An MRC duplex bearing is specifically manufactured with a controlled relationship between the axial location of the inner and outer ring faces. Duplex bearings are ordinarily supplied as half pairs unless they are high precision machine tool bearings that typically come in pairs. Combinations of three or more bearings are also available.

MRC duplex bearings may be used to advantage in applications where:
1. Axial and radial deflections must be held to a minimum;
2. Maximum radial capacity is required;
3. Heavy single direction or reversing thrust loads must be supported;
4. Axial shaft location must be maintained under reversing thrust loads; and
5. Moment loading is present.

**Standard Methods of Mounting**

Duplex bearings can be mounted in three different ways to suit different loading conditions and requirements for rigidity. The three different positions bear the identification symbols “DB,” “DF,” and “DT.”

**DB—Back-to-back**

The sketch above shows the back-to-back (DB) position where the two halves are placed so that the contact angle lines of the two bearings diverge inwardly. For all MRC Duplex bearings, this means that the marked faces of the outer rings are adjacent. 7000 Series and Type R bearings have the low shoulder sides of the outer rings facing outward.

A DB pair may be used to carry: (1) heavy radial loads; (2) combined radial and thrust loads; (3) reversing thrust loads; (4) moment loads. Due to its construction, the DB pair has great angular rigidity and may be used in applications where it is necessary to restrict misalignment or shaft deflection. DB pairs are axially clamped on the shaft but may float in the housing to provide for thermal expansion.

**DF—Face-to-face**

This sketch shows the face-to-face (DF) position, where the two halves are placed so that the contact angle lines of the two bearings are converging inwardly. For all MRC duplex bearings, this means that the unmarked faces of the outer rings are together. On all angular contact and Type R bearings, the low shoulder sides of the outer rings will be adjacent.

The DF position may be used to advantage where the duplex pair carries: (1) a heavy radial load; (2) a combined radial and thrust load; (3) a reversing thrust load. This mounting arrangement allows the bearings to handle a small amount of misalignment. DF pairs are axially clamped in the housing and on the shaft.

**DT—Tandem**

This illustration shows the tandem mounting arrangement, where the two halves are placed so that the contact angle lines are parallel. For all MRC duplex bearings, this means that the stamped face of one bearing is in contact with the unstamped face of the other bearing.

The DT mounting is used to carry extremely high thrust loads in one direction where high speeds or space limitations prevent the use of a larger bearing.
Special Methods of Mounting

The three methods of mounting duplex pairs—DB, DF, and DT—are basic. However, other combinations may frequently be used to advantage. A few of these combinations are shown below.

Duplex Stack of Three Bearings (1½ Pair) Mounted in Tandem

This arrangement shows three bearings mounted in the tandem relationship and will provide greater thrust load carrying capacity, since three bearings are sharing the thrust load.

Additional thrust carrying capacity may be obtained by increasing the number of bearings in the stack.

Duplex Arrangement of a DT Pair Mounted in DB Relationship with a Single Bearing

An arrangement such as this will provide extremely high load-carrying capacity in the direction of the heavy outer ring shoulder of the two tandem mounted bearings as well as considerable reversing thrust. If the thrust load in both directions is equal in magnitude and duration, an arrangement of four bearings could be used in which a DT pair would be mounted in DB relationship to another DT pair. The set would have the suffix DTDB.

DB Pair Separated by Spacers

It is sometimes desirable to separate duplex bearings by equal length spacers mounted between the two inner rings and the two outer rings. This mounting arrangement is desirable when the pair is subjected to a heavy moment load, when it is necessary to minimize shaft deflection, or when the bearings are running too hot next to each other. Care should be taken to make certain that these spacers are parallel and equal in length.

Single Bearings (½ Pair)—DU, DS, DE

MRC bearings with controlled axial relationship of faces are available as single bearings (1/2 pair). They are ordinarily specified when the customer uses duplex bearings in a number of different mounting arrangements and wishes to simplify the problem of stocking prearranged pairs. Single duplex bearings are ground for universal mounting and may be matched with any other bearing from a carton having identical markings.

Type DU bearings have flush ground faces and when mounted in pairs and clamped, have neither preload nor end play.

Type DS bearings are furnished with preload and are also identified on the bearing with the designation DL, DM, DH or DX for light, medium, heavy, or special preload respectively.

Type DE bearings are furnished with end play as clamped and are also identified on the bearing with the designation CA, CB, CC or CX for specific end play values with CX calling for special end play.

Duplex Arrangement of a DT Mounted in DF Relationship with a Single Bearing

This arrangement provides the same capabilities as the DB mounting except the bearings are mounted in a DF relationship. The set would have the suffix DTDF.
**Duplex Bearings**

**Before Clamping**

**Preloaded Bearings**

Preloaded duplex pairs are made from single bearings having inner and outer rings of equal width but in which the stamped face of the outer ring protrudes beyond the face of the inner. The sketches show this relationship for a DB pair. “A” is known as the bearing offset.

**Clamped**

When the inner and outer rings are clamped together an elastic deformation takes place in the contact between the balls and races. Since the deflection rate of a bearing decreases with increasing load it is possible to eliminate the major portion of the potential deflection of a bearing under load through preloading.

In order to suit the customers’ application requirements MRC bearings are available with light, medium, heavy or special preload. Please consult our Technical Services Department for the proper selection of preload.

**End Play**

Duplex pairs with end play are made from single bearings having inner and outer rings of equal width but in which the face of the inner protrudes beyond the stamped face of the outer. End play in duplex pairs is desirable where there is misalignment, high operating temperatures or when the bearings are mounted with a heavy press fit on the shaft and/or in the housing.

**Interchangeability**

Types DU, DS and DE (single bearings) may be mounted in the DB, DF, or DT relationship. However, these bearings should not be used with bearings from any other box unless the markings on both boxes are identical.

In the case of making replacements for bearings which have been installed and run, we recommend that both bearings be replaced. This avoids the dangers involved in attempting to match two bearings, one of which has unknown internal characteristics.

**Shaft and Housing Fitting Practices**

The control of the axial location of inner and outer ring faces found in all duplex bearings is dependent upon the internal clearance in the bearing. A change in internal clearance will result in a change in the flushness or offset of the faces.

In mounting a duplex pair, it is particularly important that excessive press fits on the shaft or in the housing be avoided. Otherwise, the individual bearings in the set will be axially preloaded against each other which might result in excessive heating and early failure. In those cases where heavy press fits are imperative, duplex sets with end play should be used.

Refer to page 248 for mounting recommendations.

**Packaging**

Types DB, DF, and DT duplex pairs are ordinarily supplied wired together in the same relationship as they are to be used. The pair is then packaged together and the carton is stamped with the appropriate symbol.

Types DU, DS, and DE (single bearings) are typically packed separately. If special packaging is required, please consult MRC’s Application Engineering group.
97000U and 97000UP Series

The 97000U Series consists of a matched set of 9000UDT (split inner ring) and 7000DT flush ground bearings having a 29° contact angle. The 97000UP Series consists of a matched set of 9000UPDT (split inner ring) and 7000PDT flush ground bearings having a 40° contact angle.

Typical Mountings

The bearings are usually mounted in pairs. This arrangement divides the thrust load in one direction while accommodating reversing thrust load. To increase thrust capacity in one direction it is possible to mount additional bearings in tandem. The number of bearings in the set will be identified by a number at the end of the bearing designation. For example, a set of three bearings (triplex) is identified as the 97000U3 and a set of four (quadruplex) as the 97000U4. Numbers 2 through 9 only will apply. Numbers 10 and higher indicate some special characteristic. Illustration of typical mountings are shown below.

Mounting Orientation

**Caution:** To obtain proper load distribution, it is necessary to orient mating bearing ring faces, and the inner ring halves of the split ring bearing (9000UDT), according to the illustration below. The counterbored outer ring bearing (7000DT) can be mounted either at side (A) or side (B) of the split ring bearing as shown.

In addition, each bearing in the set will be marked with a “V” etched on the outer ring surface with the apex pointing in the main shaft thrust direction.

Notes: The numbers “1” and “2” marked on the bearing with the split inner ring, are to keep the proper relationship between the inner rings and the outer ring.

The counterbore bearing(s) can be mounted either side (A) or (B) (above or below) the split bearing provided that the “V”s marked on the O.D. of bearings are pointed in the direction of the “Primary Shaft Thrust”.

Bearing Identification Marking

The box and bearings will be marked according to the following example:

Bearing size: 97314UP2
Box: 97314UP2-BRZ
0001
BRZ = Machined Bronze Cage
0001 = MRC Specification Code Suffix
Bearing: All bearings in the set will be marked 97314UP2 0001

Previous marking: The bearing set was identified on the box as 9314UPDT/7314PDT; and on the bearings as 9314UPDT and 7314PDT.