General Service Bulletin

CSHA-SB-2B

Library	**Service Literature**
Product Section	**Refrigeration**
Product	**Scroll Compressors**
Model	**CSHA**
Literature Type	**General Service Bulletin**
Sequence	**2B**
Date	**April 2000**
File No.	**SV-RF-COM-CSHA-SB-2B-400**
Supersedes	**CSHA-SB-2A, 2764002203, PB-GB-87**

Subject

Replacement of CSHS Compressors with CSHA Compressors

When replacing a CSHS compressor with a CSHA model in a Trane or American Standard unit, the information discussed in this bulletin should be used. This information does not apply when installing CSHA compressors in other manufacturer's units.

Contents

Since the company has a policy of continuous product improvement and parts standardization, it reserves the right to change specifications and design without notice. The installation and servicing of this equipment should be done by qualified, experienced technicians

X39640518-02

Introduction

General Information

Warnings and Cautions

Warnings and Cautions appear at appropriate sections throughout this manual.

⚠ WARNINGS
alert the installer, owner, operator or service personnel to potential hazards that, if not avoided, could result in death or serious personal injury.

⚠ CAUTIONS
are pro vided to alert per son nel to con di tions which, if not avoided, may re sult in mi nor or mod er ate in jury. It may also alert against un safe prac tice caus ing dam age to equip ment.

Literature Change History

CSHA-SB-2 (October 1997)

Original issue of manual; specifically intended for use by experienced service technicians.

CSHA-SB-2A (November 1998)

Manual revisions to include:

- Major rewrite of all sections
- Part selection information
- Ship with list of parts
- Additional part numbers
- Oil Section added

CSHA-SB-2B (April 2000)

Minor part number change in Table 1.

Introduction

This bulletin provides part selection information and installation details for the replacement of CSHS compressors with newer model CSHA compressors within Trane or American Standard units. Once all compressors have been replaced within the units, this bulletin no longer needs to be used.

Each CSHA compressor ships with the following items:

Table 1 - CSHA Compressor Ship with Items

Part Number	Quantity	Part Description	Reference Page
CAP00285	1	Oil equalizer cap, 0.625 OD	See Literature 2764-0014-02-00
2764-0014-01-00	1	Literature, Scroll Compressor Electrical Phasing	N/A
2764-0014-02-00	1	Literature, Scroll Compressor Oil Equalizer cap and Equalizer Line	N/A
SCR00370	3	Screw, 10-32 X 0.50, used in junction box	N/A
2764-0022-01-00	1	Literature, Replacement Scroll Compressor Log Sheet	N/A
PART-IN-1	1	Literature, Causes of Compressor Failure	N/A
KIT05990	1	Orifice, Suction 9.3 & 10, 14 & 15 Ton Compressors	17
SPC00348	1	Spacer, Manifold Bracket	6
NUT00248	2	Nut, 0.31-18 Whiz Lock	6
SCR00034	2	Screw, 0.31-18 X1.75 Hex Cap	6
WAS00033	2	Washer, 0.31 ID X 0.75 OD	6
CSHA-SB-2B	1	Literature, CSHA Service Bulletin	N/A
CSHA-SB-1B	1	Literature, Approved Oils for Trane CSHA and Interchangeability of CSHA and CSHS Compressors	N/A

Introduction

Sample Model Number

C	S	H	A	1	5	0	K	0	*	0	0
1	2	3	4	5	6	7	8	9	10	11	12

Digit 1- Positive displacement refrigeration compressor

Digit 2- S=Scroll Compressor

Digit 3- H=Hermetic Compressor

Digit 4- Development Sequence

A= 3450 rpm vertical welded shell motor

Digit 5, 6, 7- Designates Size
(Nominal Tons)

093 = 9.3 tons	140 = 14.0 tons
100 = 10.0 tons	150 = 15.0 tons

Digit 8- Voltage Designator

A = 200-60-3	F = 220-50-3
R = 208/230-60-3	V = 346-50-3

K = 460-60-3 or 400-50-3
D = 575-60-3
X = 380-60-3

Digit 9- Capacity Control
0 = Single Speed, no unloading

Digit 10- Design Sequence, Factory Assigned

Digit 11- Method of Control or Unloading
0 = Single Speed, no unloading

Digit 12- Basic Compressor Variation
0 = Stub tubes, oil charging valve, oil equalizer tube, manifold bracket
A = Stub tubes, oil charging valve,no oil equalizer tube, manifold bracket
B = Rotalocks with access port, oil charging valve,no equilizer tube, manifold bracket

Discussion

Begin by determining the configuration of the unit where the CSHA compressor will be installed.

Not all CSHS in stal la tions are the same. Some CSHS com pres sors are in stalled in re frig era tion cir cuits hav ing only the one com pres sor. Oth ers may be in stalled in cir cuits hav ing two, three or even four com pres sors.

Some of the two com pres sor cir cuits use brac ing to tie the top of the com pres sors to gether. Other two com pres sor cir cuits will not have these brack ets, i.e. SWUD. All units hav ing three or four com pres sors per re frig era tion cir cuit do not use top sup port brack ets. Where top sup port brack ets are pres ent, there are two de signs that have been utilized. First in production is what is referred to as “Hand-Cuff” supports that wrapped around the compressor shells. Later in 1992 these hand- cuffs were re placed with a top mounted flat plate de sign.

When a mani fold set is en tirely CSHA com pres sors, all of the elec tri cal modi fi ca tions and brack ets are in place. The use of the orifice in the compressor suction is not important when all compressors are CSHA, i.e., the downstream CSHA compressor can have a mix of compressors with or without orifices.

Section 1

Spacer Bracket Assembly Installation

Typical Installation for Nominal 20, 25 & 30 Ton Circuits.

These instructions apply to all units that shipped *after* mid-August , 1992, with manifold compressor configurations of 2 compressors per circuit only. The CSHA compressor has a shorter height than the CSHS compressor. Therefore, for manifold 2 compressor configurations, a spacer bracket is needed to accommodate this difference in compressor height. Figures 1 through 3 are for illustration only. They show 2 compressor manifold configurations of similar and dissimilar physical sizes. Note that the 9.3 and 10 ton compressors look identical as well as the 14 and 15 ton compressors. The differences for both are internal.

A kit containing the spacer bracket, screws, washers and nuts is shipped with each compressor. See Table 1, CSHA Compressor Ship with Items, and Figure 1 for details.

For CSHS and CSHA Pairs:

1. Take existing support plate and bolt to the CSHS scroll compressor using carriage bolts and whiz nuts. Support plate part numbers are listed below.

2. With the spacer bracket in between the support plate and the CSHA compressor, bolt together using flat washers, hex head screws and whiz nuts.

3. Tighten the bolts and nuts on support plate to 12-14 ft. Lbs. of torque.

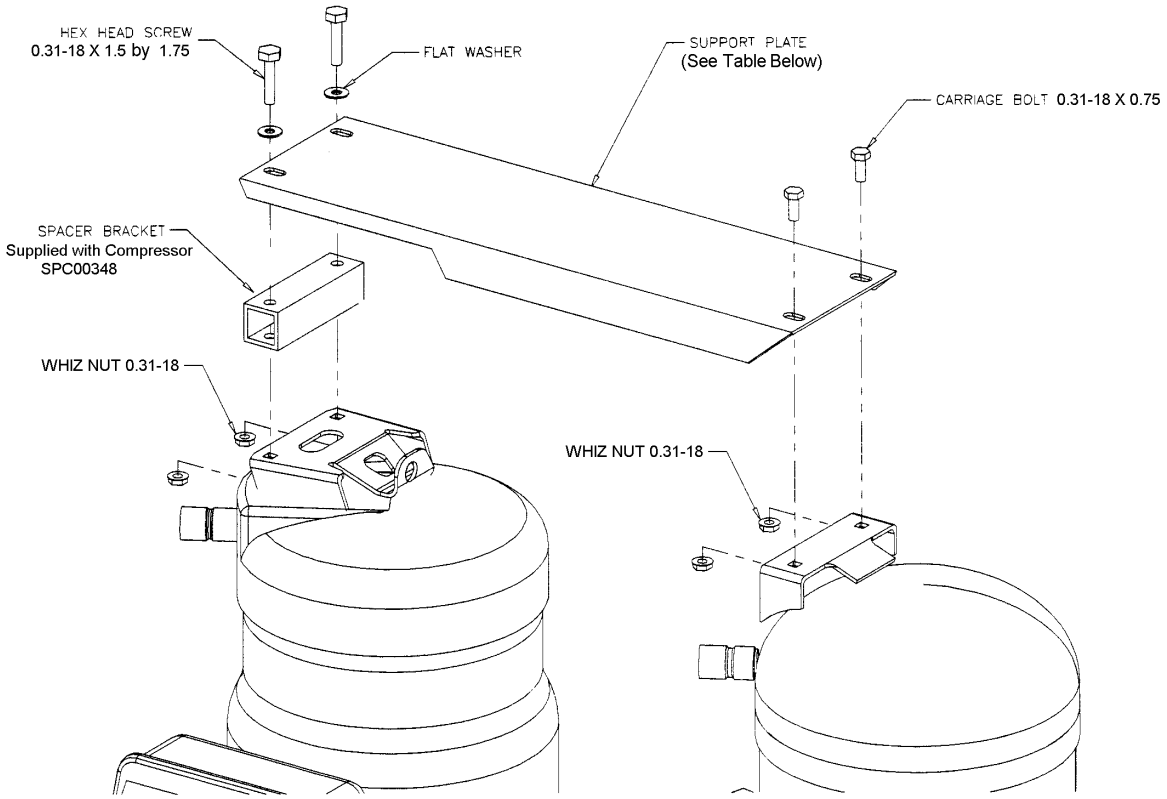
Section 1

Continued

For a Pair of CSHA Com pres sors:

1. Install support plate without the use of any spacer brackets. Secure using (4 each) 5/16-18 X 5/8" hex screws with locking nuts. Tighten to 12-14 ft. lbs of torque. When both compressors in the manifold pair will be CSHA models, then the flat support plate should be utilized on all units requiring top support. In other words, hand-cuff brackets described in Section 2 should be discarded and replaced with flat support plates.

Figure 1 — Typical Installation



CSHA Compressor (Replacement) **CSHS Compressor (Existing)**

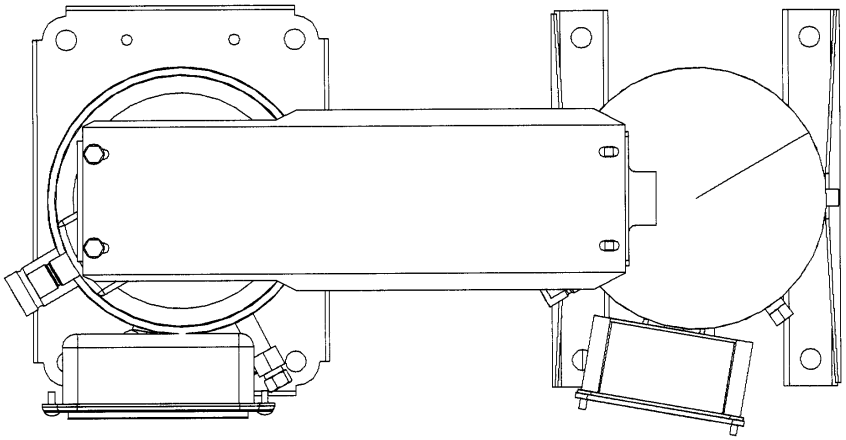
Part Number	Description
PLT02718	Nominal 20 Ton Circuit
PLT02719	Nominal 30 Ton Circuit
PLT02720	Nominal 25 Ton Circuit

Section 1

Continued

Figure 2—Nominal 20 Ton Installation

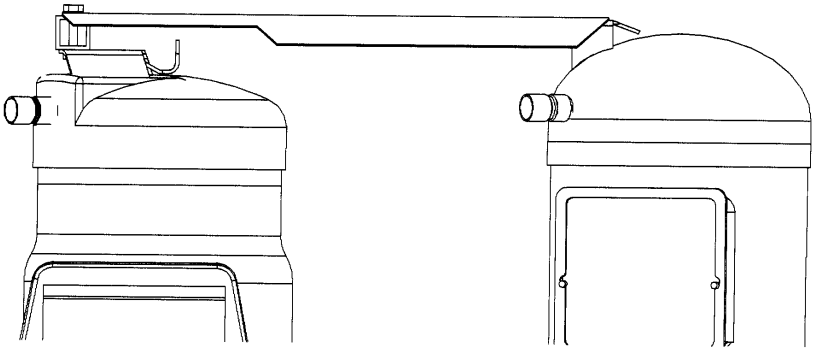
Top View



CSHA (9.3 or 10 ton) (Replacement)

CSHS (9.3 or 10 ton) (Existing)

Side View

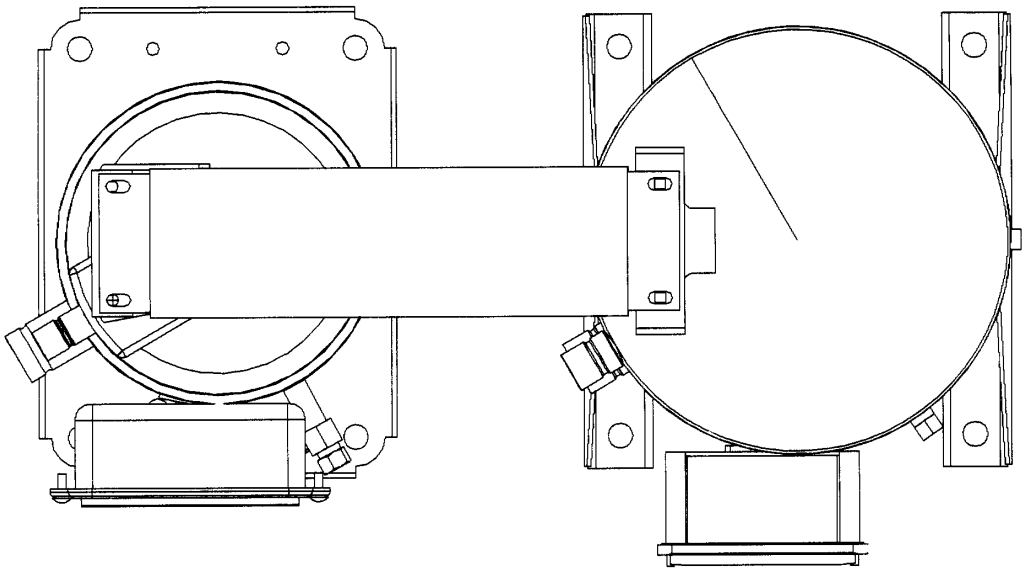


Section 1

Continued

Figure 3 — Nominal 25 Ton Installation

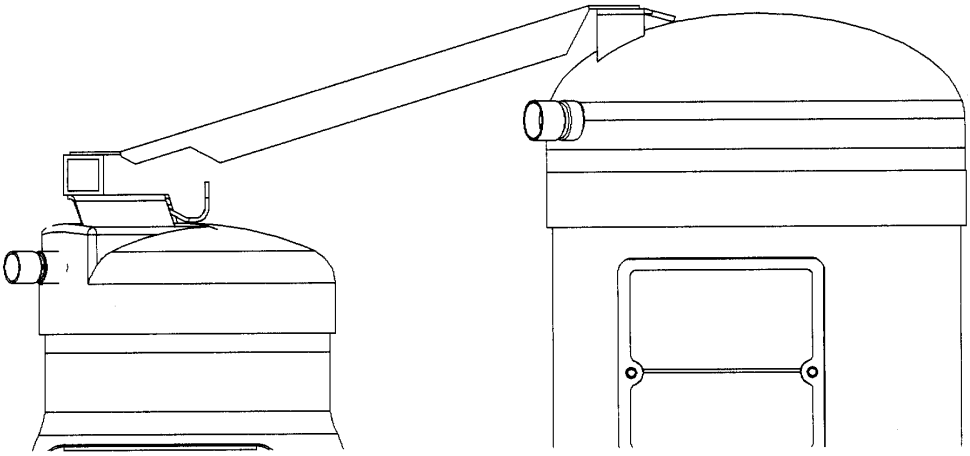
Top View



CSHA (9.3 or 10 ton) (Replacement)

CSHS (14 or 15 ton) (Existing)

Side View



Discussion

Section 2a

Hand-cuff Bracket Assembly Installation

Typical Installation for 20, 25 & 30 Ton Circuits

These instructions apply to all RAUC, CGAD, S*HC and S*HD units which shipped between August 15, 1991 and August 12, 1992, where 14 and 15 ton compressors are used. These units have compressors that use the “Hand-cuff” brackets to secure the manifold compressors together. For further information detailing the hand-cuff brackets and the units these are installed on, refer to the General Service Bulletins HCOM-SB-79B and HCOM-SB-83 or most recent revisions.

The 14 or 15 ton CSHA compressor has a smaller diameter than the 14 or 15 ton CSHS compressor. Manifold configurations using a 14 or 15 ton compressor and using the hand-cuff brackets need a spacer bracket * to accommodate this difference in compressor diameters. Refer to Figure 4 through 7 for installation details.

1. Modify the existing bracket by cutting out a 4.5” X 1.25” section as shown in the bracket modification on page 10, Figure 5. (Not required for nominal 20 ton circuits).

2. Take brackets and bolt together loosely using carriage bolts and whiz nuts.

3. Take ring and run whiz nut up all the way to the end of threads on ring with washer side of nut facing out, to 12-14 ft. Lbs. of torque.

4. Take brackets, with tab facing compressor J-box, and position them between discharge line and J-box. Insert ring around compressor with the hook going into slot of bracket and the threaded end going into tab hole. Start nut on ring. Repeat procedure on the other compressor with the remaining ring.

* This spacer bracket (BRK02576) is required ONLY when replacing 14 or 15 ton compressors in manifolded configurations and is ordered separately.

Section 2a

Continued

Figure 4 — Typical Installation of BRK02576

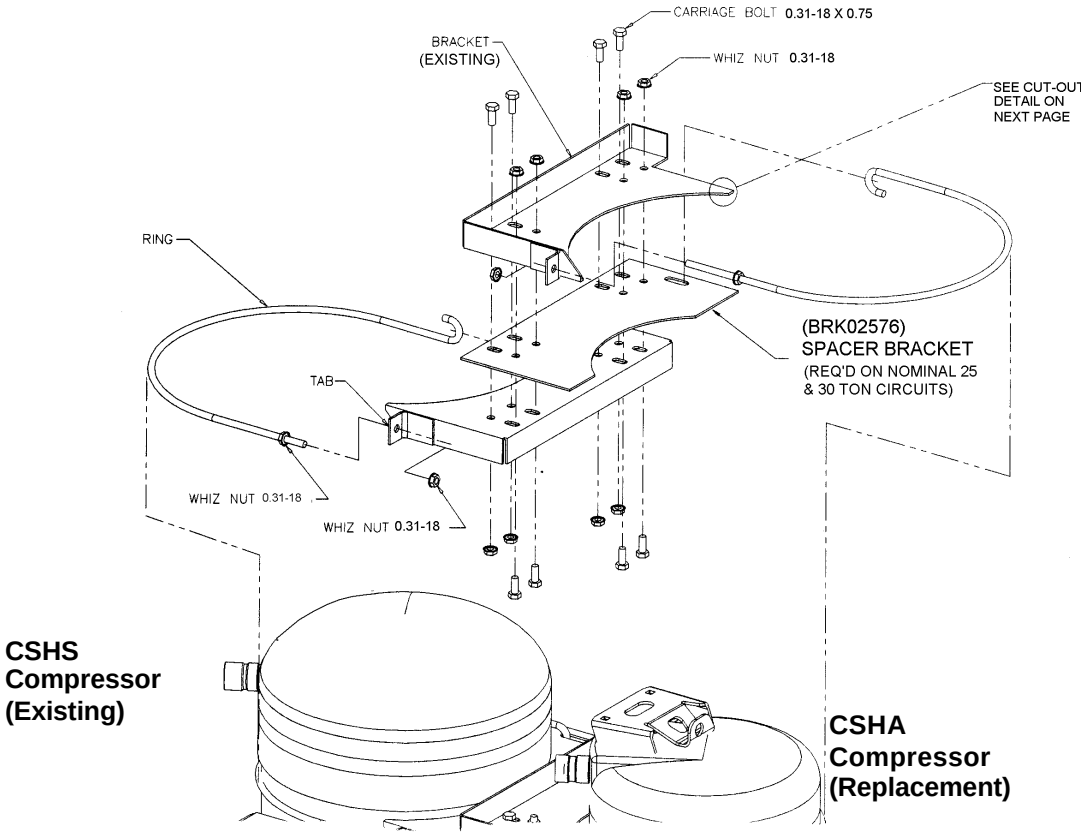
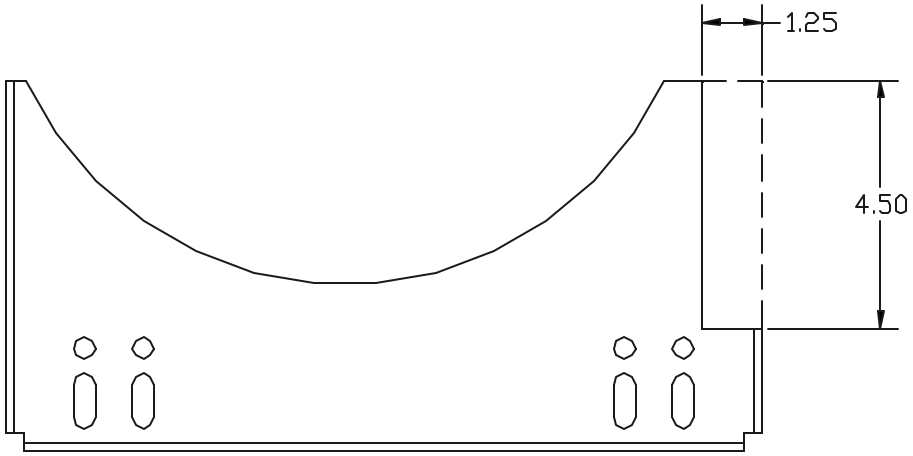


Figure 5 — Bracket Modification Detail (Only required on nominal 25 & 30 ton circuits)

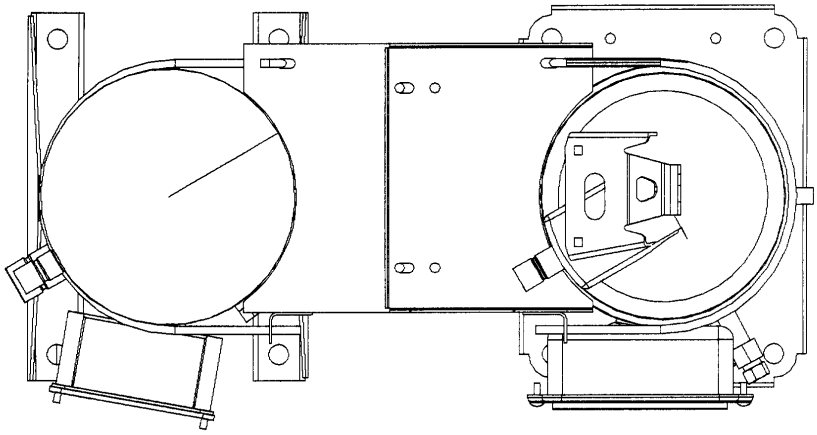


Section 2a

Continued

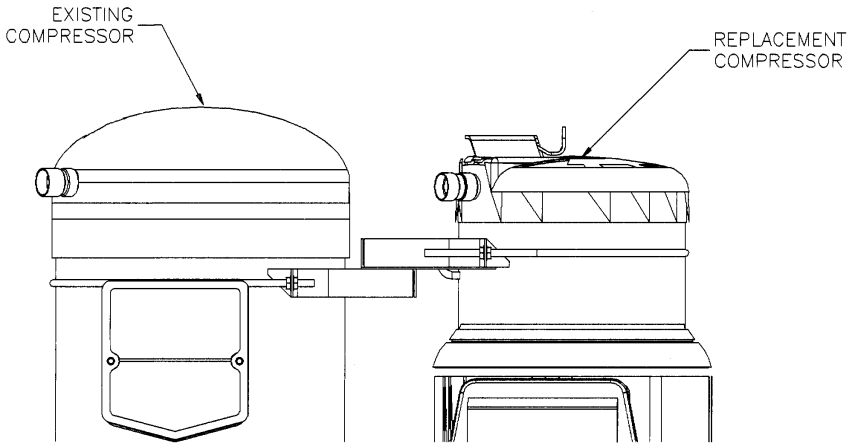
Figure 6 — Nominal 20 Ton Installation, Spacer Bracket Not Required

Top View



CSHS (9.3 or 10 ton) **CSHA (9.3 or 10 ton)**

Side View



Section 2a

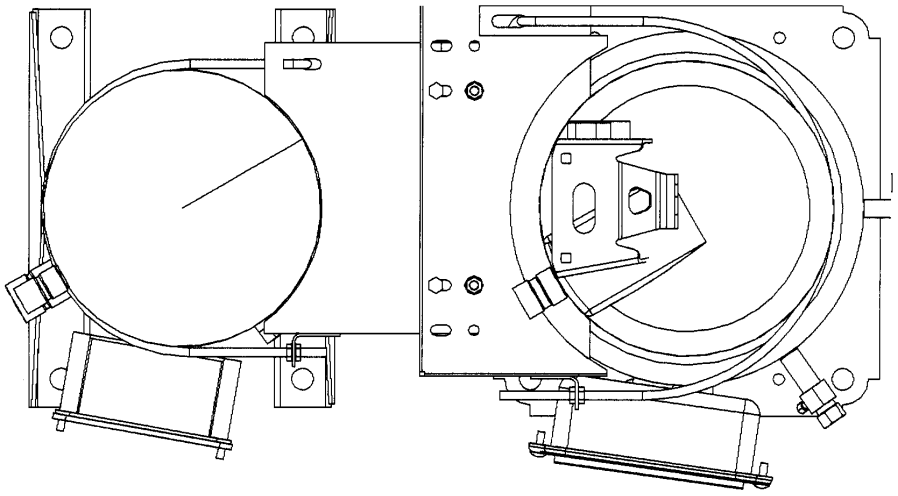
Continued

5. With brackets and rings between discharge line and compressor junction box, tighten ring around compressor until tab starts to deflect—then stop. Run whiz nut back to tab and tighten. Brackets or rings MUST NOT RUB tubing or junction box. Brackets may be out of alignment when viewed from the top by the amount allowed by bolt size vs. hole size.

6. Tighten the remaining bolts and nuts on the brackets to 12-14 ft. Lbs. of torque.

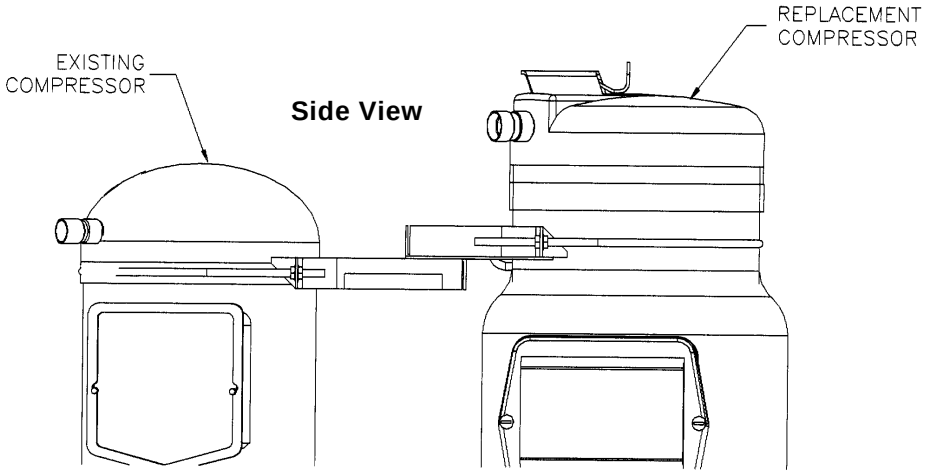
Figure 7 — Nominal 25 Ton Installation, Spacer Bracket Required

Top View



CSHS (9.3 or 10 ton)

CSHA (14 or 15 ton)

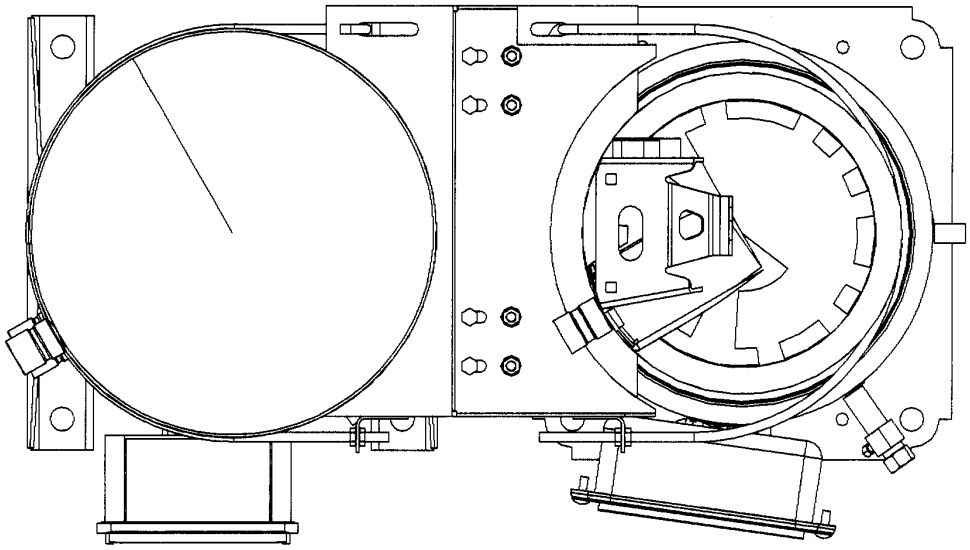


Section 2a

Continued

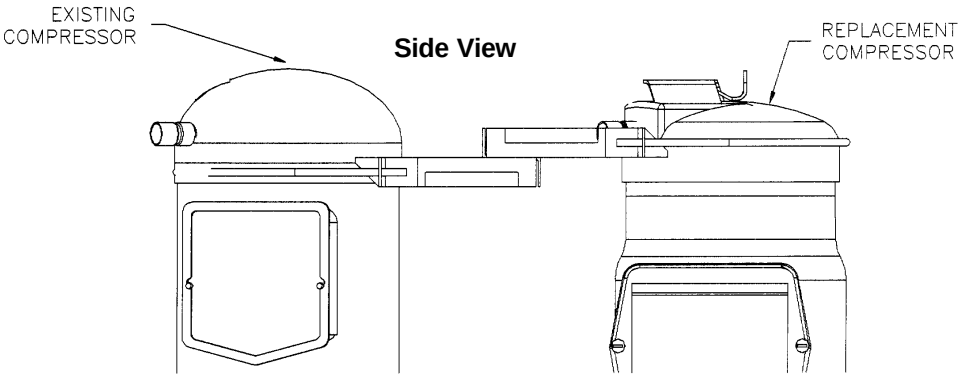
Figure 8 — Nominal 30 Ton installation, Spacer Bracket Required

Top View



CSHS (14 or 15 ton) **CSHA (14 or 15 ton)**

Side View



Discussion

Section 2b

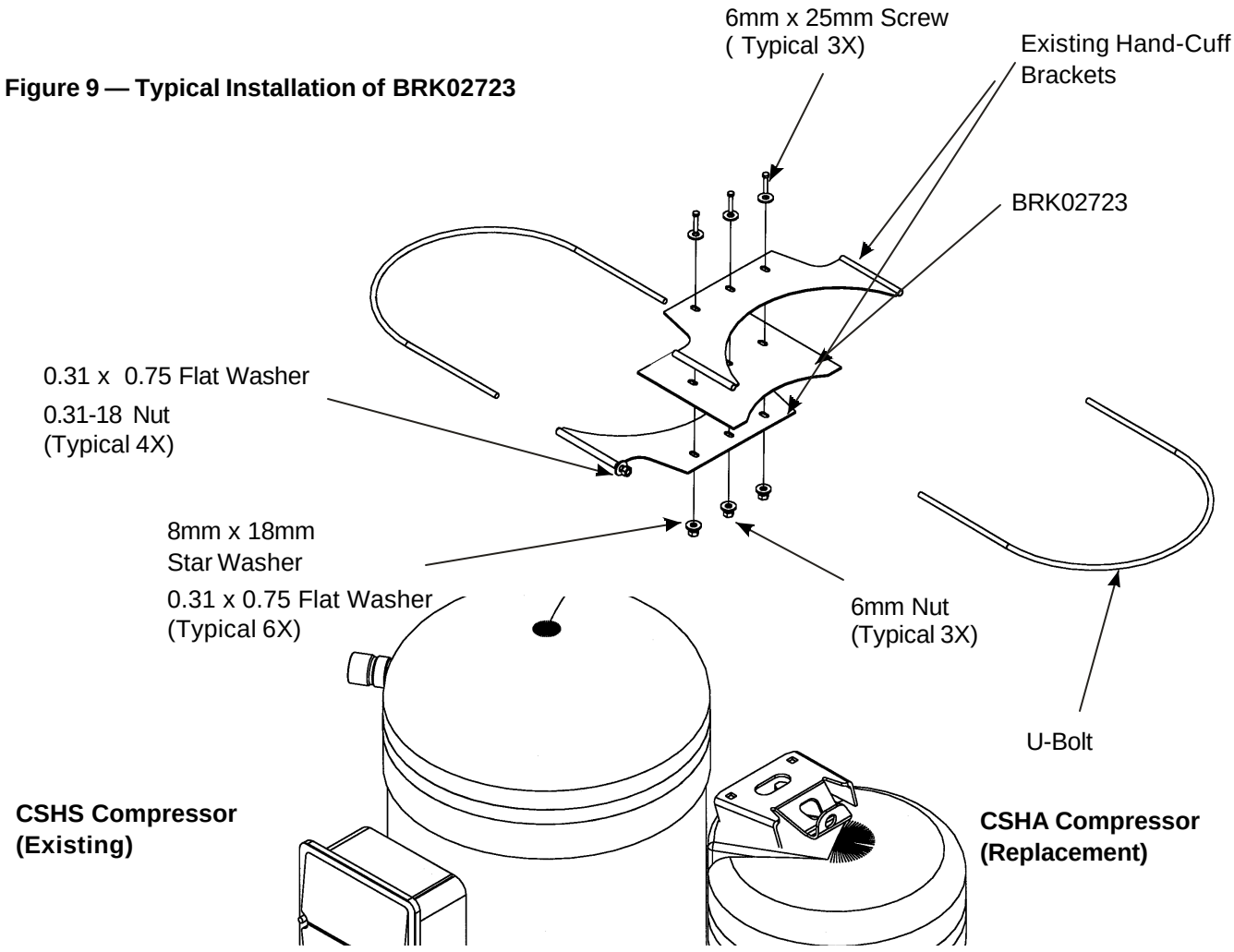
Hand-cuff Bracket Assembly Installation

Typical Installation for 20, 25 & 30 Ton Circuits

These instructions apply to all RWUD, CUAD, CGWD and CCAD units of 25, 30, 50 and 60 ton capacity, which shipped between August 15, 1991 and September 15, 1992 where 10 and 15 ton CSHS compressors were used. These units use the “hand-cuff” brackets to secure the manifold compressors together. For further information detailing the hand-cuff brackets and the units these were installed in, refer to the General Service Bulletin HCOM-SB-80 or the most recent revision.

Note that an adapter bracket (BRK02723) is needed when replacing a CSHS compressor with a CSHA compressor in manifold nominal 25 and 30 ton configurations. This is because the CSHA compressor has a smaller diameter than the CSHS compressor. The adapter bracket will accommodate the difference in compressor diameters and is ordered separately. (Note: BRK02723 is not required for a nominal 20 ton installation). See Figures 9,10 and 11 and the installation instructions for details.

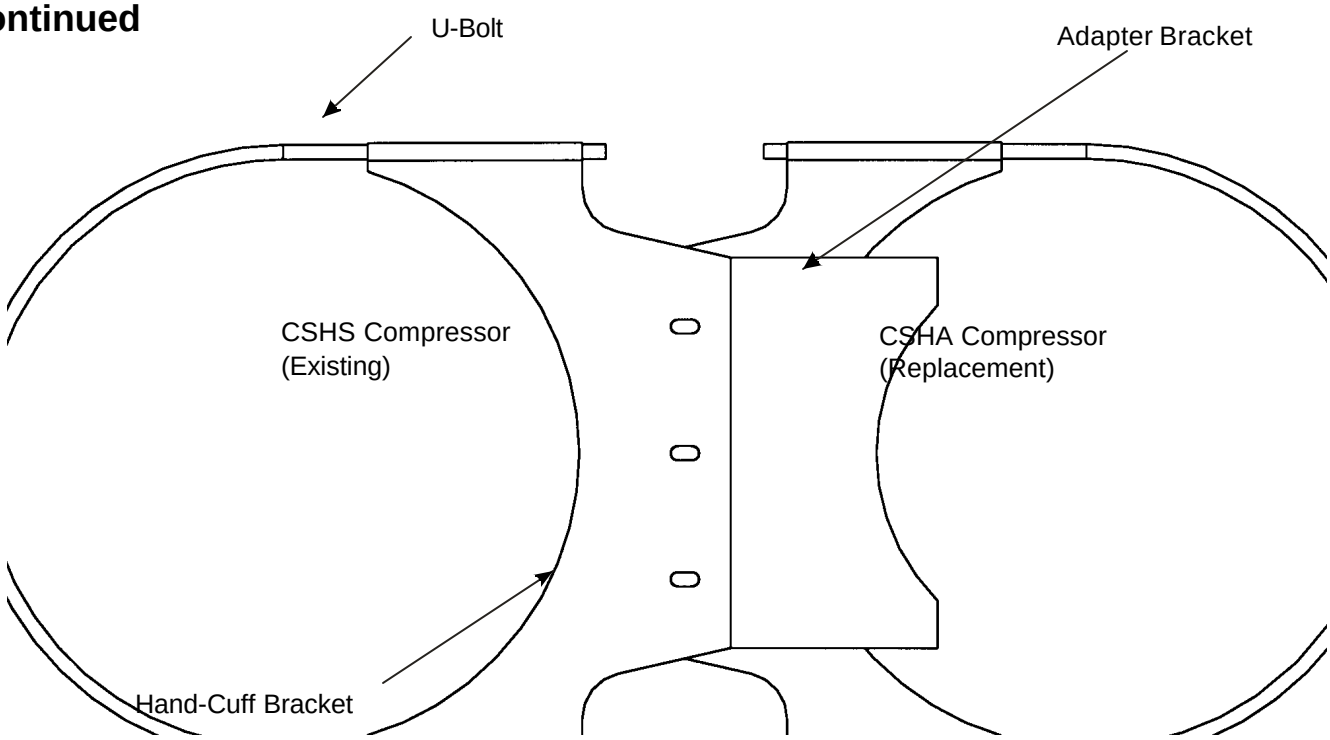
Figure 9 — Typical Installation of BRK02723



Section 2b

Continued

Figure 11 — Hand-Cuff Bracket Detail



1. Position the original hand-cuff bracket around the new CSHA compressor.

2. Wrap the mating U-bolt around the new CSHA compressor and slide the threaded ends through the original hand-cuff bracket.

3. Install a 0.31 x 0.75 flat washer and 0.31-18 nut on each threaded end of the U-bolt. Do not tighten the nuts at this time.

4. Bolt the three brackets together using three 6mm x 25mm screws and secure them with the star washers, washers and 6mm nuts.

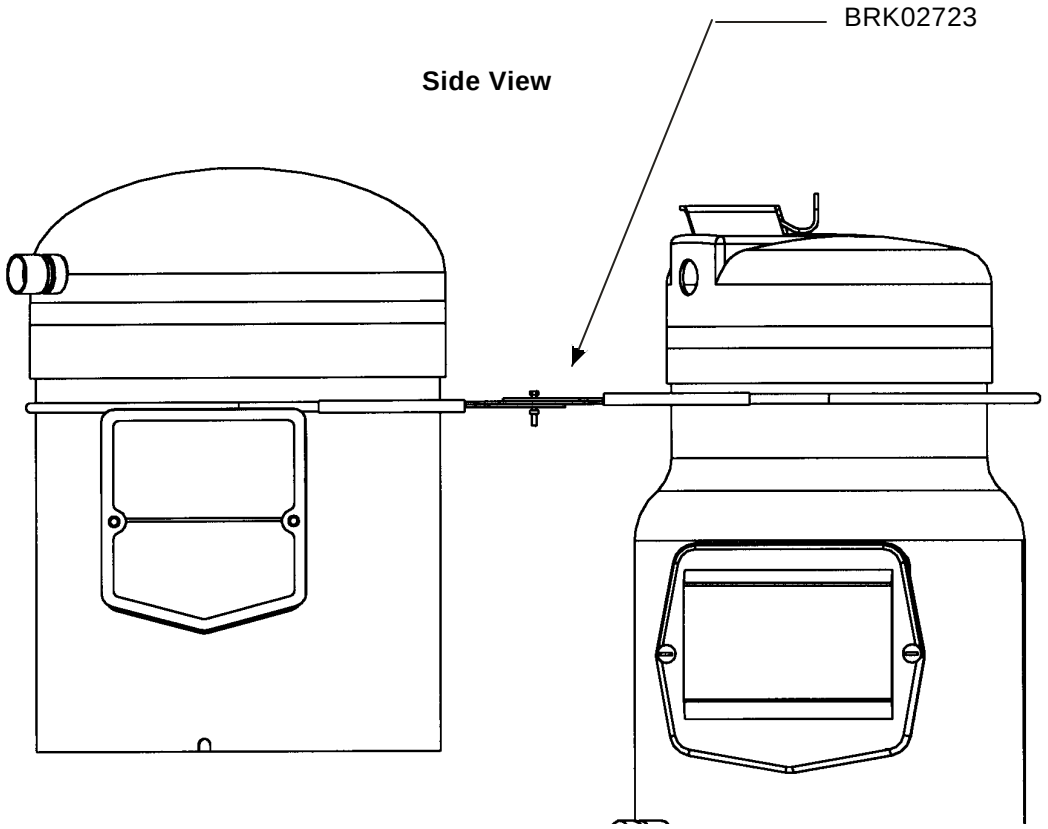
Note: The brackets and U-bolts must be positioned so that they will not rub against the compressor junction box or any adjacent piping.

5. With the brackets properly installed and positioned, tighten all nuts and bolts to 12-14 ft.-lbs. of torque

Section 2b

Continued

Figure 10 — Side View, Typical Installation of BRK02723 , Nominal 30 ton circuit shown



CSHS Compressor (Existing)

CSHA Compressor (Replacement)

Section 3

Orifice Assembly for Manifold Applications

The use of the orifice in the compressor suction is not important when all compressors in the manifold set are CSHA, i.e., the downstream compressors can be a mix of CSHA compressors with or without orifices.

Do not substitute using field fittings or tubing when connecting suction piping. Existing suction pipe must be reused or replaced with new Trane or American Standard parts. This original suction tubing and fittings assure that oil is returned to the first compressor in a manifold set.

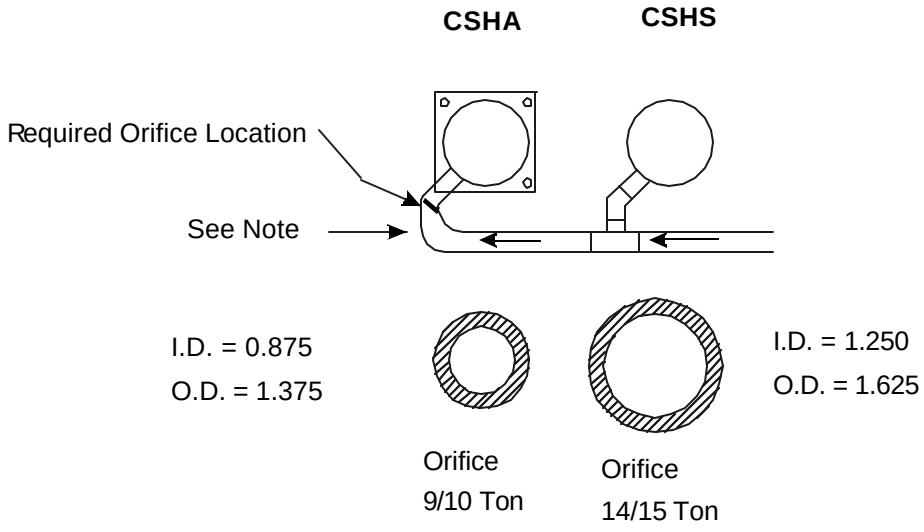
Place the washer shaped orifice into the compressor suction pipe stub on any CSHA compressor mounted in a downstream position. Insert the suction line into the pipe stub so it securely butts up against the face of the orifice. Braze the suction line into place.

Note: If the CSHA compressor is installed in the first upstream position, the orifice is NOT required.

Figure 13 illustrates the location of upstream and downstream compressors in a two, three and four manifold installation.

CAUTION
Failure to install the orifice may result in compressor failure.

Figure 12 — Placement of an Orifice into a CSHA when in the DOWNSTREAM position of a CSHS

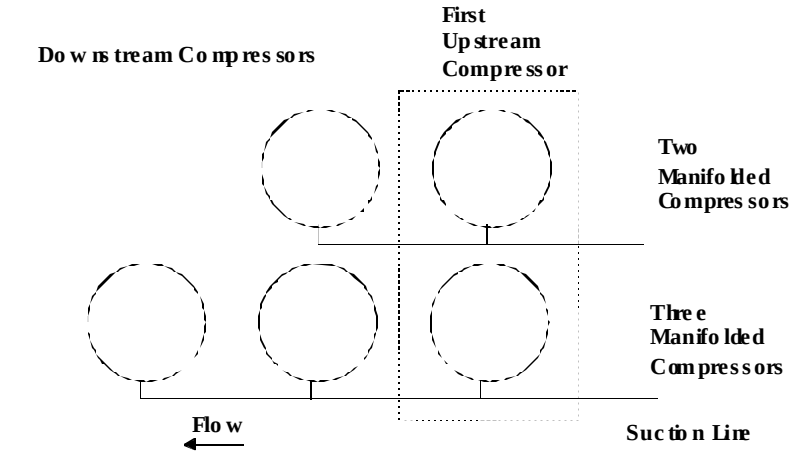


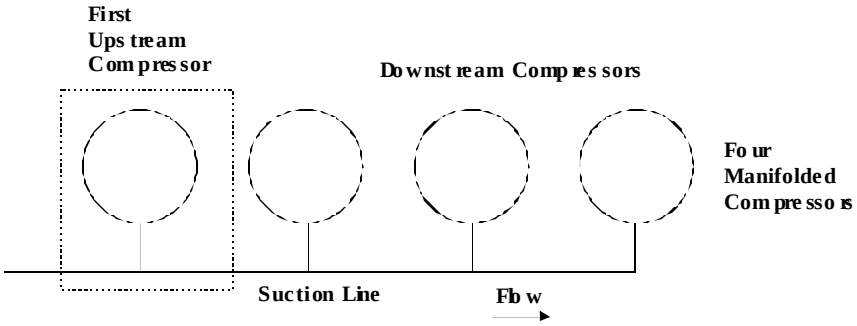
Note: Use the appropriate orifice for the replacement CSHA compressors size. Discard extra orifices.

Section 3

Continued

Figure 13—Upstream and Downstream Compressors





Section 4

Electrical Information

The electrical considerations vary from one unit to another. Some units protect the compressor motor using circuit breakers, others use external overloads, while still others use the units UCM and current transformers for current protection. Only in cases where circuit breakers are originally used, is it necessary to provide larger circuit breakers and possibly contactors due to changes to starting current. Other existing overloads can continue to be used with the new CSHA compressor.

⚠ CAUTION

Failure to replace these electrical components may result in system failure.

The CSHA compressor has higher locked rotor amps than the CSHS compressor. Therefore, when replacing a CSHS compressor with a CSHA compressor in the units detailed per Table 2, the existing circuit breaker must be changed. Also, in some of these same applications, the contactor may need to be changed. See Table 3 for replacement circuit breakers and contactors.

These replacement breakers and contactors apply only to the models listed in Table 2.

Table 2

Model	Description
RAUCC20-60**J-K	RAUC, 20 through 60 tons, design sequences J through K
S*HCC20-60	S*HC, 20-60 tons, design sequences P through 3
S*HDC20-30**K-Z	S*HD, 20 through 30 tons, design sequences K through Z
S*HFC20-75**A-J	S*HF, 20 through 75 tons, design sequences A through J
TC*330-600A	TC*, 27.5 through 50 tons, development sequence A and B
TE*330-600A	TE*, 27.5 through 50 tons, development sequence A and B
YC330-600A	YC*, 27.5 through 50 tons, development sequence A and B
TC*240-300B***B-D*	TC*, 20 through 25 tons, design sequences B through D
YC*240-300B***B-D*	YC*, 20 through 25 tons, design sequences B through D
S*HGC90-D13**A-H	S*HG, 90 through 130 tons, Design Sequence A through H

Section 4

Continued

Table 3 — Replacement Circuit Breakers and Contactors

Compressor Tons	Voltage	Replacement Circuit Breaker	Replacement Contactor	
9 or 10	200 208-230 460 575	BKR00829 BKR00831 BKR00830 BKR00832	No Change	
14 or 15	200 208-230 460 575	BKR00834 BKR00836 BKR00835 BKR00837	**120 Volt Coil** CTR01162 CTR01162	**24 Volt Coil** CTR00525 CTR00525

Table 4 — Voltage Utilization Range

Electrical Characteristics	Voltage Utilization Range
200-60-3	180-220
208/230/60/3	187-254
380/60/3	342-418
460/60/3	414-508
575/60/3	518-635
200/50/3 (9 and 10-ton only)	180-220
220/50/3	198-254
346/50/3	308-381
400/50/3	340-460

Section 5

High Pressure Control

The CSHA compressor does not have an internal pressure relief valve like the CSHS compressor. Therefore, when replacing a CSHS compressor with a CSHA compressor, a high pressure control is required for the unit model numbers listed in Table 5.

KIT05446 contains the parts required and is ordered separately.

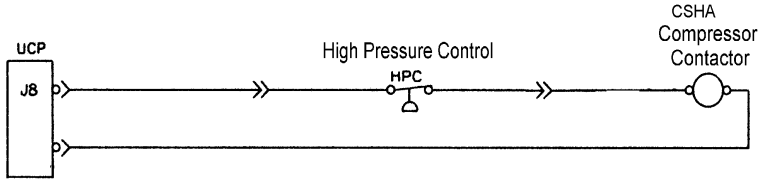
Install these parts on the existing port in the CSHA compressor discharge line as shown in Figure 15. The tee supplied includes a valve core depressor to push open existing schrader valve on discharge line. One end of the male fittings has capability of housing a schrader valve core. Place cap on this fitting. Be sure to connect the high pressure switch to the male fitting without the schrader valve core.

Identify the CSHA compressor electrical circuit. Wire the high pressure control in series with the CSHA compressor contactor coil. Refer to Figure 14.

Table 5

Model	Description
TC*240-300B***B-D*	TC*, 20-25 tons, design sequences B through D.
YC*240-300B***B-D*	YC*, 20-25 tons, design sequences B through D.

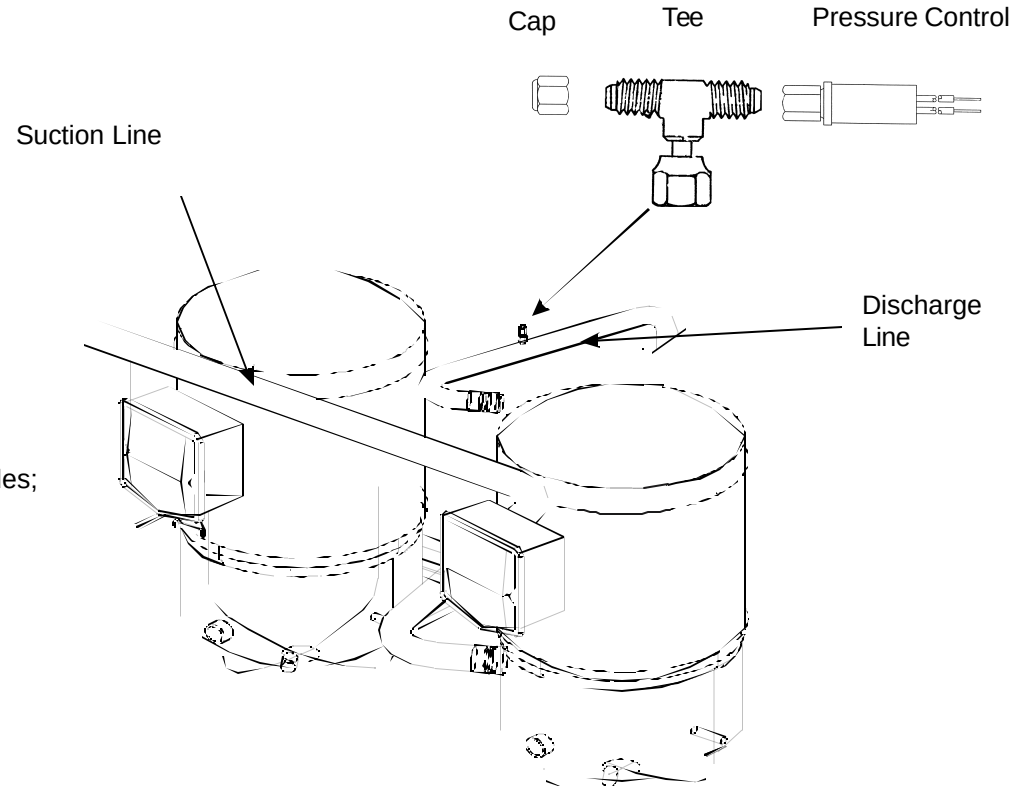
Figure 14—Typical High Pressure Control Wiring



Section 5

Continued

Figure 15 — KIT05446, High Pressure Control Installation



Note: KIT05446 includes;

(1) TEE00109

(1) CNT00510

(1) CAP00209

Section 6

Isolator Removal

The CSHA compressor has a different base than the CSHS compressor. Thus, when replacing a compressor that is mounted on base rails the base rail isolator under the new compressor will interfere with the compressor base. Remove the items above the base rail to allow clearance. This usually involves removing the isolator washer, steel sleeve and bolt. The bolt may not be required. Refer to Figure 16.

Section A — A

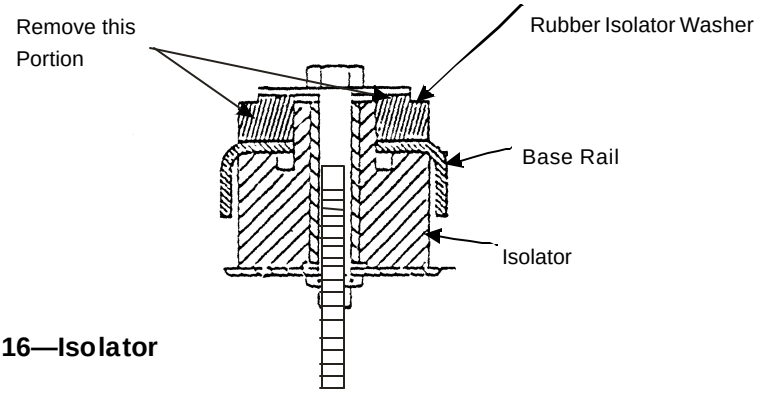
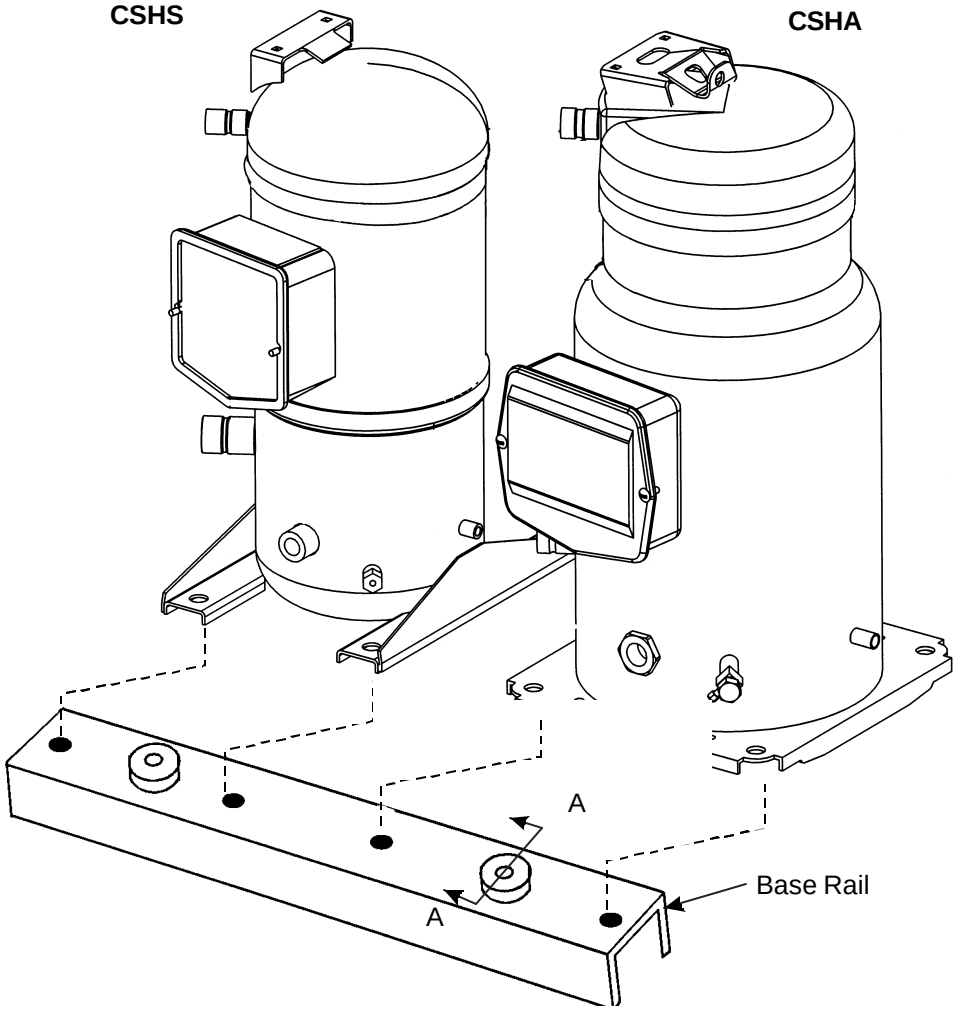


Figure16—Isolator



Section 7

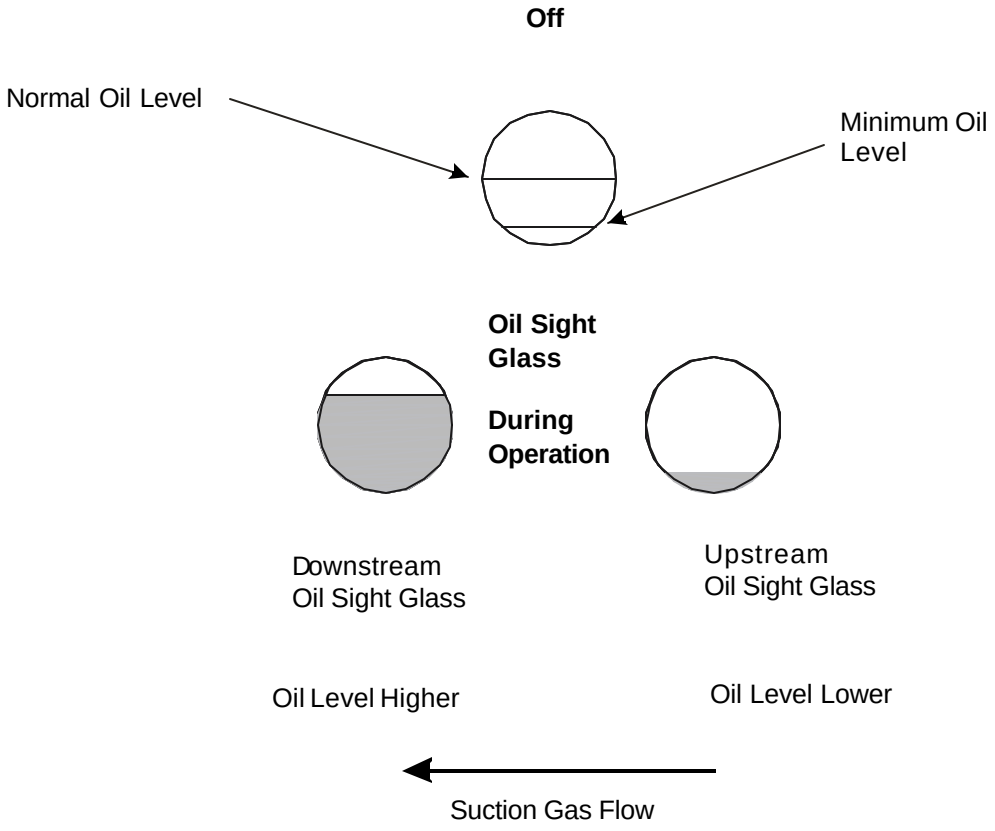
Oil Information

The information in this section is only a small part of the oil information. For further instructions refer to CSHA-SB-1B, or most recent version.

Oil Levels

The oil level can only be evaluated when all the compressors are shut off. During operation the oil levels will vary. Generally speaking the oil level will be highest in the last compressor in the manifold set. The minimum oil level with the compressors shutoff is at the bottom of the oil sight glass.

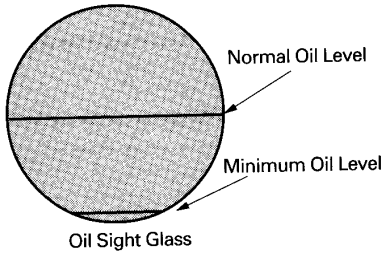
Figure 17 — Oil Level for Manifold Compressors



Section 7

Continued

Figure 18 — Oil Level, Single Compressor



On the center compressor of a three-compressor set and on the middle two compressors of a four compressor set, it is necessary to remove the oil sight glass(s) and replace it with an adapter (ADP00493- ordered separately) for connecting the oil equalizer line. The adapter used on the original CSHS compressor does not fit in the new CSHA compressor.

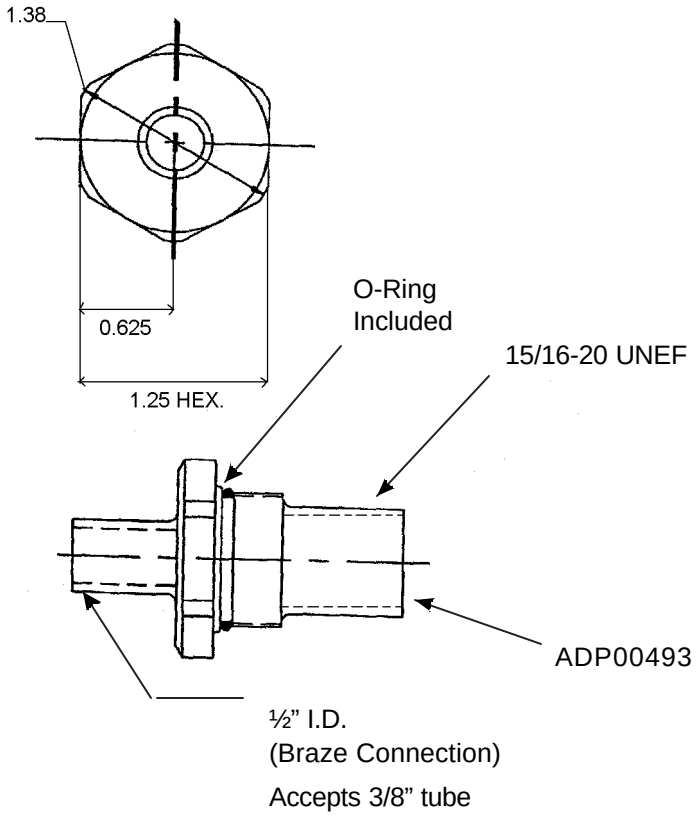
- Tilt the compressor back to remove the sight glass.
- Install the oil equalizer tube adapter, ADP00493, See Figure 19.
- Torque the adapter to 45 ± 5 ft. Lbs.
- It may be necessary to drain some oil out of the compressor so that it does not run out of the adapter.

Following the installation of oil equalizer line, some slope of the line is expected due to the variation of compressors heights. This is normal and does not affect oil return.

Section 7

Continued

Figure 19 — Oil Equalizer Adapter, Required for Three and Four Compressor Manifold Set.

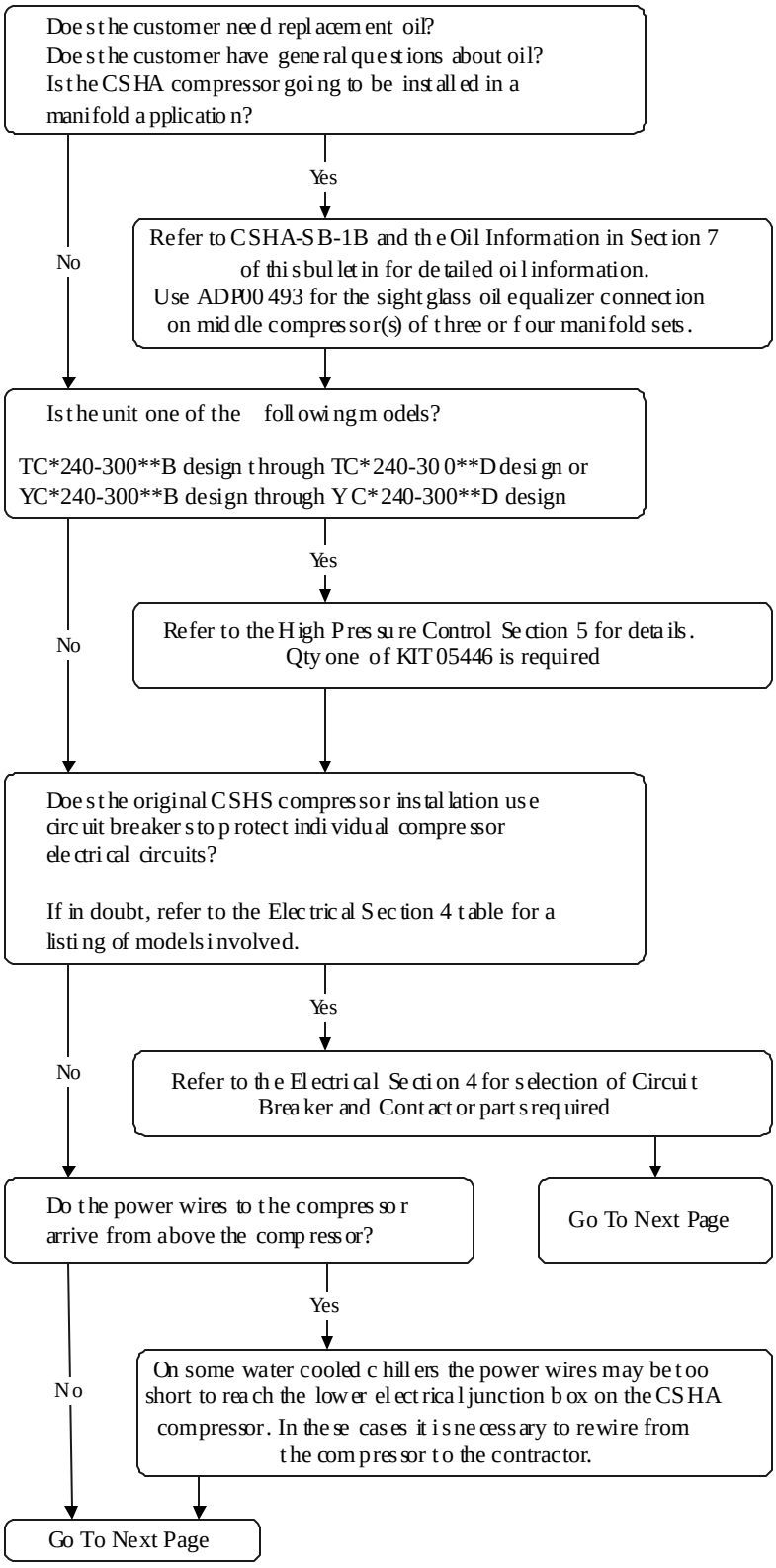


Parts Selection

OIL

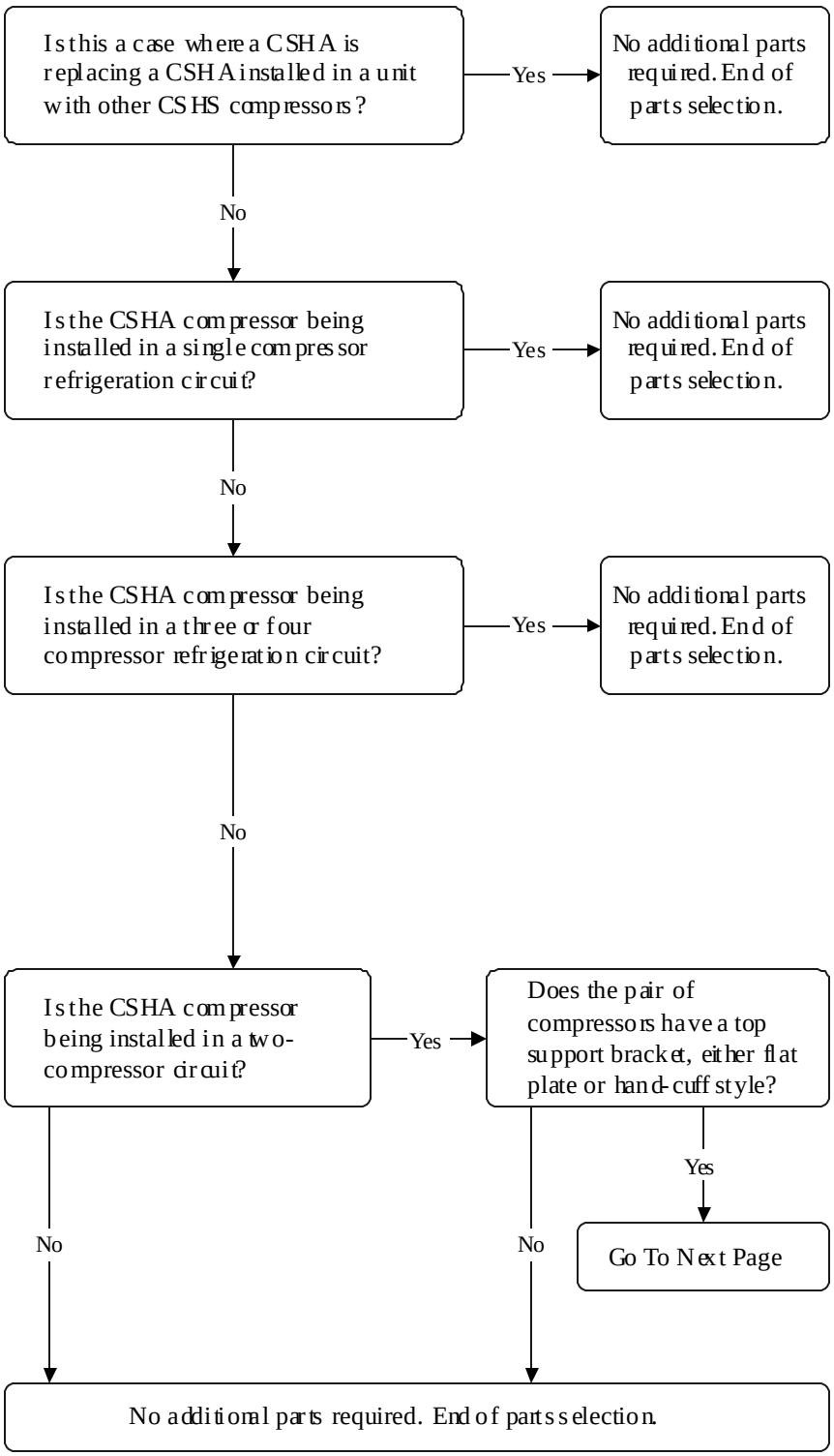
HIGH PRESSURE CONTROLS

ELECTRICAL



Parts Selection

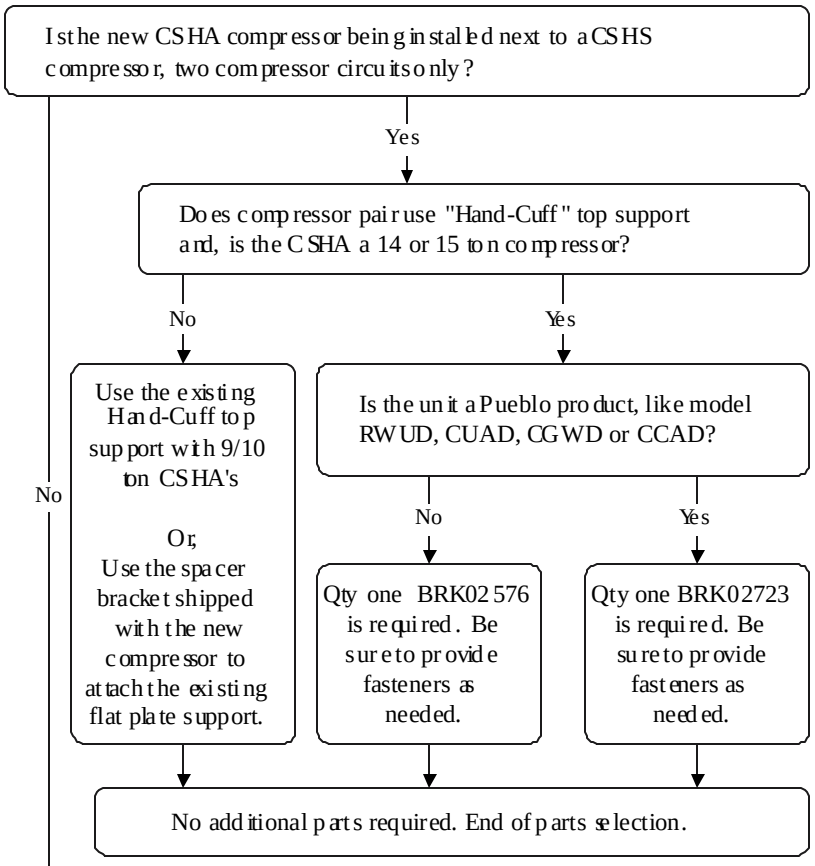
SUPPORT BRACKETS



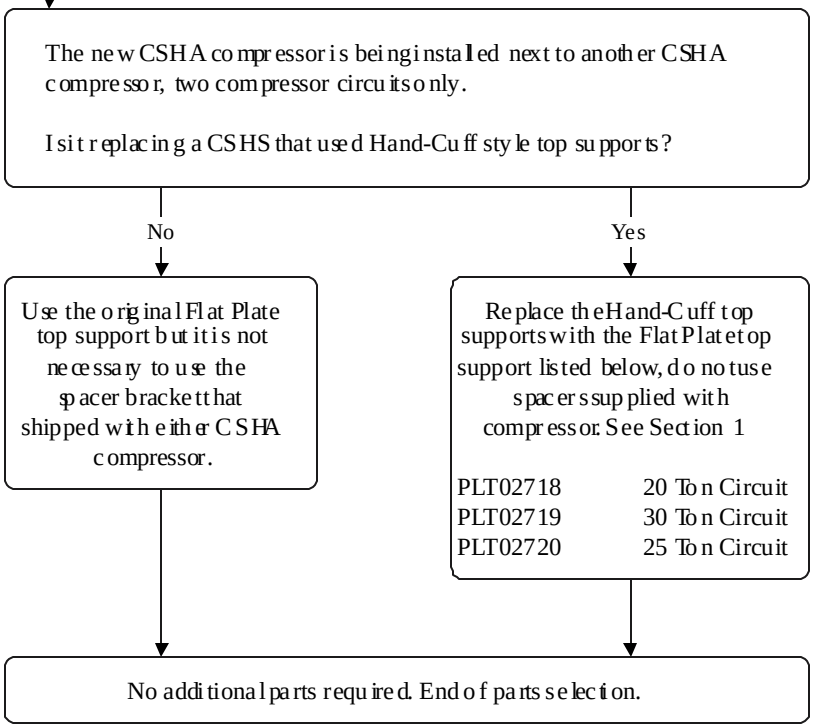
Parts Selection

SUPPORT BRACKETS Continued

CSHA next to a CSHS Compressor



CSHA next to a CSHA Compressor



Production Changes

Model CSHA compressors started shipping in new Trane and American Standard units during 1997. This bulletin does not apply for those units.