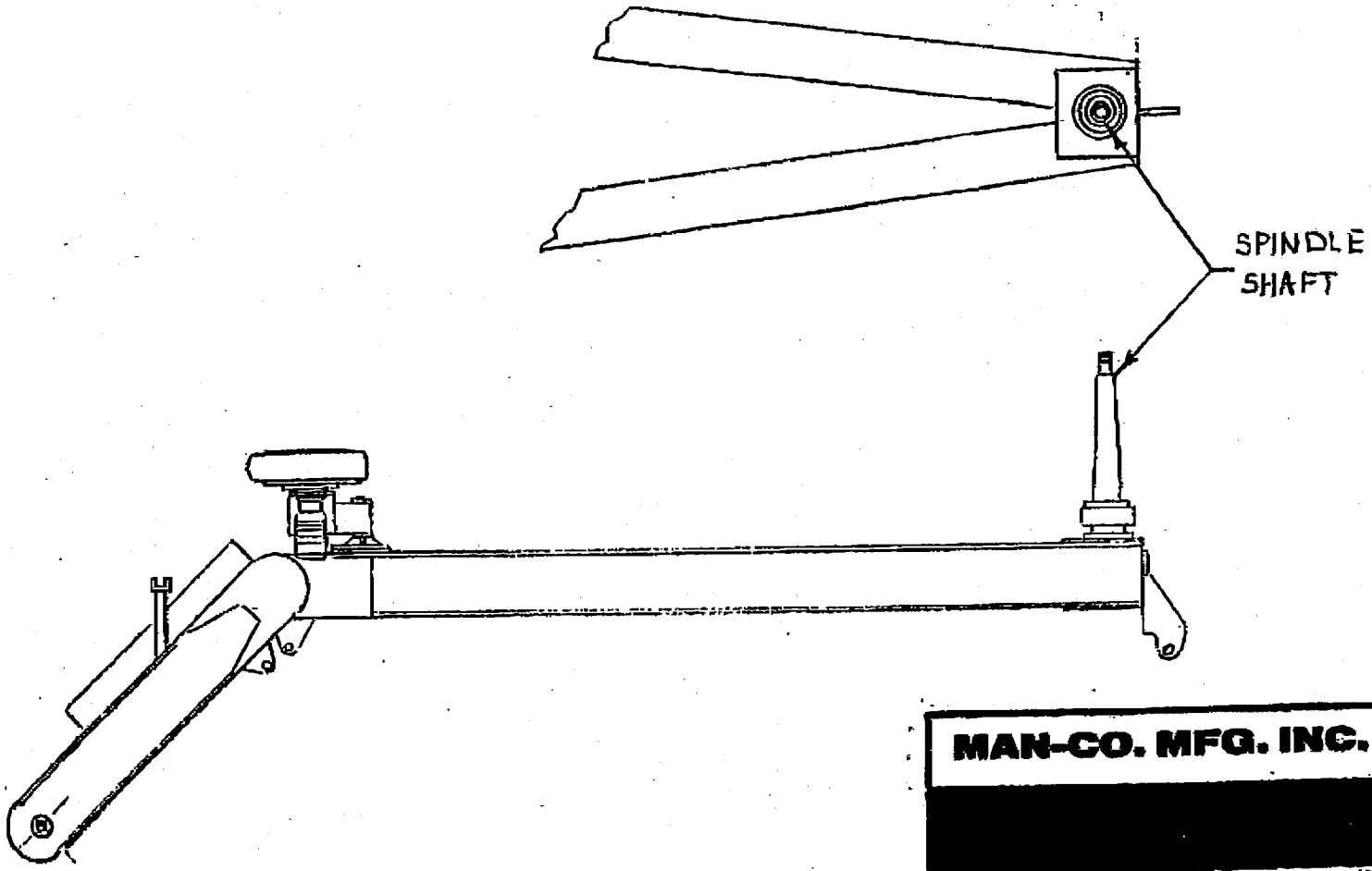
Fireball - portable

1. Spindle shaft



MAN-CO. MFG. INC.
P.O. BOX 12114
SALEM, OR 97309

SCALE: NONE	DATE: 3-14-89	DRAWN BY: SWJ
30' FOLDING ROUND-UP		ANCHOR SHAFT
		SK 314890



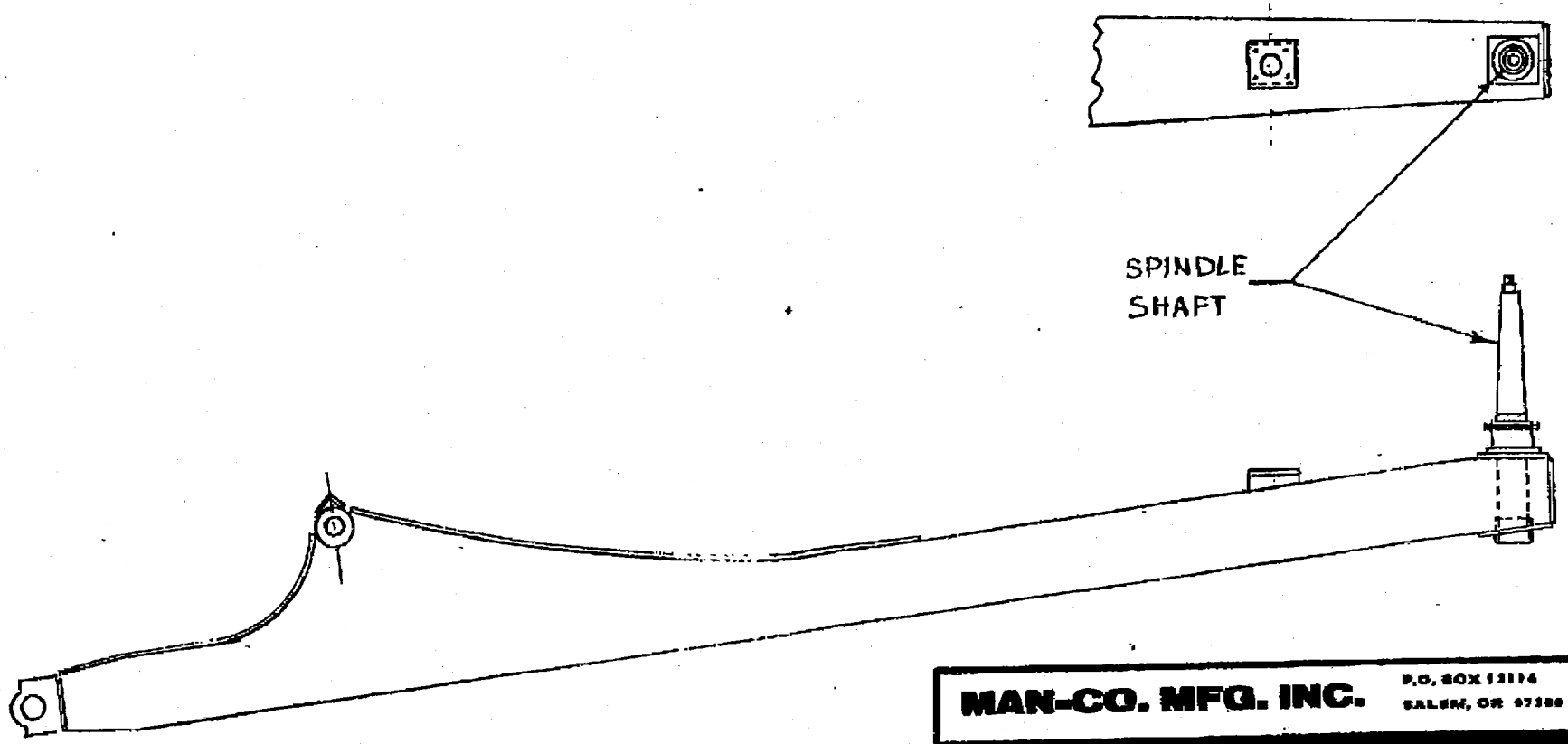
MAN-CO. MFG. INC.

P.O. BOX 13114
SALEM, OR 97309

SCALE:	DATE:	DRAWN BY
NONE	3-14-89	SWJ

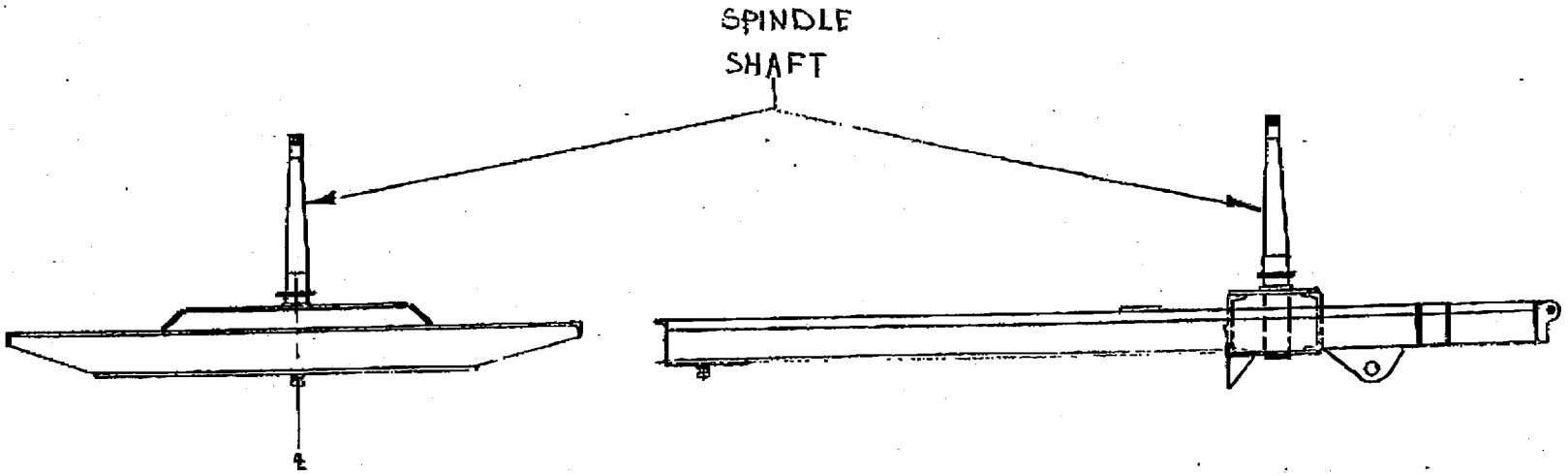
RIM DRIVE PARA BOOM

SK 314891



MAN-CO. MFG. INC. P.O. BOX 13114 SALEM, OR 97309

SCALE: NONE	DATE: 3-14-89	DRAWN BY: SWJ
SPINDLE SHAFT ON BOOM		HYD. PARA.
		SK 31489



MAN-CO. MFG. INC.

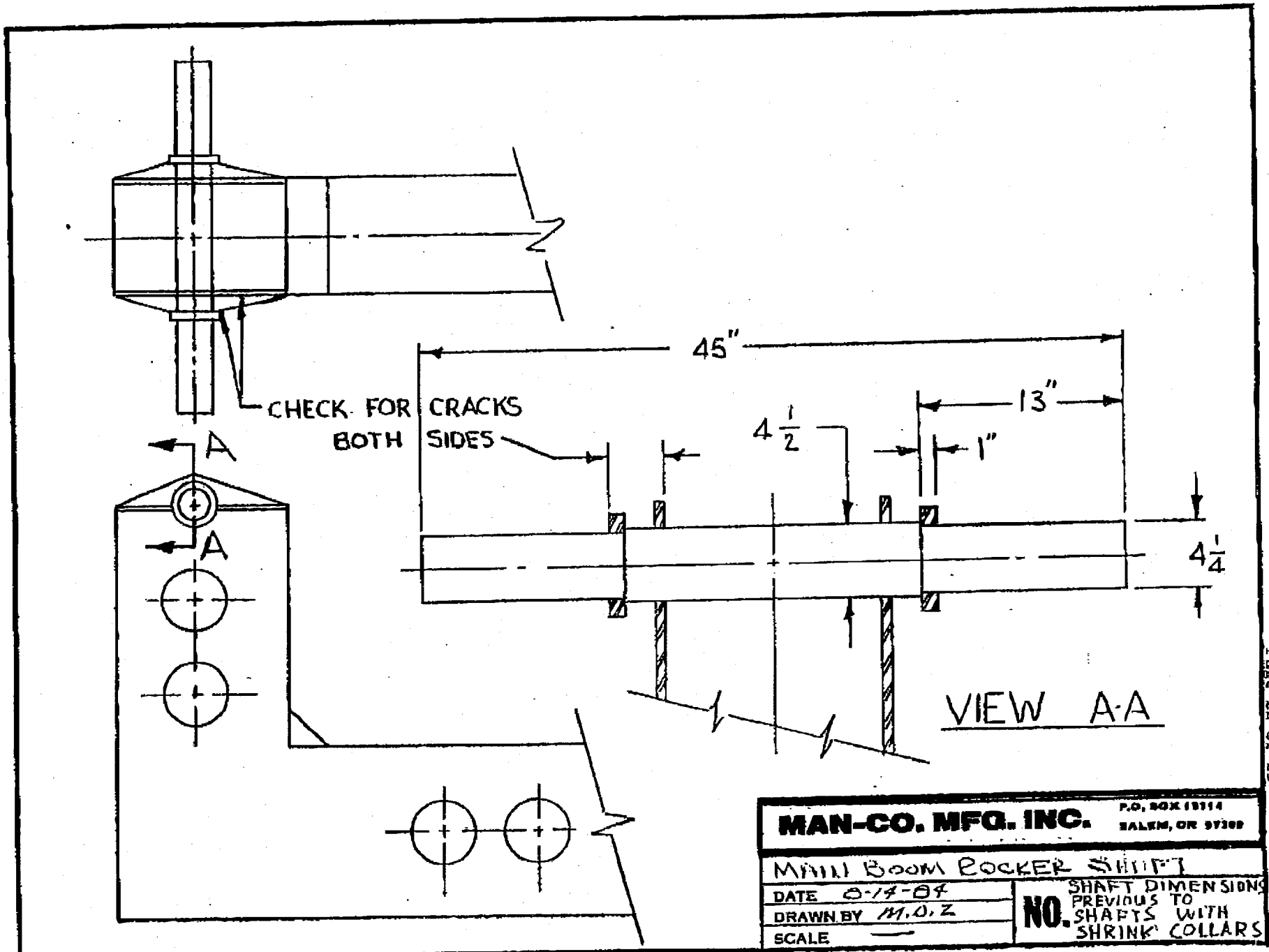
P.O. BOX 13114
SALEM, OR 97309

TOLERANCES: UNLESS NOTED			DRAWN BY. SWJ
DECIMALS	FRACTIONS	ANGLES	DATE. 3-14-89
.X ± .015 .XX ± .010 .XXX ± .005			SCALE. NONE

FIREBALL SPINDLE SHAFT

NEXT ASSEMBLY	REVISION	DRAWING NO.	
		SK-314892	A

REV.	DATE	DESCRIPTION
REVISIONS		



MAN-CO. MFG. INC.
P.O. BOX 19114
SALEM, OR 97309

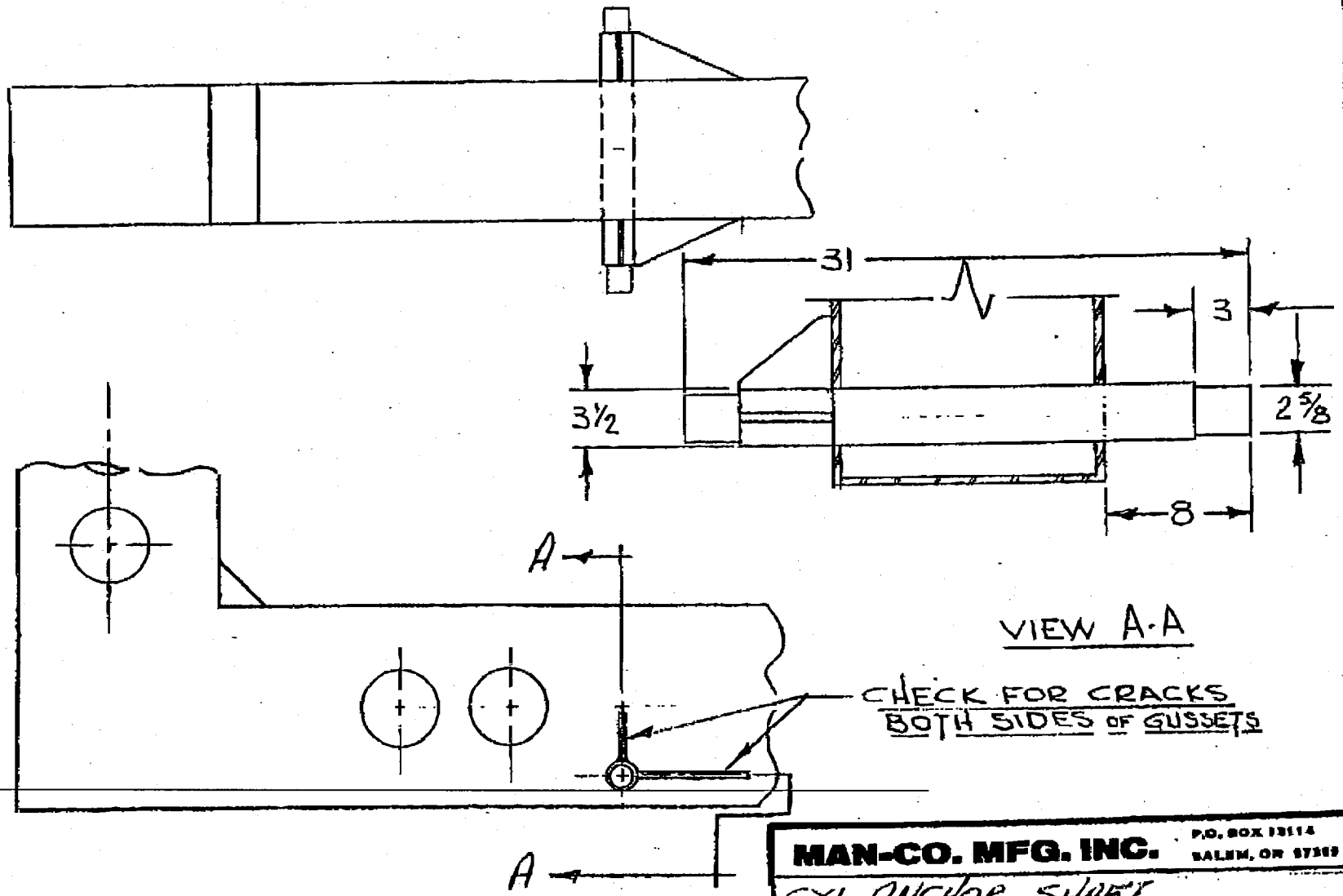
MAIN BOOM ROCKER SHAFT

DATE 8-17-04

DRAWN BY M.O.Z

SCALE —

NO. SHAFT DIMENSIONS PREVIOUS TO SHAFTS WITH SHRINK COLLARS



MAN-CO. MFG. INC.	P.O. BOX 13114 SALEM, OR 97309
CYL. ANCHOR SHAFT	
DATE 8-14-84	NO. SHAFT DIMENSIONS PREVIOUS TO SHAFTS WITH SHRINK COLLARS
DRAWN BY M.D.Z	
SCALE —	

Man-Co Manufacturing, Inc.
P. O. Box 13114, Salem, OR 97309
2470 Ewald Ave., SE 97302
Phone 362-2341

AUGUST 14, 1984

BULLETIN #B-133.NC

MAIN BOOM ROCKER SHAFT FOR ROUND-UP RIDES MANUFACTURED BY FRANK HRUBETZ & CO., INC. AND KILINSKI MFG. CO.

ATTENTION OWNERS OF ABOVE RIDES

A failure has been reported of the main boom rocker shaft on a Round Up manufactured by Frank Hrubetz & Co., Inc. Although Man-Co Mfg., Inc. does not accept responsibility for rides built by Frank Hrubetz & Co., Inc., or Kilinski Mfg. Co., we feel that this is a potential safety problem sufficiently important to bring to your attention.

If you own a Round-Up we strongly urge that you immediately inspect the main boom rocker shaft and the cylinder anchor shaft for cracks using Ultrasonic Test. The test must be done by someone qualified to Level 2 ultrasonic testing. It is not necessary to disassemble the ride to perform the test on the main boom rocker shaft, or the cylinder anchor shaft.

THIS ULTRASONIC TEST MUST BE PERFORMED ONCE A YEAR.

This test was performed on a Round-Up by Man-Co Mfg., Inc. by an independent testing lab, using a 2.25 Mhz transducer on the end of the shaft. The instrumentation was set up to produce a strong reflection from the opposite end of the shaft and calibrated so that the shoulder on the far end of the shaft registered approximately 15-20% of full scale. This would cause a crack at or near the closer shoulder to register significantly. The test was repeated at the other end of the shaft. A sketch of the shaft is on Sheet 2.

If any indication of cracks is found, a 5 Mhz transducer may be helpful in determining it's extent.

The test was not considered to be difficult by the testing lab.

If cracks are found in the shaft, it SHALL BE replaced immediately. Replacement shafts of the latest design may be purchased from Man-Co Mfg., Inc.

Visually inspect all welds for cracks. For verification, use magnetic particle testing.

Man-Co Manufacturing, Inc.
P. O. Box 13114, Salem, OR 97309.
2470 Ewald Ave. SE 97302

ULTRASONIC TEST REQUIREMENTS

Ultrasonic testing shall be performed once a year (or as noted) on the following rides built by Frank Reubert & Co.

Non-Folding Round-Up

1. Rocker shaft - see Dwg. BU-133MC sht. 2 of 3
2. Cylinder Anchor shaft - see Dwg. BU-133MC sht. 3 of 3
3. Spindle shaft every two (2) years)

Folding Round-Up

1. Rocker shaft - see Dwg. BU-133MC sht. 2 of 3
2. Cyl. anchor shaft - see Dwg. BU-133MC sht. 3 of 3
3. Spingle (every two (2) years)

NOTE: If rocker shaft, cyl. anchor shaft or spindle have been replaced with new shaft with shrink collar, then Ultrasonic testing is required every two (2) years.

Ultrasonic Testing shall be performed every two (2) years on the following rides built by Frank Reub. Co.

Folding Round-Up

1. Rocker shaft
2. Cyl. anchor shaft
3. Spindle

Super Round-Up

1. Rocker shaft
2. Cyl. anchor shaft
3. Spindle

Hydraulic Paratrooper - park and portable

1. Spindle

Rim Drive Paratrooper - park and portable

1. Spindle

Standard Paratrooper - park and portable (built by Frank Reubert & Co.)

1. Spindle

MAN-CO MANUFACTURING, INC.

QUALITY CONTROL PROCEDURE

ULTRASONIC INSPECTION OF STEEL

MAIN SPINDAL SHAFTS

QC - 1

Revision D

11/96

Initiated by:

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ULTRASONIC INSPECTION OF STEEL MAIN SPINDAL SHAFTS

1. METHOD

1.1 Scope

This procedure establishes the minimum requirements for the pulse echo ultrasonic inspection of steel main spindal shafts by the contact longitudinal and angle beam techniques.

1.2 Principle

High frequency sound waves are induced into the material under test with the reflected sound wave forms being displayed on a cathode-ray tube. The soundness of the material is determined by analyzing the reflection patterns on the cathode ray tube.

2. APPARATUS

2.1 Electronic Apparatus

An ultrasonic, pulsed, reflection type of instrument shall be used for the inspection. The system shall have a minimum capability for testing at frequencies of 1 to 5 MHZ.

2.2 Search Units

Contact type search units shall be used for angle beam and/or longitudinal wave modes of testing. Search units shall be utilized at their rated frequencies. The maximum search unit dimension shall not exceed 1 inch, with a minimum frequency of 2.25 MHZ.

2.3 Couplant

A couplant, liquid or paste, having sufficient wetting properties to transmit ultrasonic vibrations from the transducer to the test surface such as, oil, glycerin, water, grease, or equivalent, shall be used.

2.4 Reference Standards

Reference standards made from acoustically similar material shall be used to establish a suitable base for determining the adjustment of the instrument used.

2.4.1 Reference blocks used as standards for the longitudinal beam examination shall contain flat bottom holes no larger than 5/64 inch diameter at approximate metal paths of 1/4T, 1/2T and 3/4T. (T= Thickness)

Reference blocks used as standards for the angle beam examination shall contain a notch no greater than 1/8" deep x 1/2" long at a depth equal to or greater than the thickness of the material to be inspected.

2.4.2 When it is impractical to have reference blocks per paragraph 2.4.1 it is acceptable to calibrate on the test material itself, as described in Figure 1 and Figure 2.

2.5 Personnel Qualification

Personnel performing the test shall be certified to ASNT-TC-1A. Personnel who read and interpret indications and evaluate them shall be certified to ASNT-TC-1A, Level II or equivalent.

3. GENERAL PROCEDURE

3.1 The procedure to be used is that of hand scanning the material by the contact longitudinal and angle beam method and introducing into it a beam of ultrasonic energy. Reflections of a portion of this energy will occur at the interfaces of material having different acoustical properties. The reflections are presented on a cathode ray tube and can be evaluated electronically against a predetermined standard. The scanable areas are noted on each piece and tabulated on the inspection report.

3.2 Surface Condition of Test Material

The beam entry surface of the material shall be free of scale, dirt, grease, paint, or other foreign materials. The surface to be tested shall be uniformly smooth with a surface finish adequate to permit ultrasonic inspection at the required sensitivity.

3.3 Instrument Calibration

3.3.1 Longitudinal Beam Examination

When calibration is performed on a reference block the indication amplitude of all defects shall be adjusted to obtain a pulse height on the instrument screen of at least 70 percent of full scale.

When calibration is performed on the test material the instrument adjustment shall be as described in Figure 1.

3.3.2 Angle Beam Examination

When calibration is performed on a reference block the indication amplitude of the reference notch shall be adjusted to obtain a noise height on the instrument screen of at least 70 percent of full scale.

When calibration is performed on the test material instrument adjustment shall be as described in Figure 2.

3.3.3 After instrument calibration and the test of any material is initiated, additional adjustment of the instrument shall not be permitted without recalibration.

3.4 Scanning Surfaces

3.4.1 Longitudinal and angle beam examination shall be performed on the test material as described in Figure 3.

3.4.2 A calibration standard shall be referenced at the beginning and end of each test piece or at intervals not exceeding 1 hour.

3.5 Interpretation of Results

Material is unacceptable if longitudinal and/or angle beam examination results show one or more reflections greater in amplitude than the indication from the calibration defect or reference line and are not associated with the geometric configuration.

3.6 Test Reports

Test records shall be maintained by the testing organization for a minimum period of three years following completion of order. The following data shall be recorded on the test report.

3.6.1 Specific written test procedure and revision utilized for performing the test.

3.6.2 Transducer description, instrument and ultrasonic frequency employed.

3.6.3 Reference standard description.

3.6.4 Location and identification of rejectable indication in material. (Sketch to be included)

3.6.5 Customer identification and location of material and equipment serial number.

3.6.6 Name and location of testing organization.

3.6.7 Date of Test

3.6.8 Signature of Operator

Figure 1

Calibration on test piece for longitudinal beam examination

Notes for Figure 1:

1. A 3/4" Diameter - 5 MHZ Transducer is recommended.
2. The search unit shall be placed on center of shaft area (A) and adjust second back reflection to 100%.
3. Move transducer towards edge of shaft (A) step 1 should appear to be approximately 25% of the screen. Scan the perimeter and adjust to the average.
4. The search unit shall be placed on an indication free area (B) of the shaft being tested and the first back reflection shall be set between 75 to 90% of full screen height.

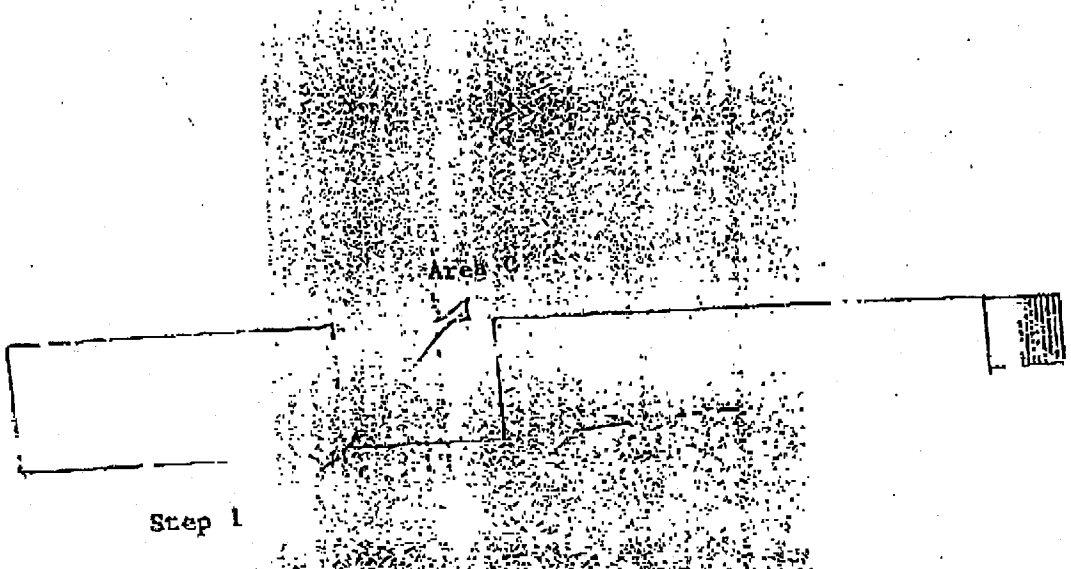


Figure 2

Calibration on test piece for Angle Beam examination

Notes for Figure 2:

1. A 1/2" x 1/2" - 2.25MHz - 45° angle beam search unit is recommended.
2. The search unit shall be placed on an indication free area (C) and the instrument shall be adjusted to obtain a signal amplitude of 40 to 60% full screen height from the shape step - 1.

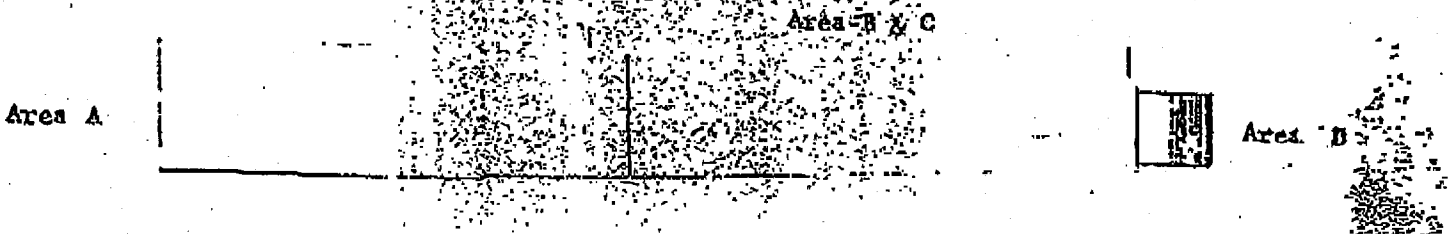
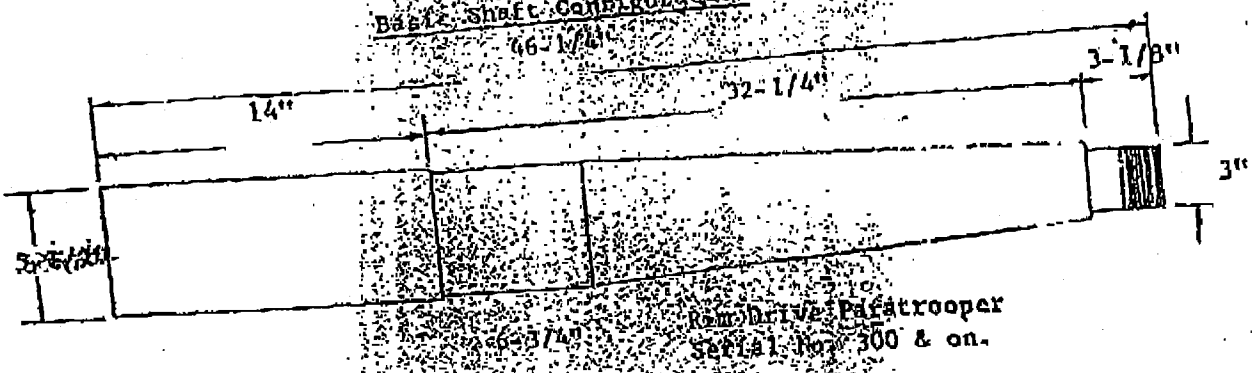


Figure 3

1. Longitudinal Beam Examination
   - A. Area (A) and (D) shall be scanned 100%.
   - B. Area (B&C) shall be scanned 100%.
2. Angle Beam Examination
   - A. Area (B&C) shall be scanned 100% in two axial directions 180° opposed.

Useful Information :

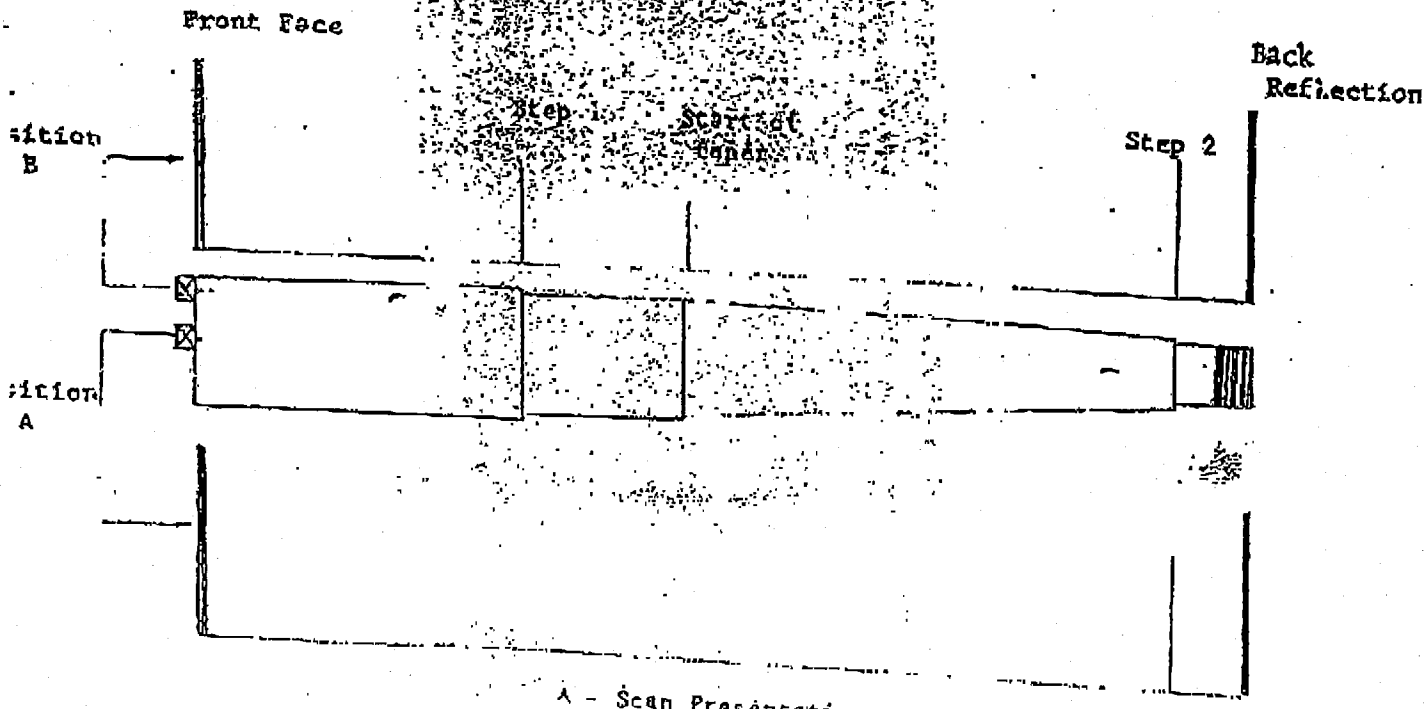


I. Material: Carralloy Steel
Longitudinal Velocity: 2.31" per second x 10^5

II. Transducer Beam Divergence in Steel:

1" Dia. Transducer @ 1 MHz = 30^0 or 3" per ft.
1" Dia. " @ 2.25 MHz = 14^0 or 1-1/2" per ft.
1" Dia. " @ 5.0 MHz = 6^0 or 5/8" per ft.

.750" Dia. " @ 1 MHz = 45^0 or 4-1/2" per ft.
.750" Dia. " @ 2.25 MHz = 20^0 or 2-1/8" per ft.
.750" Dia. " @ 5.0 MHz = 9^0 or 7/8" per ft.



A - Scan Presentation