INSTRUCTION BOOK
DEPOT MAINTENANCE

MODE S
SIX-PATH ASR ROTARY JOINT

TYPE FA-10215
SERIAL NOS. 001-034

SECTIONS 1-11, VOLUME II

CONTRACT NO. DTFA01-88-C-00007
MARCH 25, 1988

CONTRACTOR

KEVLIN MICROWAVE CORP.
5 CORNELL PLACE
WILMINGTON, MA 01887

MADE FOR

U.S. DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

CONTROLLED
DOCUMENT

RECORD OF CHANGES

Specification No.

CHANGE TO BASIC	SUPPLEMENTS			OPTIONAL USE	CHANGE TO BASIC	SUPPLEMENTS			OPTIONAL USE

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Tech Officer
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James P Moe
SIGNATURE OF VALIDATING OFFICER

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SAFETY NOTICE

The attention of operating and maintenance personnel is directed to FAA Instruction 6000.15 "Maintenance of Airway Facilities" for instructions on the subject of safety precautions to be observed, and to FAA Order 3900.0 "Accident Prevention Handbook for Airway Facility Personnel." Personnel must observe the safety regulations at all times. Maintenance personnel shall become familiar with the technique for resuscitation.

INTERLOCKS

This equipment does not contain interlocks.

KEEP AWAY FROM LIVE CIRCUITS AND ROTATING EQUIPMENT

Operating and maintenance personnel must at all times observe all safety regulations. Do not change components or make adjustments inside equipment with high voltage supply on or while the equipment is rotating.

RESUSCITATION

Maintenance personnel should familiarize themselves with the technique for resuscitation found in the manual of first aid instructions.

GUARANTEE

Kevlin warrants that its products are free from defects in material and workmanship and that, if properly used, they will perform in accordance with their applicable specifications for a period of one (1) year after final acceptance by the government. Any products that Kevlin finds not to meet the warranty will be repaired or replaced without charge, as described below, except for components that have given normal service.

This warranty is void under the following circumstances:

a. If the products have been partially or completely disassembled, or if any attempt has been made to disassemble them prior to their return to Kevlin, or

b. If the products have been improperly used, either electrically or mechanically or

c. If the products have been damaged by the carrier (unless Kevlin has assumed responsibility for safe delivery to the first destination).

No product will be accepted for repair or replacement consideration unless the Manager, Contracts Department, at Kevlin has consented to the return prior to shipment, and has assigned an "Authorization" number to be marked on the shipping papers. Any claim of warranty must be accompanied by the purchaser's complete rejection report, supporting test data, and photographs (if available).

All such products returned will be evaluated by our technical and quality assurance staff. A fee will be charged to cover the cost of such evaluation if the evaluation shows that the products meet their electrical and mechanical specifications and/or are defective for reasons not covered by this warranty.

Transportation charges for products returned to Kevlin are to be sent collect. Kevlin will bear the transportation charges to return repaired or replaced products covered by this warranty.

This warranty does not obligate Kevlin to evaluate, inspect, test replace, or collect its products "in place" in the field, but Kevlin may elect to correct the product "in place."

This warranty is in lieu of all other warranties, express or implied. Kevlin is not liable, in any event, for collateral or consequential damages.

SECTION 1
GENERAL INFORMATION AND REQUIREMENTS

1.1 INTRODUCTION.—

This instruction book contains information and instructions on the Mode S Six-Path ASR Rotary Joint Type FA-10215 used with the ATCRBS five-foot antenna. The rotary joint is manufactured for the Federal Aviation Administration by Kevlin Microwave under Contract DTFA01-88-C-00007. This section provides a description of the equipment supplied and a summary of the principal physical and electrical characteristics. Section 2 describes the technical details of the equipment. Section 3 is not applicable. Section 4 provides a tabulation of the significant parameters of the equipment, along with initial and operating tolerances. Section 5 and 6 are not applicable. Section 7 contains corrective maintenance (overhaul) instructions. Section 8 contains the parts list. Section 9 is not applicable. Section 10 contains wiring diagrams and mechanical drawings. Section 11 is not applicable. Serial numbers of rotary joints covered by this instruction book are S/N 001 through S/N 034.

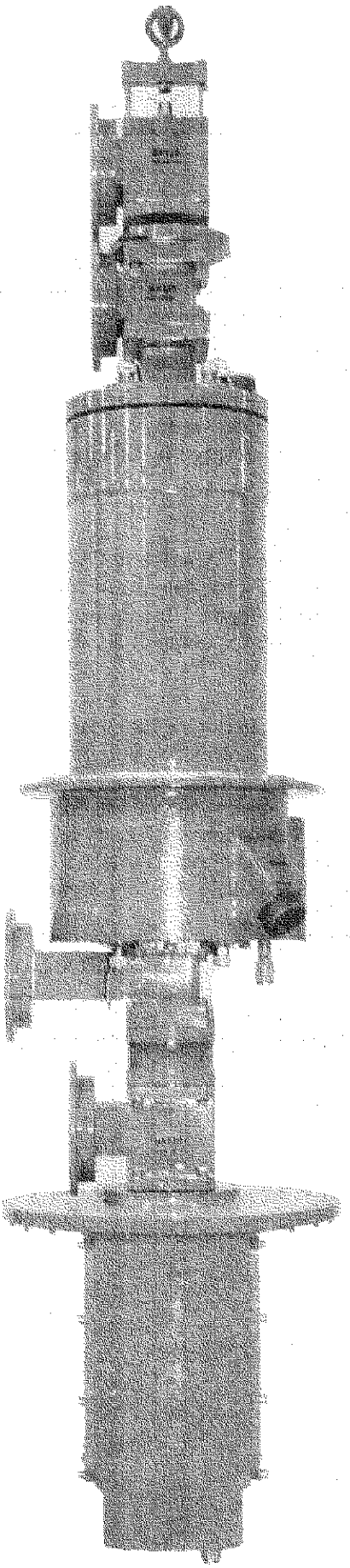
1.2 EQUIPMENT DESCRIPTION.—

The MODE S Six-Path ASR Rotary Joint, Type FA-10215, hereafter referred to as the rotary joint, consists of three S-band RF channels, three L-band RF channels, an integral 12-channel slipring assembly, and two digital shaft encoders. The rotary joint, shown in figure 1-1, is intended to replace the existing rotary joints in ASR-7, and -8, MODE S radar sites. The rotary joint is compatible with all requirements of the S-band radar and ATCRBS/MODE S.

1.2.1 Installation Requirements.—Installation of the rotary joint in the various radar pedestals is simplified by the fact that the ASR-7, and -8 pedestal both share a common mounting configuration for the rotary joint and a common positioning for all the waveguide runs attached to the rotary joint. At radar sites where one or more of the RF channels of the rotary joint are not required, the connector ports providing access to those functions are sealed using the weatherproof covers which are factory installed on the rotary joint. Figure 1-2 shows the rotary joint configuration and channel designations. Table 1-1 lists the rotary joint requirements for ASR-7 and -8 radar sites modified for use with the ATCRBS five-foot antenna.

TABLE 1-1. ROTARY JOINT FUNCTIONAL REQUIREMENTS FOR ASR-7 and -8 INSTALLATION

Radar System	Channel 1 High-Power S-Band	Channel 2 Low-Power S-Band	Channel 3 Low-Power S-Band	Channel 4 Beacon Directional L-Band	Channel 5 SLS L-Band	Channel 6 Monopulse L-Band	Slipring Channels	Encoder Drive
ASR-7	Yes	Yes	Not Used	Yes	Yes	Yes	Yes	Yes
ASR-8	Yes	Yes	Not Used	Yes	Yes	Yes	Yes	Yes



1625-901

Figure 1-1. Photograph of MODE S Six-Path ASR Rotary Joint, Type FA-10215

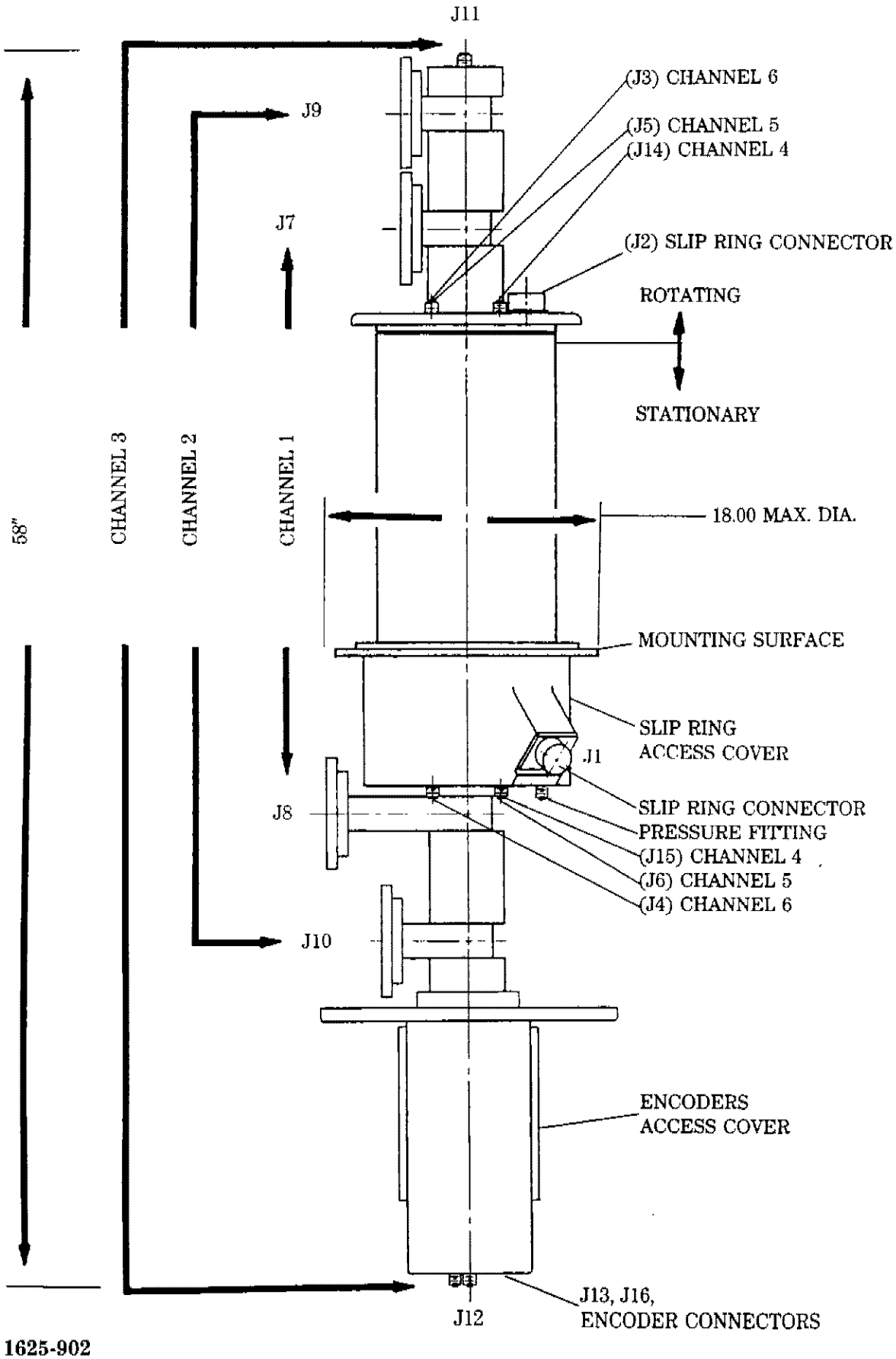


Figure 1-2. MODE S Six-Path ASR Rotary Joint, Type FA-10215

1.3 EQUIPMENT SPECIFICATION DATA.—

Table 1-2 describes the reference data pertinent to the rotary joint.

TABLE 1-2. REFERENCE DATA

Nameplate

Manufacturer	Kevlin Microwave Corporation Wilmington, MA 01887
FAA Type	FA-10215
Manufacturer's Type	Mode S Six-Path ASR Rotary Joint Part Number 1625

Functional Characteristics

Mechanical

Height	60 inches	
Maximum diameter	12.13 inches	
Weight	120 lbs.	
Pressurization	5 psig maximum, air humidity 10 percent maximum	
Paint (urethane)	Aviation orange, color number 12197 (MIL-C-83286, Type 1)	
Alodine	BASF Wyandotte Corp. Alodine 1200	
		Reference Designator
Encoder Output Connectors	MS3114P14-15S/MS3114P14-15SX	8A1J13/8A1J16
Slipring Input Connector	MS3102R-28-18P	8A1J1
Slipring Output Connector	MS3102R-28-18S	8A1J2
Rotation	12.5 RPM, Clockwise or Counterclockwise	

RF Input/Output Connectors

Channel Number	Channel Description	Input/Output Connector	Reference Designator: Input Connector	Reference Designator: Output Connector
1	High power, S-band	UG-585A/U, Waveguide Choke Flange	8A1J8	8A1J7
2	Low power, S-band	UG-585A/U, Waveguide Choke Flange	8A1J10	8A1J9
3	Low Power, S-band	Type N female	8A1J12	8A1J11
4	Beacon, directional L-band	Type N female	8A1J15	8A1J14
5	SLS, L-band	Type N female	8A1J6	8A1J5
6	Monopulse, L-band	Type N female	8A1J4	8A1J3

APG

1. 14 bit Azimuth Change Pulse (ACP) Lines

Frequency	16,384 pulses per revolution
Voltage	Line driver output (SNC 55183) or equivalent
Pulsewidth	2 to 6 usec.
Pulse position	±79 arc sec absolute ±20 arc sec bit to bit

2. 14 bit Azimuth Reference Pulse (ARP) Line

Frequency	1 pulse per revolution
Voltage	Same as 14 bit ACP
Pulsewidth	Same as 14 bit ACP
Pulse position	±20 arc sec absolute
(leading edge)	Coincident with 12-bit ARP leading edge

3. 12 bit ACP line

Frequency	4096 pulses per revolution
Voltage	Line driver output (SNC 55183) or equivalent
Pulse Shape	Rectangular, 25% to 50% duty cycle
Pulse Position	+2.0 arc min. absolute ±20 arc sec pulse to pulse

4. 12 bit ARP Line

Frequency	1 pulse per revolution
Voltage	Same as 12 bit ACP
Pulse shape	Same as 12 bit ACP
Pulse position	Midway between two clockwise ACP's

5. Output Isolation:

Frequency	Isolation between ACP and ARP signals, including hum and noise, shall be 40 dB or more.

6. Input Voltage: Each APG shall be designed to operate with an input voltage of +5VDC at one percent regulation with a maximum current of 300 MA.

The APG employs an optical encoder and solid state light source with a minimum lifetime of 50,000 hours. The above characteristics shall be met when measured at the end of a terminated cable consisting of a shielded twisted pair of 22 gauge wires for any cable length up to 300 feet.

ELECTRICAL

Parameter	Channel 1	Channel 2 and 3	Channel 4, 5 and 6
Frequency Range	2.7 to 2.9 GHz (S-band)	2.7 to 2.9 GHz (S-band)	1025 to 1035 MHz 1085 to 1095 MHz (L-Band)
Peak Power			
Unpressurized	1.25 MW	1kW	5kW
Pressurized	2.50MW	N/A	N/A
Duty Cycle	0.0015	0.0015	0.01
Maximum VSWR	1.2:1	1.2:1(See Note 2)	1.2:1(See Note 2)
VSWR Change over 360-degree rotation	0.05 maximum	0.05 maximum	0.07 maximum
Insertion Loss	0.2 dB maximum	Ch. 2, 0.5 dB maximum Ch. 3, 0.75 dB maximum	1.0 dB max. (See Note 1)

Parameter	Channel 1	Channel 2 and 3	Channel 4, 5 and 6
Phase Shift Change over 360 degrees rotation	5 degrees max.	5 degrees max.	4 degrees max. (See Note 1)
Isolation between channels	50 dB minimum	50 dB minimum	50 dB minimum

Slipring

Life	25,000 hours minimum without adjustment
Voltage rating	120 Vac, 60 Hz
Current rating	5 amps maximum
Number of circuits	12
Leakage resistance	100 megohms minimum between adjacent sliprings

ENVIRONMENTAL CHARACTERISTICS

Elevation	0 to 10,000 feet above sea level
Temperature	-50° to +70°C
Relative humidity	5 to 100 percent
Rain	Up to 60 mm/hour
Hail	Up to 1 inch diameter at 60 feet/s
Barometric pressure	Up to 30.5 inches of mercury
Electromagnetic radiation	Up to 200,000 watts (peak) per square meter at duty cycles up to 0.2 percent at any frequency between 1200 and 1350 MHz or between 2700 and 2900 MHz
Wind	N/A
Ice	N/A

NOTE 1: Throughout the frequency range from 1025.0 to 1035.0 MHz, the insertion loss of channels 4 and 5 shall be the same to within 0.2 dB and the phase match through these two channels shall be the same to within 2 degrees. Throughout the frequency range from 1085 to 1095 MHz, the insertion loss of channels 4 and 6 shall be the same to within 0.2 dB and the phase match through these two channels shall be the same to within 2.5 degrees. Channels 4 thru 6 shall meet the following additional requirements when a standard Mode S reply pulse having rise and fall times less than 50 nanoseconds is transmitted through these channels. The rise and fall times of the output pulses shall be less than 60 nanoseconds and the output pulses shall be flat to within -15 percent of their respective peak amplitudes over the pulse duration (of .3 usec) (that is, between the 90-percent amplitude points on the leading and trailing edges). Between the 10 and 90 percent amplitude points on the leading and trailing edges of the output pulses, the pulse shapes in channel 4 thru 6 shall be the same to within ±10 percent of the input pulse amplitude of the respective sections. Between the 90-percent amplitude points on the leading and trailing edges of the output pulses, the pulse shapes shall be the same to within ±5 percent of the input pulse amplitude of the respective sections.

NOTE 2: Input impedance for channels 3, 4, 5 and 6 is 50 ohms.

1.4 EQUIPMENT AND ACCESSORIES SUPPLIED.—

Table 1-3 provides typical weight and dimensional data for the equipment and accessories supplied with each rotary joint.

TABLE 1-3. EQUIPMENT AND ACCESSORIES SUPPLIED

Quantity	Item Name or Nomenclature	Type FAA Number	Overall Dimension	Weight and Volume
1	Mode S Six-Path Rotary Joint, ASR (Kevlin part number 1625)	FA10215	Crated: 67 x 19 x 23 inches (170 x 48 x 58 cm) Uncrated: 60 inches long (152 cm long) maximum diameter 12.13 inches (30.8 cm)	Crated: 200 lbs. 17 cubic feet (0.48 cubic meters) Uncrated: 120 lbs. 1.10 cubic feet (0.03 cubic meters)
1	Kit A, Miscellaneous Hardware (KMC P/N A1625-62G1)		Plastic bag	2 pounds

1.5 EQUIPMENT REQUIRED BUT NOT SUPPLIED.—

Reference to Table 7-1.

SECTION 2
TECHNICAL DESCRIPTION

2.1 FUNCTIONAL DESCRIPTION.—

The primary function of the rotary joint is to provide a continuous conducting RF path between the stationary and rotating parts of the ASR and MODE S antenna system. To serve this function, the rotary joint is designed for continuous rotation in either a clockwise or counterclockwise direction with minimal effect on the RF energy propagating through it. The unit, as shown in figure 1-2, contains six RF channels, three S-bands and three L-bands, and connects the stationary transmitter and receiver of the primary radar and the Air Traffic Control Radar Beacon System (ATCRBS/MODE S) to their respective antennas.

2.1.1 In addition to the RF channels, the rotary joint provides a conducting path for multiple low-frequency (60 Hz) signals. A 12-channel slipring assembly is an integral part of the rotary joint and provides the six, 120 volt, 60 Hz signal paths required by the ASR radar antenna plus six spare paths for possible future use.

2.1.2 For use at ASR-7 and -8 sites, the rotary joint also includes two digital shaft encoders.

2.2 THEORY OF OPERATION.—

The theory of operation of the rotary joint is divided into four main topics and is described in subsequent paragraphs in the following order.

a. S-band channels

b. L-band channels

c. Slipring assembly

d. Encoder

e. Overall mechanical configuration.

2.2.1 S-Band Channels.—The three S-band channels are used by the radar portion of the ASR system and are constructed using concentric coaxial waveguide paths through the central section of the rotary joint. In this configuration each coaxial inner conductor, starting with that of the high-power outermost channel, forms the outer conductor of the succeeding channel as shown in figure 2-1.

2.2.1.1 This configuration yields a compact rotary joint cross section and makes maximum use of the precision tube that forms the coaxial path. RF energy propagating through the coaxial path is maintained in the dominant coaxial mode of propagation.

2.2.1.2 The rotary joint high-power channel (channel 1 as shown in figure 2-1) has a rectangular waveguide input and output with UG-585 A/U type choke flanges for connectors. Upon entering the waveguide of this channel, RF energy is transformed from the dominant mode of propagation in rectangular waveguide (the TE_{10} mode) into the dominant mode of propagation in coaxial waveguide (the TEM mode) for transmission through the length of the rotary joint. Once reaching the opposite end of the unit, the energy is transformed back to the dominant mode of propagation in rectangular waveguide and exits the rotary joint. RF continuity between the stationary and rotating portions of the coaxial transmission path is maintained by the use of folded half-wavelength RF chokes. Typical electrical performance characteristics are listed in table 2-1.

2.2.1.3 Channel 2 of the rotary joint (the low power channel) is constructed basically the same as channel 1. Again the channel, as shown in figure 1-2, has a rectangular waveguide input and output, and transitions are made to and from the coaxial mode of propagation for transmission through the length of the rotary joint. Since the coaxial path of this channel is concentric to and confined inside of the center conductor of channel 1, the

power handling capability of this channel (determined primarily by the physical dimensions of the coaxial path) is less than that of channel 1. RF continuity between stationary and rotating portions is again maintained by the use of folded half-wavelength RF chokes. Typical electric performance characteristics for this channel are listed in table 2-1.

2.2.1.4 Channel 3 of the rotary joint (another low-power channel) is a spare channel and has no present use in ASR-7, or -8 radars. This channel, as shown in figure 1-2, has coaxial input and output connectors and uses a coaxial transmission path through the length of the rotary joint. As shown in figure 2-1, the coaxial transmission path for channel 3 is concentric to and confined inside of the center conductor of channel 2; therefore, it is further restricted in its power handling capability relative to channel 2. This channel also has folded half-wavelength RF chokes to maintain continuity between stationary and rotating parts. Typical electric performance characteristics of channel 3 are listed in table 2-1.

2.2.2 L-Band Channels.—The three L-band channels of the rotary joint are used by the radar beacon system to carry RF signals to and from the ATCRBS 5 foot antenna. These channels are three separate, individual, but identical L-band modules which are stacked in series with the slipring between the input & output waveguide ports of channel 1 (high power S-band).

The RF design of these modules consist of a thick strip power divider on the input side the outputs of which are of equal phase and amplitude. These outputs terminate in a circular strip (that is—a stripline which is continuous about 360°). This circular strip is air dielectric capacitive coupled to an identical circular strip. The inputs from this strip attach to a thick-strip power combiner. The single output of this combiner is the output of the module (either channel 4, 5 or 6). The circular strip circuit is contained about an annulus by ground planes. These ground planes are separated in the area of the weakest RF fields thus allowing one of the circular strips to rotate relative to the other. This separation along with the air dielectric coupling of the circular strips makes for a completely non-contacting RF module. Typical electrical performance characteristics of channels 4, 5 and 6 are listed in table 2-1. The L-band modules are factory repairable only.

2.2.3 Slipring Assembly.—The slipring assembly consists of 12 silver rings each providing a one wire circuit capable of handling 5 amperes at 208 volts (60 Hz). The slipring brushes are constructed of a mixture of silver and graphite and rub on the silver rings to provide a continuous 60 Hz path through the rotary joint during rotation. An access cover shown in figure 1-2 is provided for inspection and/or replacement of the slipring brushes.

2.2.4 Encoders.—Two identical azimuth pulse generators (No. 1 and No. 2) are coupled to the rotating antenna via Rotary Joint. Each encoder provides both 12-Bit and 14-Bit outputs. ARP signals occur once in each 360-degree antenna rotation. For the 12-Bit encoder operation, ACP signals occur once for each 0.088 degree increment of antenna rotation. (4096 ACPs in a 360-degree antenna rotation). For the 14-Bit encoder operation ACP signals occur once each .022 degree increment of Antenna rotation (16,384 ACPs for 360 degree of antenna rotation).

2.2.5 Overall Mechanical Configuration.—The rotary joint is a key component of the system and therefore has been designed with as much mechanical safety factor as possible. All of the structural elements which are subject to any mechanical stress are manufactured from aluminum castings. There are no dip brazed structural joints in the entire assembly. All the ball bearings used are permanently lubricated and once installed do not have to be relubricated throughout the life of the rotary joint. The main bearings are a factory preloaded pair assembled face to face which insures a long life. All other bearings are assembled under lightly loaded conditions and are mainly used for maintaining concentricity.

The entire assembly is pressure sealed and can be pressurized to 5 psig for maximum protection of the elements. This rotary joint contains a single dynamic pressure seal (a spring-loaded flat carbon ring which runs against a flat aluminum oxide coated corrosion resisting steel mating ring) which maintains pressure during rotation. All non-rotating (static) seals areas are sealed using rubber O-Rings or gaskets. The entire rotary joint construction consists of modular elements which allow simplified depot maintenance.

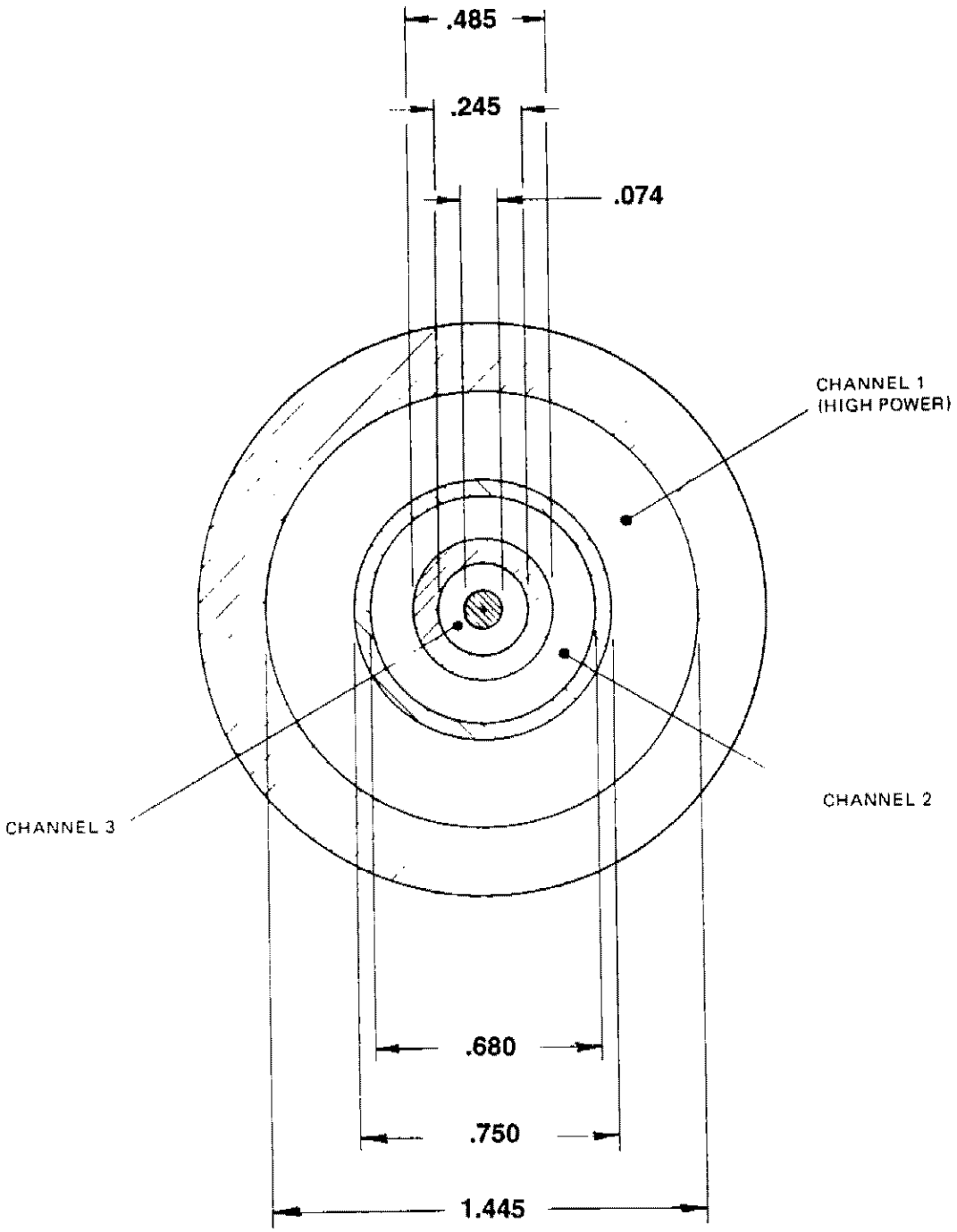


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FIGURE 2-1. S-BAND CONCENTRIC COAXIAL LINE CONFIGURATION
(DIMENSIONS ARE IN INCHES)

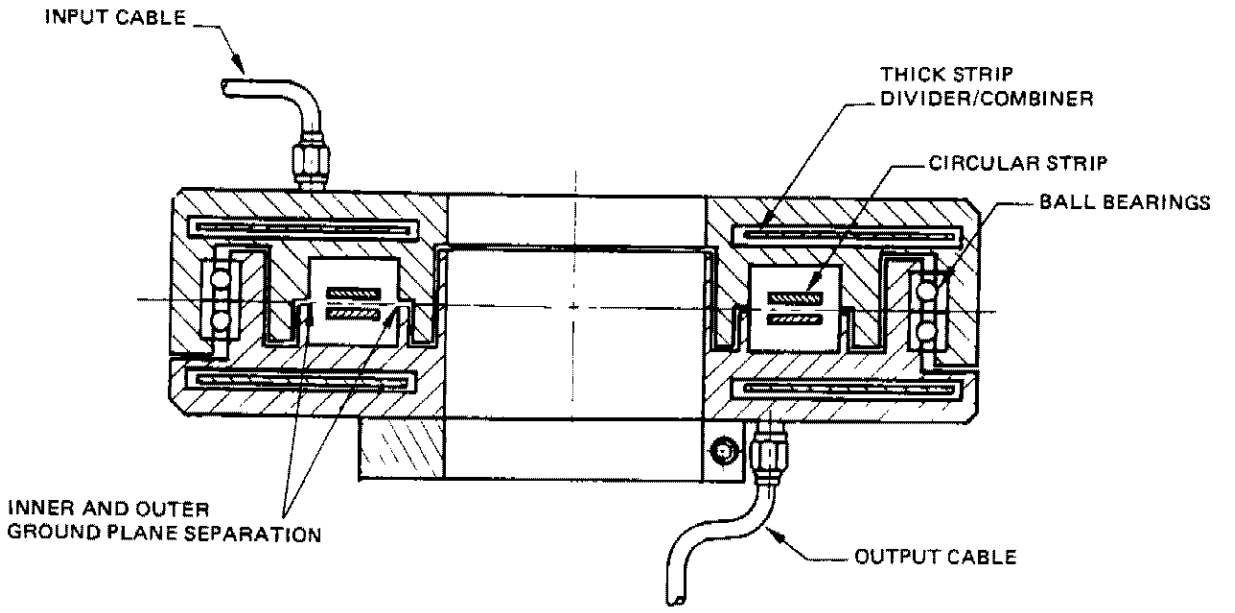

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FIGURE 2-2. L-BAND MODULE

TABLE 2-1. ROTARY JOINT PERFORMANCE CHARACTERISTICS

Parameter	Channel 1*	Channel 2*	Channel 3*	Channels 4, 5, 6*
Frequency range	(2.7 to 2.9 GHz)	(2.7 to 2.9 GHz)	(2.7 to 2.9 GHz)	(1,025 to 1035 MHz) (1,085 to 1,095 MHz)
Maximum VSWR	1.15 (1.20)	1.15 (1.20)	1.15 (1.20)	1.15 (1.20)
VSWR WOW	0.02 (0.05 maximum)	0.02 (0.05 maximum)	0.02 (0.05 maximum)	0.04 (0.07 maximum)
Insertion loss (dB)	0.1 (0.2 maximum)	0.3(0.5 maximum)	0.6 (0.75 maximum)	0.75 (1.0 maximum)
Loss WOW (dB)	<0.05	<0.05	<0.05	<0.05 (0.07)
Phase shift/360-degree rotation (degrees)	<1 (5)	<1 (5)	<1 (5)	<1 (4)
Isolation between channels (dB)	>70 (50 minimum)	>70 (50 minimum)	>70 (50 minimum)	>60 (50 minimum)
Input/output connector	Waveguide flange, UG-585A/U	Waveguide flange, UG-585A/U	Type N, female	Type N, female

*Specification limits are shown in parentheses.

SECTION 3
OPERATION

3.1 GENERAL.—

This section is not applicable since there are no controls or indicators in the rotary joint.

SECTION 4
STANDARDS AND TOLERANCES

4.1 GENERAL.—

The rotary joint standards and tolerances/limits are listed in table 4-1. An explanation of each column heading in table 4-1 is given in the following paragraphs. Table 4-2 lists the nut and bolt torque requirements.

4.2 STANDARD.—

The standard is the optimum value assigned to an essential parameter of the equipment and is compatible with the system as a whole and the design capability of the equipment involved.

4.3 INITIAL TOLERANCE/LIMIT.—

The initial tolerance/limit is the maximum deviation from the standard value of the parameter, or the range, which is permissible when the equipment is accepted for use in the National Airspace System at the time of initial commissioning, or after any readjustment, modification or modernization.

4.4 OPERATING TOLERANCE/LIMIT.—

The operating tolerance/limit is the maximum deviation from the standard value of the parameter, or the range, within which an equipment may continue to operate on a commissioned basis without adjustment or corrective maintenance, and beyond which remedial action by maintenance personnel is mandatory.

TABLE 4-1. STANDARDS AND TOLERANCES OF EQUIPMENT PARAMETERS

Parameter	Reference Paragraph (Performance Test Procedure)	Standard	Tolerance/Limit	
			Initial	Operating
Channel 1 VSWR	7.11.2	1.20:1 maximum, from 2.7 to 2.9 GHz	1.20:1 maximum, from 2.7 to 2.9 GHz	1.20:1 maximum, from 2.7 to 2.9 GHz
Channel 2 VSWR	7.11.2	1.20:1 maximum, from 2.7 to 2.9 MHz	1.20:1 maximum, from 2.7 to 2.9 GHz	1.20:1 maximum, from 2.7 to 2.9 GHz
Channel 3 VSWR	7.11.3	1.20:1 maximum, from 2.7 to 2.9 GHz	1.20:1 maximum, from 2.7 to 2.9 GHz	1.20:1 maximum, from 2.7 to 2.9 GHz
Channels 4, 5 and 6 VSWR	7.11.6	1.20:1 maximum, from 1025 to 1035 MHz and 1085 to 1095 MHz	1.20:1 maximum, from 1025 to 1035 MHz and 1085 to 1095 MHz	1.20:1 maximum, from 1025 to 1035 MHz and 1085 to 1095 MHz
Channel 1 and 2 VSWR change over 360-degree rotation (VSWR WOW)	7.11.2	0.05 maximum	0.05 maximum	0.05 maximum
Channel 3 VSWR change over 360-degree rotation (VSWR WOW)	7.11.3	0.05 maximum	0.05 maximum	0.05 maximum
Channel 4, 5, and 6 VSWR change over 360-degree rotation (VSWR WOW)	7.11.6	0.07 maximum	0.07 maximum	0.07 maximum
Channel 1 insertion loss	7.11.4	0.20 dB maximum	0.20 dB maximum	0.20 dB maximum
Channel 2 insertion loss	7.11.4	0.50 dB maximum	0.50 dB maximum	0.50 dB maximum
Channel 3 insertion loss	7.11.5	0.75 dB maximum	0.75 dB maximum	0.75 dB maximum
Channels 4, 5, and 6 insertion loss	7.11.7	1.00 dB	1.00 dB	1.00 dB

Parameter	Reference Paragraph (Performance Test Procedure)	Standard	Tolerance/Limit	
			Initial	Operating
Slip ring leakage resistance	7.11.9	100 megohms or greater between adjacent slip rings	100 megohms or greater between adjacent slip rings	100 megohms or greater between adjacent slip rings
Rotary joint pressure leakage	7.10.2	1 psig per hour maximum, at 5 psig	1 psig per hour maximum, at 5 psig	1 psig per hour maximum, at 5 psig
Channels 4 and 5 phase tracking	7.11.8	2-degree maximum phase tracking error, at 1030 ± 5 MHz	2-degree maximum phase tracking error, at 1030 ± 5 MHz	2-degree maximum phase tracking error, at 1030 ± 5 MHz
Channels 4 and 5 amplitude tracking	7.11.8	0.2 -dB maximum amplitude tracking error, at 1030 ± 5 MHz	0.2 -dB maximum amplitude tracking error, at 1030 ± 5 MHz	0.2 -dB maximum amplitude tracking error, at 1030 ± 5 MHz
Channels 4 and 6 phase tracking	7.11.8	2.5-degree maximum phase tracking error, at 1090 ± 5.0 MHz	2.5-degree maximum phase tracking error, at 1090 ± 5.0 MHz	2.5-degree maximum phase tracking error, at 1090 ± 5.0 MHz
Channels 4 and 6 amplitude tracking	7.11.8	0.2 -dB maximum amplitude tracking error, at 1090 ± 5.0 MHz	0.2 -dB maximum amplitude tracking error, at 1090 ± 5.0 MHz	0.2 -dB maximum amplitude tracking error, at 1090 ± 5.0 MHz
Encoders	7.11.10	± 10% Jitter	± 10% Jitter	± 10% Jitter

TABLE 4-2. NUT AND BOLT TORQUE REQUIREMENTS

Size	Torque
#4—40	4—8 inch-lb
#6—32	4—8 inch-lb
#8—32	10—14 inch-lb
#10—32	10—14 inch-lb
1/4—28	5—7 foot-lb

SECTION 5
PERIODIC MAINTENANCE

5.1 GENERAL.—

This section is not applicable as the function of the depot maintenance volume is the complete disassembly and replacement of parts.

SECTION 6
MAINTENANCE PROCEDURES

6.1 GENERAL.—

This section is not applicable as the function of the depot maintenance volume is the complete disassembly and replacement of parts.

SECTION 7
CORRECTIVE MAINTENANCE (OVERHAUL)

7.1 GENERAL.—

This section contains depot-level maintenance (overhaul) procedures for the rotary joint. This maintenance is to be performed on a rotary joint that was not repairable at the field level or was removed after 40,000 hours of operation.

7.2 STANDARD TOOLS AND TEST EQUIPMENT.—

Standard tools and test equipment required for depot maintenance are listed in table 7-1.

7.3 SPECIAL TOOLS AND TEST EQUIPMENT.—

There is one special set of equipment necessary for overhaul and/or testing—the MODE S Encoder Test Set FA-10256. Designed and manufactured by KMC. (KMC equivalent part #1639-620A)

7.4 TROUBLESHOOTING.—

Troubleshooting procedures are based on the premise that the rotary joint has been determined to be faulty at the field level as a result of abnormal indications encountered during operation of the ASR system or during the scheduled preventive maintenance performance check procedures. Isolation of a malfunction in the rotary joint is accomplished through the use of the troubleshooting chart, table 7-2.

TABLE 7-1 STANDARD TOOLS AND TEST EQUIPMENT

Name	Qty.	Type	Required Characteristics
Crystal detector	2	Hewlett-Packard HP-423A	Frequency range: 1.0 to 3.0 GHz Sensitivity: 0.4 mV/ W
Coaxial Attenuators	2	Narda 757C-10	Fixed Attenuators of 10dB
Power Supply	1	VIZ WP 706	0-25 Volts
Volt Meter	1	Simpson 360-2	Digital Readout
Waveguide to Co-axial adapter	2	Hewlett-Packard HP-S281A	Type N to WR284 Waveguide Adapter Frequency Range: 2.6 to 3.0 GHz, VSWR: 1.20 Max.
R.F. Network Analyzer	1	Hewlett-Packard HP-8753B	300 KHz to 6 GHz
S-Parameter Test Set	1	Hewlett-Packard HP-85047A	50 Ohms, 300 KHz to 6 GHz
Software	1	Hewlett-Packard HP-85160A	Automation Software for the HP-8753B
Controller	1	Hewlett-Packard HP-98580B	Model 310M Controller
Ram Module	1	Hewlett-Packard HP-98257A	Add-On M Byte Ram Module
Computer Interface Cable	1	Hewlett-Packard HP-10833A	HP-IB Cable
Plotter	1	Hewlett-Packard HP-7550A	8-Pen Graphline Plotter

TABLE 7-1 STANDARD TOOLS AND TEST EQUIPMENT (Continued)

Name	Qty.	Type	Required Characteristics
Dual Disk Drive	1	Hewlett-Packard HP-9122	3 1/2"drive
W/G Attenuator	2	Hewlett-Packard HP-S370C	10 dB
50 ohm Coax Load	8	"N"	Wiltron 26N50
R.J.	1	KMC 1106	Type N inline for rotation of output cables
Oscilloscope Dual Trace	1	TEK 2235	Bandwidth = 100 MHz Max. Sensitivity
Coaxial Coupler	1	Microlab CB46N	Freq. 1.0-1.1 GHz Coupling 6dB
Counter	1	Hewlett-Packard HP-5315A	Universal Counter Digital
Waveguide Crystal Detector	1	Hewlett-Packard HP-S424A	Frequency Range: 2.6 to 3.0 GHz Sensitivity: 0.4 mV/W VSWR: 1.20 maximum
Coaxial Short	1	Hewlett-Packard HP-1511A	Type N Female Coaxial Short Circuit
Flexible Coaxial Cable		Flexco S342-AU-0120-D-9	Precision Flexible Cable, Length 3FT. Connectors: APC-7 and Type N Male Frequency range: 1.0 to 3.0 GHz VSWR: 1.05 max.
Assorted Coaxial Cables		Amphenol or Eq.	Frequency Range: 1.0 to 3.0 GHz, Cable Type: RG-214/U Connectors: Type N Male Length: 1 to 4 ft.
Waveguide Short	1	Waveline Model 296	Shorting Plate to Mate with UG-53/U flange.
Waveguide Straight Section	2	Waveline Model Model 243-2	6 to 20 inch long WR-284 waveguide
Assorted coaxial cables		Amphenol or equivalent	Cable type: RG-58/U Connectors: BNC Male Length: 2 to 4 ft
Wrench Set, Box/Open End	1	Sears, Roebuck P/N 94462	7/16 to 3/4
Hex Key Set	1	Sears, Roebuck P/N 946696	.050 to 1/4 in.
Torque Screwdriver	1	Utica Kit #2 75-30	10 to 30 in. lbs.

TABLE 7-1 STANDARD TOOLS AND TEST EQUIPMENT (Continued)

Name	Qty.	Type	Required Characteristics
Ratchet Wrench	1	Sears, Roebuck P/N 9H43788	3/8 in. drive
Socket Set	1	Sears, Roebuck P/N 9HT4389	3/8 to 13/16 in., 3/8 drive
Insulation Tester	1	Simpson Model 400	0-200 Megohms
Torque wrench	1	Sears, Roebuck P/N 9H44643	0 to 600 in.-lbs., 3/8 drive
Screwdrive set	1	Sears, Roebuck P/N 9G41501	Slotted head
Tie-wrap gun	1	Panduit Corporation GS-2B	—
Cutting pliers	1	Sears, Roebuck P/N 9H45072	Diagonal cutting
Hex socket set	1	Xcelite 99-PS-40BP	11 piece
Ball point screwdriver	1	Xcelite 99-PS-40BP	11 piece
Torque wrench	1	Utica CH-150	1-150 in.-lbs.
Retaining ring pliers	1	Waldes 0300	Standard, internal
Adhesive, eccosil		Emerson & Cuming TP50 A&B	Adhesive
Loctite		Loctite #242 medium strength	Adhesive
Solvent		—	Methyl-ethyl-ketone (MEK) (TT-M-261-B)
Solvent		—	Isopropyl alcohol (TT-1-735)
Lubricant		Dow Corning Corporation #4	Silicone grease
Cotton Swabs		—	—
Urethane paint		Andrew Brown Company Color no. 12197	Surface finish coating (MIL-C-83286, type 1)
Alodine		B.S.A.F. Corporation Alodine 1200	Aluminum surface coating

7.5 VISUAL INSPECTION.–

All parts removed during disassembly should be visually inspected for defects such as burrs, dents, scratches, and corrosion. Minor surface defects may be lightly sanded using 400-grit sandpaper. Restoration of surface finishes should be performed as needed (refer to paragraph 7.8).

TABLE 7-2 TROUBLESHOOTING CHART

Symptom	Probable Cause	Action
High VSWR and/or insertion loss in channel 1, 2, or 3 (S-band)	a. Damaged waveguide subassemblies	a. Disassemble rotary joint and visually inspect for damaged subassemblies. Repair or replace damaged subassemblies.
	b. Contaminants in waveguide	b. Disassemble rotary joint and remove contaminants.
Excessive VSWR WOW in channel 1, 2, or 3 (S-band)	a. Contaminants in waveguide	a. Disassemble rotary joint and remove contaminants.
	b. Damaged or bent waveguide flange	b. Repair or replace damaged subassembly.
	c. Defective bearing	c. Replace defective bearing and repair or replace any damaged subassemblies.
High VSWR, excessive VSWR WOW, or high insertion loss in channel 4, 5, or 6 (L-band modules)	a. Moisture and/or contaminants in connectors	a. Clean and dry connectors with a lint free cloth
	b. Damaged coaxial connector or cables	b. Replace cable assembly
	c. Internal damage and/or misalignment	c. Replace damaged L-band module
Excessive phase or amplitude tracking error between channels 4 and 5 or 4 and 6 (L-band)	a. Damaged coaxial connector or cable	a. Replace cable assembly
	b. Internal damage and/or misalignment	b. Replace damaged L-band module
Open circuit in slipring channel.	a. Damaged slipring brushes	a. Repair or replace slipring brushes.
	b. Defective wire harness	b. Visually inspect and perform continuity check. Refer to figure 10-2. Repair or replace defective wire harness.
	c. Defective slipring or interconnecting wiring	c. Disassemble rotary joint and repair or replace slip ring.
Isolation between slipring channels less than 100 megohms.	a. Excessive wear contaminants between adjacent slipring channels and/or brushes.	a. Clean contaminants from affected parts.
	b. Moisture in connectors	b. Clean and dry connectors with a lint free cloth.
	c. Damaged interconnecting wiring	c. Visually inspect wiring. Check continuity (see figure 10-2). Repair or replace defective parts.

TABLE 7-2 TROUBLESHOOTING CHART (continued)

Symptom	Probable Cause	Action
Excessive rotational torque, roughness, or grinding noises	a. Damaged or misaligned slipring brushes	a. Align or replace slipring brushes.
	b. Defective bearing or slipring	b. Disassemble rotary joint and replace defective parts.
Excessive air leakage during pressurization test (5 psig maximum pressure).	a. Omitted or improperly installed O-Ring/gasket	a. Disassemble rotary joint to leakage point and verify properly installed O-Ring or gasket.
	b. Defective or improperly installed carbon-face rotary seal	b. Repair or replace carbon face rotary seal.
Defective encoder wire assembly	a. Broken or damaged wiring	a. Visually inspect. Refer to figure 10-2 and perform continuity check. Repair or replace defective wiring.
	b. Damaged connector	b. Repair or replace wire harness.

CAUTION

Do not use forced air on bearings or on subassemblies that have bearings installed.

7.6 CLEANING OF PARTS OR SUBASSEMBLIES.–

All disassembled parts or subassemblies that are to be reused must be cleaned of all dust, dirt, or other contaminants before reassembly. Each part should be cleaned with a forced-air jet and wiped with a solvent-saturated nonlinting cloth.

7.7 DISASSEMBLY.–

Throughout the disassembly procedures refer to Figures 7-1 and 7-2. Numbers in parenthesis are item numbers of the particular item in Figures 7-1 and 7-2.

7.7.1. Before disassembling the Rotary Joint, determine what is wrong with the unit. Information accompanying Rotary Joint returned for depot maintenance can be one of the following:

a. Faulty Rotary Joint with fault identified at field level maintenance.

b. Return for depot maintenance after completion of 40,000 hours operation (field level preventative maintenance).

c. No information at all.

7.7.2 Rotary Joint may be placed horizontally on bench for disassembly.

7.7.3 Remove protective caps (items 104, 148, 135, 134, 149, 150) from connectors and waveguide flanges.

7.7.4 Loosen twenty-four #10-32 x 3/4 slotted head captive screws (173) twenty-four split lockwashers (204) and twenty-four flatwashers (205) till cover is removeable. Remove Encoder Access Covers (102) and two o'rings (165).

7.7.5 Discard o'rings (165).

7.7.6 Disconnect connector assemblies (77, 78) from Encoders (item 74).

7.7.7 Remove twenty-four #6-32 x 3/4 hex head screws (184), twenty-four flat washers (201) and twenty-four split lockwashers (200). Remove Encoder Housing (106) being careful not to damage Outer Conductor Housing Ch. 3 (73).

7.7.8 Remove o'ring (164) and discard.

7.7.9 Loosen 4 #6-32 x 3/8 hex socket head screws (185). Turn Encoder cleats (140) to allow removal of Encoders (74) and re-tighten screws (185).

7.7.10 Carefully remove Encoders (74).

7.7.11 Loosen retaining screw on Encoder drive gear (146).

7.7.12 Proceed to opposite end of Rotary Joint. Loosen 5/8-24 threaded connector type N female (113).

CAUTION

As this connector is epoxied in place, heat may have to be applied to the connector shell. Discard this connector shell (113).

7.7.13 Remove conductor assembly channel #3 (107). With this assembly will come the type N insulators (111, 112). Discard these items.

CAUTION

Set screw in Encoder drive gear (146) must be loosened in order to accomplish this task.

7.7.14 Proceed to opposite end of Rotary Joint. Remove four #4-40 hex head socket screws (176), four split lock washers (198) and four flat washers (199) that fasten outer choke (127). Do not disassemble outer conductor ch. #3 stator (73) at this time. Obtain Encoder Housing (106) and carefully remove outer conductor channel 3 stator (73) from encoder housing and discard o'ring (167).

7.7.15 Proceed to Opposite end of Rotary Joint. Remove four #6-32 x 3/4 Hex Head Bolts (184) Flat Washers (201) and Split Lock Washers (200) holding Center Conductor Assembly (98). Being sure to support Pinion Gear (146).

7.7.16 Remove four 1/4-28 x 1 hex head bolts (193), four flat washers (207) and four split lock washers (206) from gear housing (232). Carefully remove gear housing (232). Remove and discard o'ring (156).

7.7.17 Remove bearing (212) from Encoder Housing (233). Discard bearing. Remove retaining ring (145) from housing. Discard ring.

7.7.18 Remove retaining ring (145) and remove bearing (212). Discard ring and bearing.

7.7.19 Remove four 1/4-28 x 1-1/4 hex head bolts (195), four split lockwashers (206) and four flat washers (207) from W/G transition casting (19). Remove waveguide transition casting (19).

CAUTION

Upon removal of casting one loose part may fall from unit, specifically choke Ch #2, #1 (32). This part must not be damaged. Remove and discard o'ring (154).

7.7.20 Remove four 1/4-28 x 1-1/2 Hex Head Bolts (197) four split lockwashers (206) & four flat washers (207) from Post Assy Ch. 1 (15).

7.7.21 Remove Bearing Housing (63), Remove & Discard Bearing (211), Remove & Discard O'Ring (169).

7.7.22 Loosen #10-32 x 3/4 Hex Head Bolt (190) located in Bearing Support Clamp (38). Remove support clamp.

CAUTION

Upon removal of Bearing Support Clamp Two Loose Parts (31 Housing Choke, 34 Sleeve Choke) may fall out of unit. Remove these parts to Avoid damage to Internal Choke. Remove & discard O'Rings (155, 157).

7.7.23 Remove seven 1/4-28 x 1" long hex head bolts (193) and four split lockwashers (206) and four flatwashers (207) from sleeve choke assembly (43).

7.7.24 Remove waveguide transition casting (15). Remove o'ring (158) and discard.

7.7.25 Remove sleeve, choke assembly (43) and remove o'ring (161). Discard o'ring.

CAUTION

Use extreme care in removing sleeve, choke assembly (43) as 1/4 wave chokes inside of unit damage easily.

7.7.26 Proceed to opposite end of Rotary Joint. Remove four 1/4-28 x 1-1/8 hex head bolts (194), four split lockwashers (206) and four flat washers (207) from center conductor assembly (55).

7.7.27 Remove waveguide transition casting ch. 2 (22). Remove o'ring (154) and discard.

7.7.28 Remove four 1/4-28 x 1-1/2 hex head bolts (197), four split lockwashers (206) and four flatwashers (207) from center conductor assembly ch. 1 (55).

7.7.29 Remove center conductor assembly ch #1 (55).

7.7.30 Remove o'ring (155) and discard.

7.7.31 Remove four 1/4-28 x 1-1/8 hex head bolts (194), four split lockwashers (206) and four flat washers (207) from connector housing rotor (40).

7.7.32 Remove waveguide transition casting (18). Remove o'ring (158). Discard o'ring.

7.7.33 Remove four #6-32 x 1/4 flat head screws (179) which hold shield (72) in place. Slide shield down over Stator Slip Ring Housing (2).

7.7.34 Disconnect the lead wires located at the terminal ring (118). These wire leads come from the back of the rotor slipring connector (241). Retain terminal screws and lockwashers.

7.7.35 Remove four #6-32 x 3/8 hex socket screws (182), four split lockwashers (200) and four flatwashers (201) which attach rotor slip ring connector (241) to rotor connector housing (40).

7.7.36 Remove rotor slip ring connector (241) and gasket (136). Discard connector gasket.

7.7.37 Remove jam nuts located at connector assemblies J3, J14, and J5.

7.7.38 Remove three #4-40 x 3/8 hex socket screws (175), three split lockwashers (198) and three flat washers (199) which hold connector cover (50) to rotor connector housing (40) three places at connectors J3, J14, and J5.

7.7.39 Remove connector covers (50) and o'rings (152) three places. Discard o'rings (152).

7.7.40 Remove three 1/4-28 x 1-1/2 seal screws (172) which hold the rotor connector housing (40) to the rotor housing (12).

7.7.41 Remove rotor connector housing (40) and o'ring (153). Discard o'ring (153).

7.7.42 Remove shield (72) at this time.

7.7.43 Disconnect the rotor cable assemblies (301, 308 and 312) at the connectors on the rotor housing (12).

7.7.44 Proceed to opposite end of Rotary Joint. Loosen eight #10-32 x 3/4 slotted head captive screws (170) eight split lockwashers (204) and eight flatwashers (205) which hold slip ring access cover (30) to stator slip ring housing (2) till cover is removable.

7.7.45 Remove the slip ring access cover (30). Discard o'ring item (161).

7.7.46 Disconnect lead wires from the stator slip ring connector assembly (242) to brush block assemblies (122, 123).

7.7.47 Remove and retain four #10-32 x 1/2 hex socket screws (189), four split washers (204) and flat lock washers (205) from stator slip ring housing (2). Remove brush block assemblies (122, 123) and discard.

7.7.48 Remove and retain #8-32 x 1/2 hex socket screw (188), split washer (202) and flat lockwasher (203) that retains mounting tie to slip ring casting see view H-H.

7.7.49 Remove four #6-32 x 1/2 hex socket head (183), four split washers (200) and four flat lockwashers (201) which hold the stator slip ring connector assembly (242) to the stator slip ring housing (2).

7.7.50 Remove stator slip ring connector assembly (242) and the connector gasket (136). Discard connector gasket (136).

7.7.51 Remove jam nuts located at connector assemblies (J4, J6, and J15).

7.7.52 Remove three #4-40 x 3/8 hex socket screws (175), three split lockwashers (198) and three flat washers (199) which hold connector cover (50) to slip ring housing stator (2) three places connector locations marked J4, J6 and J15.

7.7.53 Remove connector covers (50) and o'rings (152) three places. Discard o'rings.

7.7.54 Proceed to opposite end. Remove eight 1/4-28 x 1 hex head bolts (193), eight split lockwashers (206) and eight flatwashers (207) from stator slip ring housing (2).

7.7.55 Remove bearing retainer (46) and o'ring (163) and discard o'ring.

7.7.56 Remove eight #4-40 x 3/8 hex socket head (175), eight split lockwashers (198) and eight flat washers (199) from bearing retainer (46).

7.7.57 Remove carbon face seal (137) and o'ring (160). Discard o'ring and seal.

7.7.58 Remove stator slip ring housing (2) with application of heat with heat gun by sliding away from and out over the remaining rotary joint assembly. This will expose the L-Band modules (213), the main bearing (52) and the outrigger bearing (53), also the slip ring (121).

7.7.59 Disconnect the lead wires at the back of the slip ring (121). These wires originate at the terminal ring (118).

7.7.60 Remove four #4-40 x 2-1/4 hex socket screws (177), four split lockwashers (198) and four flat washers (199) from slip ring support (35).

7.7.61 Remove the slip ring assembly (121).

7.7.62 Remove four #4-40 x 1/2 hex socket screw (176) which attaches slip ring support (35) to the rotor housing (12).

7.7.63 Pass the lead wires from the terminal ring assembly (18) through the slots in the slip ring support (35) to facilitate removal of the slip ring support (35).

7.7.64 Remove slip ring support (35).

7.7.65 Remove six #4-40 x 3/8 flat head screws (180) which capture the bearing (53) to the locking ring (54). Discard bearing (53).

7.7.66 Disconnect the stator connector assemblies, channel #4 (278), #5 (271) and #6 (282) at the connector on the L-band modules (213), three places. Discard.

7.7.67 Remove the three jam nuts which hold the rotor cable assemblies Item (331, 316, 321) to the rotor housing (12).

7.7.68 Loosen the two #10-32 x 3/4 hex head screws two turns. These screws are located at the clamp and the L-band module interface, 3 places. See Figure 7-2.

7.7.69 Loosen the 1/4-28 x 1 hex socket screw which clamps the L-band module (213) to the rotor housing (12) 3 places.

7.7.70 Remove the three L-band modules (213) along with their respective rotor connector assemblies (321), (316), and (331) by sliding them off and over the rotor housing. (The L-band modules are factory repairable only. If the modules failed electrically or mechanically replace with new modules).

7.7.71 Remove six #4-40 x 1/4 pan head screws (174) which attach the module locating bar (103) to the L-band modules and remove module locating bar (103).

7.7.72 Disconnect the rotor cable assemblies, channels #4 (331), #5 (316) and #6 (321) from the connectors at the L-band modules (213).

CAUTION

Do not damage Rotor Connector Assemblies as they are reusable.

7.7.73 Remove six 1/4-28 x 7/8 hex head bolts (192), six split lockwashers (206) and six flat washers (207) which secure the main bearing duplex pair (52) to the rotor housing (12).

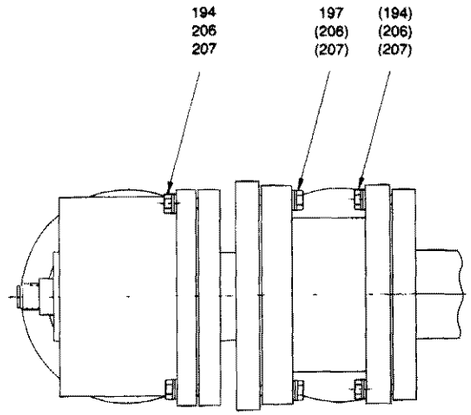
7.7.74 Remove locking ring (39) and the main bearing duplex pair (52) and note shim Item (350) location on rotor housing (12). Discard the bearing duplex pair (52).

7.7.75 Remove and discard the mating ring (138) and the o'ring (159) from the rotor housing (12).

7.7.76 Remove four #4-40 x 1/2 hex socket screws (176), four split lockwashers (198) and four flat washers (199) which hold the terminal ring (118) to the rotor housing (12).

7.7.77 Remove the terminal ring (118) and the terminal ring gasket (49) from the rotor housing (12). Discard terminal ring gasket (49) and O'ring (151).

This completes the disassembly procedure.



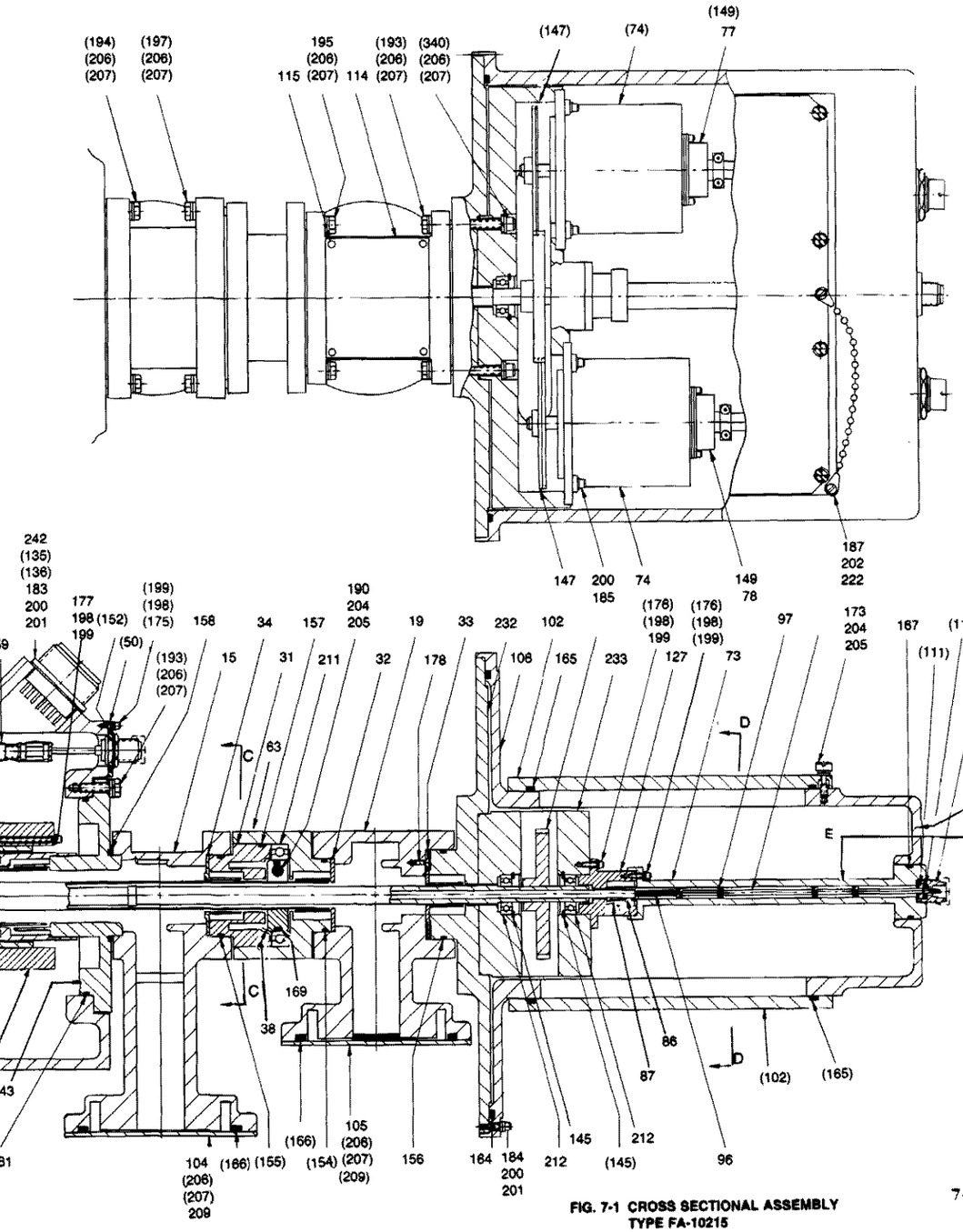
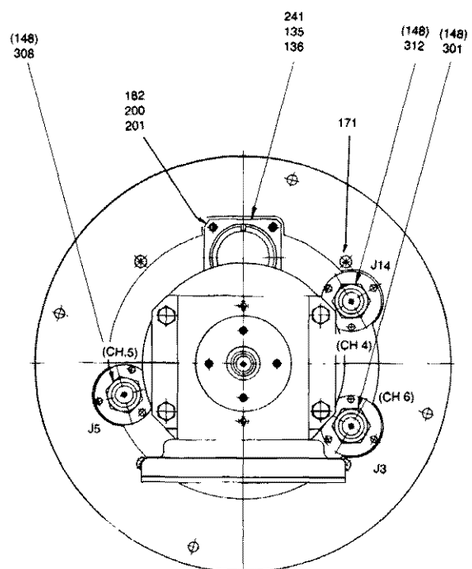
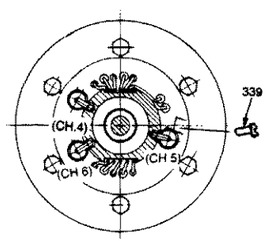


FIG. 7-1 CROSS SECTIONAL ASSEMBLY
TYPE FA-10215

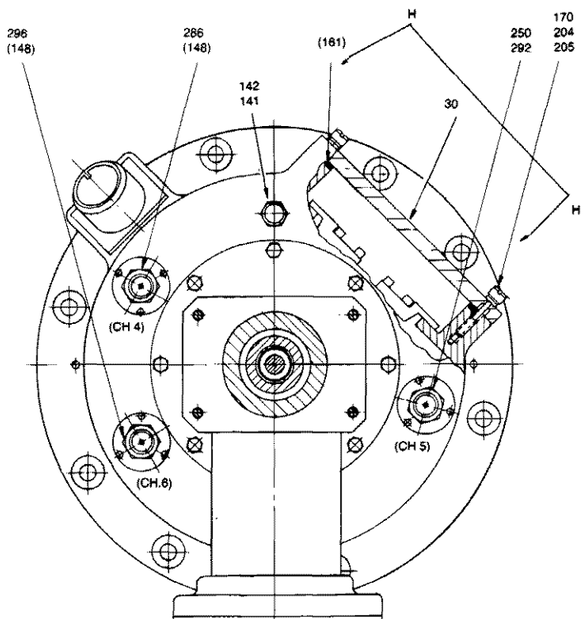
1625-905



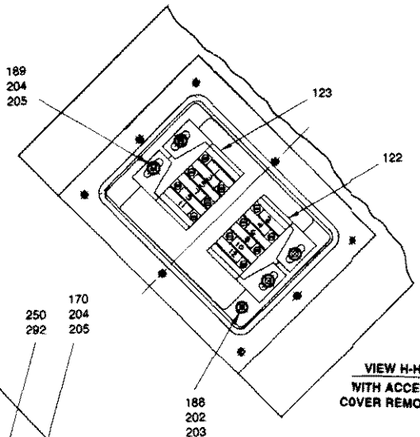
VIEW A-A



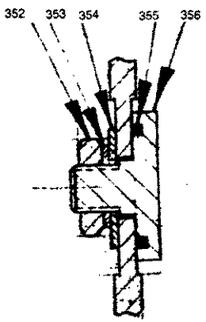
SECTION B-B



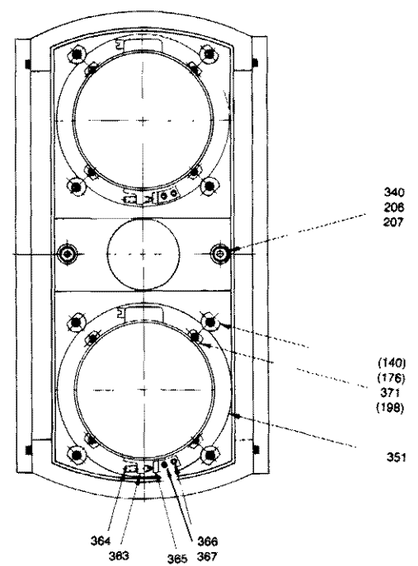
SECTION C-C



VIEW H-H
WITH ACCESS
COVER REMOVED



SECTION E-E



SECTION D-D

1625-906

FIG. 7-1 CROSS SECTIONAL ASSEMBLY
TYPE FA-10215

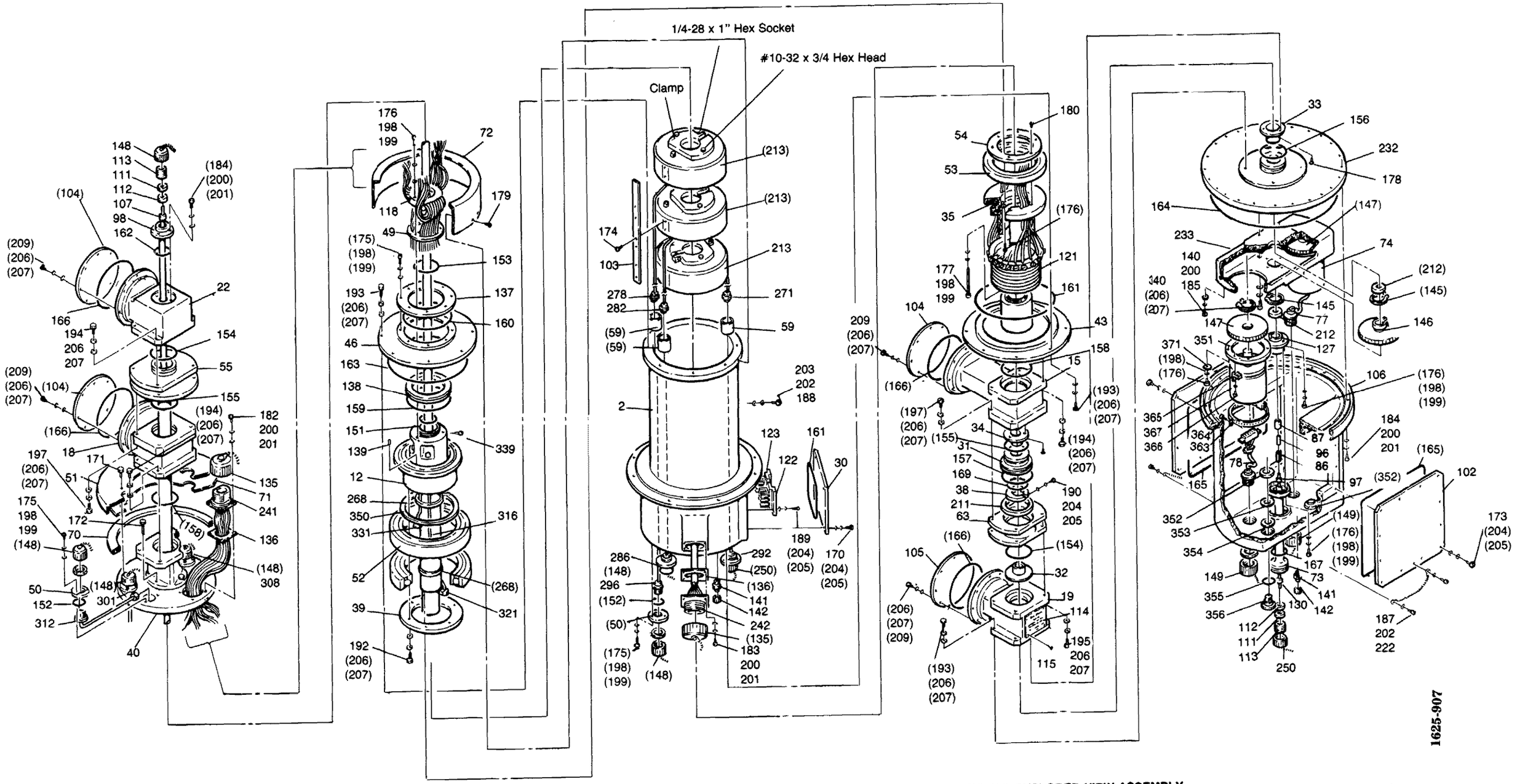


FIG. 7-2 EXPLODED VIEW ASSEMBLY
TYPE FA-10215

TABLE 7-3 PARTS CROSS REFERENCE (FOR FIGURES 7-1 AND 7-2)

Code I.D.	Quantity	Description	Part No.	Item
25634	1	Stator Slip Ring Hsg. Comp.	J1618-1G1	2
25634	1	Rotor Housing	J1618-2G1	12
25634	1	Post Assy Ch #1	C1618-70G1	15
25634	1	Post Assy Ch #1	C1618-70G2	18
25634	1	Cstg. W/G Trans. Ch 2 Comp.	J1618-4G1	19
25634	1	Cstg. W/G Trans. Ch 2 Comp.	J1618-28G1	22
25634	1	Slip Ring Access Cover	C1618-7	30
25634	1	Housing Choke Ch #1	C1618-9	31
25634	1	Sleeve, Choke Ch #2, #1	B1618-11	32
25634	1	Sleeve, Choke Ch #2, #2	B1619-12	33
25634	1	Sleeve, Choke Ch #1, #2	B1618-13	34
25634	1	Slip Ring Support	D1618-14G1	35
25634	1	Bearing Support Clamp	C1618-15	38
25634	1	Locking, Ring	B1618-16	39
25634	1	Cstg. Conn. Hsg. Rotor Comp.	J1618-17G1	40
25634	1	Sleeve, Choke Assy	C1618-8G1	43
25634	1	Bearing Retainer	D1618-18G1	46
25634	1	Gasket, Terminal Ring	C1618-19	49
25634	6	Cover, Connector	B1618-20P1	50
25634	1	Interface Plate	D1618-21	51
25634	1	Bearing, Ball Duplex Pair	C1619-31	52
25634	1	Bearing, Ball Conrad Type	B1619-23	53
25634	1	Locking Ring	B1618-24	54
25634	1	Ctr Cond Assy Ch #1	D1618-25G1	55
25634	3	Heat Shrinkable Tubing	C8000-389P5	59
25634	1	Housing Bearing	D1618-5G1	63
25634	1	Pad, Interface Plate	B1618-34	70
25634	1	Gasket, Interface Plate	C1618-35	71
25634	1	Shield	C1618-36	72
25634	1	Outer Conductor Ch. 3 Stator	C1619-27	73
25634	2	Encoder 12/14 Bit	C1624-110	74
25634	1	Encoder Connector Assembly	D1625-15G1	77
25634	1	Encoder Connector Assembly	D1625-15G2	78
25634	1	Insulator, Teflon	A1619-85	86
25634	1	Insulator, Teflon	A1619-86	87
25634	1	Sleeve, Teflon	A1619-41	96
25634	4	Support, Teflon	A1618-42	97
25634	1	Center Conductor Assy. Ch 2	C1619-43G1	98
25634	2	Access Cover, Gear Box	D1619-46	102
25634	1	Module Locating Bar	C1618-68	103
25634	3	Cover W/G Flange	C1618-48P1	104
25634	1	Termination Waveguide	B1618-66G1	105
25634	1	Casting, Encoder Housing Comp.	J1619-54G1	106
25634	1	Ctr. Cond. Assy. Ch. 3, Rotor	B1619-55G1	107
25634	2	Bead, Teflon .118/,390 D Type N	A416A-29P2	111
25634	2	Bead, Teflon .118/,390 D Type N	A416A-30	112
25634	2	Conn Shell Type "N" Female	B8000-1P5	113
25634	1	Plate, Identification	C1625-72	114
	4	RD. HD. Drive Screw (All Metal)	1/4 X 3/16 LG	115
25634	1	Ring, Terminal	D1618-101G1	118
25634	1	12 Cir Slip Ring Assy	D1618-100P1	121
25634	1	6 Cir Brush Block Odd #1-#11	D1618-100P2	122
25634	1	6 Cir Brush Block Even #2-#12	D1618-100P3	123
25634	1	Choke, Outer	B1619-24G1	127
25634	1	Ctr. Cond. Assy. Ch. 3, Stator	B1619-25G1	130
	2	Cap & Chain "AN" 1 3/4-18UNEF	MS25043-28D	135
25634	2	Gasket, MS Conn. Fluorosilicone	A8000-442	136

Code I.D.	Quantity	Description	Part No.	Item
25634	1	Carbon Face Seal, Cup Assy.	D8000-305P1	137
25634	1	Carbon Face Seal, Wear Ring	D8000-305P2	138
00141	2	Spring Pin .062 X .250L (PIC)	C3-4	139
25634	8	Encoder Cleat	A1619-84	140
11649	2	1/4 Male Hex Nipple (Cajon)	-4-HN-SS	141
11649	2	1/4 Female Pipe Cap (Cajon)	-4-CP-SS	142
79136	2	Retaining Ring (Waldes)	N5000-112H	145
25634	1	Pinion Gear Clamp Type Hub	C1619-21	146
25634	2	Anti-Backlash Gear CL Type Hub	C1619-20	147
13511	6	Cap & Chain "N" (Amphenol)	82-106	148
25634	2	Cap(MS3181-14CA) & Chain 5.5L	C1639-35G1	149
02697	1	O'Ring, Fluorosilicone, (Parker)	2-033L946-60	151
02697	6	O'Ring, Fluorosilicone, (Parker)	2-023L946-60	152
02697	1	O'Ring, Fluorosilicone, (Parker)	2-030L946-60	153
02697	2	O'Ring, Fluorosilicone, (Parker)	2-032L946-60	154
02697	2	O'Ring, Fluorosilicone, (Parker)	2-034L946-60	155
02697	1	O'Ring, Fluorosilicone, (Parker)	2-036L946-60	156
02697	1	O'Ring, Fluorosilicone, (Parker)	2-038L946-60	157
02697	2	O'Ring, Fluorosilicone, (Parker)	2-140L946-60	158
02697	1	O'Ring, Fluorosilicone, (Parker)	2-154L946-60	159
02697	1	O'Ring, Fluorosilicone, (Parker)	2-156L946-60	160
02697	2	O'Ring, Fluorosilicone, (Parker)	2-160L946-60	161
02697	1	O'Ring, Fluorosilicone, (Parker)	2-025L946-60	162
02697	1	O'Ring, Fluorosilicone, (Parker)	2-166L946-60	163
02697	1	O'Ring, Fluorosilicone, (Parker)	2-278L946-60	164
02697	2	O'Ring, Fluorosilicone, (Parker)	2-275L946-60	165
02697	4	O'Ring, Fluorosilicone, (Parker)	2-346L946-60	166
02697	1	O'Ring, Fluorosilicone, (Parker)	2-027L946-60	167
02697	1	O'Ring, Fluorosilicone, (Parker)	2-132L946-60	169
06540	8	#10-32 UNF X 1.00 Capt (Amatom)	6240-SS-1032	170
25634	4	Seal Screw	A1618-65	171
02310	3	1/4-28X1.53 Hex Seal SC (Abscoa)	AB1504K14	172
06540	22	#10-32 UNF X .750 Capt (Amatom)	6238-SS-1032	173
	6	#4-4O UNC X .188 Pan Hd. Sl.	MS35233-12	174
	26	#4-4O UNC X .375 Hex.Soc.Hd.	MS16995-10	175
	24	#4-4O UNC X .500 Hex.Soc.Hd.	MS16995-11	176
25634	4	#4-4O UNC X 2.00 Hex.Soc.Hd.	4-40X2.00HS	177
	4	#6-32 UNC X .375 FL.HD. PH.	MS51959-28	178
	4	#6-32 UNC X .250 FL.HD. SL.	MS35249-33	179
	6	#4-40 UNC X .375 FL.HD. PH.	MS51959-15	180
	4	#6-32 UNC X .375 Hex.Soc.Hd.	MS16995-17	182
	4	#6-32 UNC X .500 Hex.Soc.Hd.	MS16995-18	183
	28	#6-32 UNC X .750 Hex.Soc.Hd.	MS16995-20	184
	8	#6-32 UNC X .375 Hex.Soc.Hd.	MS16995-17	185
	4	#8-32 UNC X .375 Hex.Soc.Hd.	MS16995-25	187
	1	#8-32 UNC X .500 Hex.Soc.Hd.	MS16995-26	188
	4	#10-32 UNF X .500 Hex.Soc.Hd.	MS16996-10	189
25634	1	#10-32 UNF X .750 Fill. Hd.	A8000-347-265	190
	6	1/4-28 UNF X .875 Hex. Hd.	MS35308-307	192
	19	1/4-28 UNF X 1.000 Hex. Hd.	MS35308-308	193
	12	1/4-28 UNF X 1.125 Hex. Hd.	MS35308-309	194
	4	1/4-28 UNF X 1.250 Hex. Hd.	MS35308-310	195
	8	1/4-28 UNF X 1.500 Hex. Hd.	MS35308-312	197
	50	#4 Med. Lockwasher	MS35338-135	198
	42	#4 Flat Washer, Reduced O.D.	NAS620C4	199
	44	#6 Med. Lockwasher	MS35338-136	200
	36	#6 Flat Washer, Reduced O.D.	NAS620C6	201
	3	#8 Med. Lockwasher	MS35338-137	202
	1	#8 Flat Washer, Reduced O.D.	NAS620C8	203

Code I.D.	Quantity	Description	Part No.	Item
	35	#10 Med. Lockwasher	MS35338-138	204
	35	#10 Flat Washer, Reduced O.D.	NAS620C10	205
	85	1/4 Med. Lockwasher	MS35338-139	206
	85	1/4 Flat Washer, Reduced O.D.	NAS620C416	207
	32	1/4-20 UNC X .750 Hex. Hd.	MS35307-306	209
25634	1	Bearing Conrad Type	B1618-29	211
25634	2	Bearing Conrad Type	B1619-30	212
25634	3	Single Ch. R/J (L-Band Module)	21032	213
25634	2	Chain & Coupler Assy 6.0 L	C8000-390E8L5	222
25634	1	Gear Housing	J1619-93G1	232
25634	1	Encoder Housing	J1619-94G1	233
25634	1	Slip Ring Conn. Assy. Rotor	C1387-28G1	241
25634	1	Slip Ring Conn. Assy. Stator	C1387-29G1	242
92180	2	Termination, Coaxial (TRU)	978	250
53421	2	Mounting Ties (Schaal or Eq.)	T18L	268
25634	1	Cable Assy Stator Ch. 5	C1625-77G1	271
25634	1	Cable Assy Stator Ch. 4	C1625-78G1	278
25634	1	Cable Assy Stator Ch. 6	C1625-78G2	282
25634	1	Cable Assy Stator	C1625-79G1	286
25634	1	Cable Assy Stator	C1625-79G2	292
25634	1	Cable Assy Stator	C1625-79G3	296
25634	1	Connector Assy Rotor	C1618-37G1	301
25634	1	Connector Assy Rotor	C1618-37G2	308
25634	1	Connector Assy Rotor	C1618-37G3	312
25634	1	Cable Assy Rotor Ch. #6 & #5	C1618-53G1	316
25634	1	Cable Assy Rotor Ch. #6 & #5	C1618-53G2	321
25634	1	Cable Assy Rotor Ch. #4	C1618-52G1	331
25634	3	Self-Sealing Screw	A1619-120	339
	4	1/4-28 UNF X 1.250 Hex.Soc.Hd.	MS16996-25	340
25634	1	Shim	A1639-30	350
25634	2	Adapter Plate-Encoder	B1625-13	351
	2	1/2-20 UNF, Hex. Nut	MS35650-3394	352
	2	1/2" Med. Lockwasher	MS35338-148	353
	2	1/2" Flat Washer	MS15795-819	354
	2	O'Ring, Fluorosilicone, (Parker)	2-122L946-60	355
25634	2	Plug	B1625-17	356
25634	2	Encoder Clamp Assembly	B1625-14G1	363
	2	#8-32 UNC X .750 Soc.Hd.St.SC RAD	AN565FC8H12	364
25634	2	Adjustment Stop-Encoder	A1625-11	365
	4	#2-56 UNC X .375 Hex.Soc.Hd.	MS16995-3	366
	4	#2 Med. Lockwasher	MS35338-134	367
00141	8	Motor Mount (PIC or Eq.)	L2-2	371

TABLE 7-4 ROTARY JOINT OVERHAUL REPLACEMENT PARTS (CANNOT BE REUSED)

Item Number	Part Number	Quantity	Description
49	C1618-19	1	Gasket, Terminal Ring
52	C1619-31	1	Bearing, Ball Duplex Pair
53	B1619-23	1	Bearing, Ball Conrad Type
97	A1618-42	4	Support, Teflon
111	A416A-29P2	2	Bead, Teflon
112	A416A-30	2	Bead, Teflon
113	B8000-1P5	2	Conn Shell Type "N" Female
121	D1618-100P1	1	Slip Ring Assy.
122	D1618-100P2	1	6 Cir Brush Block Odd #1-#11
123	D1618-100P3	1	6 Cir Brush Block Even #2-#12
130	B1619-25G1	1	Center cond. Assy, Ch. 3
136	A8000-442	2	Gasket, Fluorosilicone
137	D8000-305P1	1	Carbon Face Seal, Cup Assy.
138	D8000-305P2	1	Carbon Face Seal, Wear Ring
145	N5000-112H	2	Retaining Ring
146	C1619-21	1	Pinion Gear
151	2-033L946-60	1	O'Ring Fluorosilicone (Parker)
152	2-023L946-60	6	O'Ring Fluorosilicone (Parker)
153	2-030L946-60	1	O'Ring Fluorosilicone (Parker)
154	2-032L946-60	2	O'Ring Fluorosilicone (Parker)
155	2-034L946-60	2	O'Ring Fluorosilicone (Parker)
156	2-036L946-60	1	O'Ring Fluorosilicone (Parker)
157	2-038L946-60	2	O'Ring Fluorosilicone (Parker)
158	2-140L946-60	2	O'Ring Fluorosilicone (Parker)
159	2-154L946-60	1	O'Ring Fluorosilicone (Parker)
160	2-156L946-60	1	O'Ring Fluorosilicone (Parker)
161	2-160L946-60	2	O'Ring Fluorosilicone (Parker)
162	2-025L946-60	1	O'Ring Fluorosilicone (Parker)
163	2-166L946-60	1	O'Ring Fluorosilicone (Parker)
164	2-278L946-60	1	O'Ring Fluorosilicone (Parker)
165	2-275L946-60	2	O'Ring Fluorosilicone (Parker)
166	2-346L946-60	4	O'Ring Fluorosilicone (Parker)
167	2-027L946-60	1	O'Ring Fluorosilicone (Parker)
169	2-132L946-60	2	O'Ring Fluorosilicone (Parker)
211	B1618-29	1	Bearing Conrad Type
212	B1619-30	2	Bearing Conrad Type
213	21032	3	Single Channel R/J (L-Band Module)
268	T18L	2	Mounting Ties (Schaal)

7.8 RESTORATION OF SURFACE FINISHES.—

The following procedures contain information for touchup repair of painted and unpainted protective surfaces of the rotary joint.

NOTE

The hardware (including nuts, bolts, washers, etc.) used to fasten various parts of the rotary joint together is stainless steel and does not need touchup to prevent corrosion.

7.8.1 Painted Surfaces.—The painted surfaces of the rotary joint may be touched up with a small brush as follows:

7.8.1.1 Clean area to be repainted using a solvent (such as isopropyl alcohol conforming to specifications TT-I-735, grade A, technical) that will not leave oily residue.

7.8.1.2 Apply coat of zinc chromate primer in accordance with specification TT-P-645. Allow enough time for primer to dry.

7.8.1.3 Apply finish coat of aviation orange paint (color number 12197) in accordance with FED-STD-595 conforming to specification TT-E-489.

7.8.2 Unpainted Aluminum Surfaces.—The unpainted aluminum surfaces may be touched up as follows.

7.8.2.1 Thoroughly clean area to be refinished. Use solvent (such as isopropyl alcohol conforming to specification TT-I-735, grade A, technical) that does not leave oily residue. If corrosion is present, a light sanding or scraping of area may be necessary before cleaning.

7.8.2.2 Apply alodine 1200 (manufactured by B.S.A.F. Corporation, Wyandotte Chemical Corp., Wyandotte, MI) to area to be protected.

7.9 REASSEMBLY.—

Throughout reassembly, refer to Figures 7-1 and 7-2. Numbers in parentheses are index numbers of the particular item in figures 7-1 and 7-2 and are cross referenced in table 7-3. Follow table 4-2—nut and bolt requirements.

7.9.1 A complete overhaul of the rotary joint is to be performed after every 40,000 hours of operation. Items that have limited shelf life or items that cannot be reused once installed are listed in table 7-4. These items are to be replaced with new parts each time the rotary joint is disassembled.

7.9.1.1 Referring to Table 7-4, obtain all new parts that are listed and place them on a separate section of work bench. In the following reassembly paragraphs, all new items are marked with an asterisk next to the item number ( )*.

7.9.2 Obtain the parts that were not discarded after disassembly and check that they are clean and free of dents or burrs, and that all surface finishes have been restored as needed.

CAUTION

The rotary joint, although rugged in construction, is made up of precision parts. These parts make use of close-tolerance sliding fits and require extreme care in handling during assembly to ensure proper mating and/or alignment.

7.9.3 Assemble terminal ring gasket (49)* to terminal ring (118) being sure that wires align with holes in terminal ring gasket.

7.9.4 Assemble terminal ring (118) with terminal ring gasket (49) to rotor housing (12) using four #4-40 x 1/2 socket head screws (176), four split lockwashers (198) and four flat washers (199). Be sure to install o'ring (151) in slot in rotor housing (12).

NOTE: Terminal ring gasket (49) should be compressed to .049 +/- .001 thk. (use feeler gauge). Terminal ring wires should lie flat in grooves in rotor housing. See Section B-B of figure 7-1.

7.9.5 Assemble the duplex bearing pair (52)* to the rotor housing (12) and check that shim (350) is on rotor housing (12) before assembling bearings and lock in place using lockring (39) and six 1/4-28 x 7/8 hex head bolts (193), six split lockwashers (206) and six flat washers (207). The ball bearings should be placed so that the open faces are facing each other.

7.9.6 Place three L-band modules (213)* on the bench in their respective places. Channel 4, Channel 6, Channel 5. Left to right assemble the rotor cable assemblies to their respective channels. Cable assembly Ch #4 (331), cable assembly Ch. 6 (316) and cable assembly Ch. 5 (321). These cables and modules must be placed in a relative position as they appear in the overall assembly. Care should be taken to align the cables so they will enter their proper grooves per section B-B Figure 7-1.

NOTE

Prior to assembly the L-Band modules should be electrically tested per paragraph 7.11.

7.9.7 Slide rotor housing (12) with terminal ring and gasket through the L-Band modules (213) until they are in their approximate axial position. The modules should be allowed to float on the rotor housing at this time, but care should be taken so that they end up in their approximate location.

7.9.8 Attach the rotor cable assemblies for channel 4 (331), channel 6 (316) and channel 5 (321) to the rotor housing (12) by tightening the jam nuts. Loctite should be used on these nuts. Again, care should be taken to align the proper cable assemblies.

7.9.9 Once the rotor cable assemblies are locked into place, the three L-Band modules (213) should then be locked to the rotor housing shaft (12) by means of a 1/4-28 x 1 socket head screw (345), split lockwasher (206) and flat washer (207). This clamp will permanently fix the L-Band module into place. Repeat this step for channel 4, channel 6 and channel 5. Tighten the #10-32 x 3/4 hex head screws to permanently fix clamp to L-Band modules 6 places.

7.9.10 Attach the stator cable assemblies to their respective modules channel 4 (278), channel 6 (282) and channel 5 (271).

7.9.11 Rotate the free portion of each L-Band module to align the connectors with the grooves. See section B-B Figure 7-1. Attach module locating bar (103) to L-band modules using six 4-40 x 3/16 pan head screws (174). Use loctite on these screws. The module locating bar (103) must align with stator connector channel #5 (271).

7.9.12 Attach the rotor cable assemblies (301, 308, 312) to their respective connectors channel 4 (J14), channel 6 (J3) and channel 5 (J5).

7.9.13 At this point phase should be adjusted between channel 4, channel 5 and channel 6. This is accomplished by adjusting the phase trimmers while electrical testing for phase of para. 7.11.

7.9.14 Remove rotor cable assemblies 301, 308, 312.

7.9.15 Obtain the slip ring support (35) and install the bearing (53)*. Lock in place using locking ring (54) and six 4-40 x 3/8 long flat head screws (180). Loctite should be applied to these screws before assembly.

7.9.16 Push the lead wires which come from the terminal ring through the slots in the slip ring support (35).

7.9.17 Attach this subassembly to the rotor housing L-Band module subassembly using four #4-40 x 1/2 socket head screws (176) Loctite should be applied to these screws before assembly.

7.9.18 Assemble the slip ring assembly (121)* to the slip ring support using four #4-40 x 2 1/4 hex socket screws (177) four flat washers (199) and four split lockwashers (198). **NOTE:** Align terminal Lug #4, 8, 12 on slip ring till they are in line with terminal parts 8, 9, 10, 11, 12 on terminal ring (118).

7.9.19 Attach the terminal ring wires to the slip ring terminals at their appropriate location. See slip ring wiring diagram Figure 10-1.

7.9.20 Epoxy all cable connectors after tightening at the L-Band modules to prevent loosening.

7.9.21 We recommend the slip ring housing be suspended vertically. Obtain the stator slipring housing (2) and assemble this housing over the rotor housing, L-Band module and slip ring subassembly by sliding the stator housing over from the left hand side as shown in Figure 7-1. Care must be taken to align stator cable assemblies (278, 282 and 271) so they exit at their proper locations J15 (278), J4 (282) and J6 (271). It may be necessary to apply heat to (2) to facilitate assembly.

7.9.22 Assemble mating ring (138)* and o'ring (159)* into rotor housing (12) making sure to align the 2 anti-rotation pins (139).

7.9.23 Install the bearing retainer (46) and lock rotor housing (12) to stator housing (2) using eight 1/4-28 x 1 hex head bolts (193), eight split lockwashers (206) and eight flat washers (207). Place o'ring (163) on bearing retainer prior to assembly.

7.9.24 Proceed to opposite end of Rotary Joint.

7.9.25 Obtain sleeve, choke assembly (43) and assemble o'ring (161)* into groove.

7.9.26 Install sleeve choke assembly (43) into slip ring stator housing (2) and lock in place using seven 1/4-28 x 1 hex head screws (193), seven split lockwashers (206) and seven flatwashers (207).

7.9.27 Proceed to opposite end of rotary joint.

CAUTION

Mating ring (138) must be wiped with a lint free rag and alcohol. Care should be taken not to get finger prints or/ and dirt on this face once it is wiped clean.

7.9.28 Assemble carbon face seal cup assembly (137)* using eight 4-40 x 3/8 socket head screws (175), eight split lockwashers (198) and eight flat washers (199).

7.9.29 Proceed to opposite end of rotary joint. Attach the stator cable assemblies 278, 282, and 221 to the slip ring stator housing (2) with three connector covers (50) and three o'rings (152)*. Align D-shaped hole in the connector cover (50) by twisting slightly to align the clearance holes with the tapped holes in the slip ring casting. Assemble this with three #4-40 x 3/8 hex socket head screws (175), three split lockwashers (198) and three flat washers (199). Repeat this procedure for three connector locations J4, J6 and J15. Tighten jam nuts over connector threads.

7.9.30 Obtain slip ring stator connector (242), connector gasket (136)* and attach these to the slip ring stator housing using four #6-32 x 1/2 long socket head screws (183), four flat washers (201) and four split lockwashers (200) orient key way of (242) as shown in section C-C Figure 7-1. Wire harness mounting tie should be locked in place using the #8-32 x 1/2 long hex head screw (188), a split lockwasher (202) and a flat washer (203). See view H-H Figure 7-1.

7.9.31 Obtain brush block assemblies (122, 123)*. Assemble them into the stator slip ring housing per view H-H Figure 7-1.

NOTE

With the rotor end up, brush block (123) will be on the left side and brush block (122) on the right side. Care should be taken to align individual leaf springs with their respective rings. Apply pressure on the brush blocks so the leaf springs become straight. Attach these with four #10-32 x 1/2 long socket head screws (189), four split lockwashers (204) and four flat washers (205).

7.9.32 Attach the lead wires from the slip ring stator connector (242) to their respective terminals on brush block assemblies (122, 123). See slip ring wiring diagram Figure 10-1.

7.9.33 Obtain slip ring access cover (30) o'ring (161)* and attach this to the slip ring stator housing by using eight captive screws (170), eight split lock washers (204) and eight flat washers (205). See section C-C Figure 7-1.

NOTE

At this point in the reassembly process the main housing dynamic pressure seal may be checked for leakage. Both ends should be capped off and pressure applied to the pressure input port of the stator slip ring housing. See view "EE" of Figure 7-1. This will check the dynamic pressure seal for leakage. Leakage requirements are 1 PSIG drop per hour at a 5 PSIG initial test pressure.

7.9.34 Proceed to opposite end of Rotary Joint. Assemble shield (72) over stator slip ring housing (2). This should be placed all the way down to allow access to both coaxial cables and connector lead wires at a later assembly.

7.9.35 Obtain rotor connector housing (40) and o'ring (153)* then assemble it to rotor housing (12) with three hexagon self sealing fasteners (172).

7.9.36 Obtain rotor slip ring connector (241) connector gasket (136)* and assemble them to rotor connector housing (40) using four #6-32 x 3/8 hex socket screws (182), four split lockwashers (200) and four flatwashers (201). **NOTE:** Orientation of key way, see view A-A, Figure 7-1.

7.9.37 Attach the lead wires from the connector assembly (241), to their appropriate terminal lugs on the terminal ring assembly (118). See slip ring wiring diagram Figure 10-1.

7.9.38 Attach the rotor connector assemblies (301), (308), (312) to the appropriate coaxial connector in the rotor housing (12) three places. See view A-A, Figure 7-1.

7.9.39 Attach the three connector covers (50) and three o'rings (152)* over the rotor connectors three places, located at J12, J14 & J16. Again a slight rotation of the connector cover may be necessary to align the three holes in the cover with the tapped holes in the rotor connector housing. Assemble connector covers using three #4-40 x 3/8 socket head screws (175), three split lockwashers (198) and three flat washers (199). Tighten jam nuts over connectors.

7.9.40 Slide shield (72) into its proper location. Secure using four #6-32 x 1/4 Flat Head Screws (179).

7.9.41 Install o'ring (158)* onto rotor connector housing (40). Install waveguide casting Item #18 onto rotor connector housing (40) using four 1/4-28 x 1 1/8 hex head bolts (194), four split lockwashers (206) and four flat washers (207).

7.9.42 Obtain center conductor assembly ch. 1 (55), o'ring (155)* and assemble into place using four 1/4-28 x 1 1/2 hex head bolts (197), four split lockwashers (206) and four flat washers (207).

CAUTION

As the center conductor assembly will protrude from the opposite end of the assembly, care should be taken not to bend or damage shaft.

7.9.43 Proceed to opposite end of rotary joint. Obtain the stator waveguide transition casting channel 1 (15) and o'ring (158)*. Assemble these in place using four 1/4-28 x 1 1/8 hex head bolts (194), four split lockwashers (206) and four flatwashers (207).

7.9.44 Install choke sleeve CH #1, #2 (34) Choke housing CH #1 (31) and O'Ring (155)*.

7.9.45 Install O'Ring (169)* on Bearing Support Clamp (38). Install Bearing Support Clamp (38) as shown. Measure depth from top surface of Clamp (38) to outer shoulder of Choke Housing. Dimension is .472 ± .010. Tighten #10-32 Hex Head Bolt to secure Bearing Support Clamp (38) in place.

7.9.46 Install O'Ring (157)*, Bearing (211)* and Bearing Housing (63) and secure using four 1/4-28 x 1 1/2 Hex Socket Bolts (197) Four Split Lockwashers (206) and Four Flat Washers (207).

7.9.47 Install O'Ring (154)* and Choke Sleeve CH #2, #1 (32). Install Waveguide casting CH #2 (19) and secure using four 1/4-28 x 1 1/4 Hex Socket Bolts (195) Four Split Lockwashers (206) and Four Flat Washers (207).

7.9.48 Install O'Ring (156)* and gear housing (232) using four 1/4-28 x 1-1/4 hex socket screws (193), four split lockwashers (206) and four flat washers (207).

7.9.49 Proceed to opposite end of rotary joint. Obtain rotor waveguide transition housing ch. 2 (22) and o'ring (154)* and assemble into place using four 1/4-28 x 1-1/8 hex head bolts (194). Four split lockwashers (206) and four flat washers (207).

7.9.50 Proceed to opposite end of rotary joint. Obtain two bearings (212)* and two truarc rings (145)* and install in encoder housing (233).

7.9.51 Assemble (233) onto (232) and (127) onto (233).

7.9.52 Install pinion gear (146)* into position while sliding center conductor assembly ch. 2 (98) with o'ring (162)* into rotary joint. Center conductor ch. 2 (98) will engage pinion gear. Install four #6-32 x 3/4 hex socket head screws (184)., four split lockwashers (200) and four flat washers (201).

7.9.53 Install N type insulators (112 & 111)* onto center conductor Ch. 3 assembly (107).

7.9.54 Carefully install center conductor assembly Ch. 3 (107) into connector shell (113)*.

7.9.55 Carefully install center conductor assembly CH. 3 (107) into center conductor assembly CH. 2 (98). Apply a bead of epoxy (342) to base of connector threads.

7.9.56 Obtain new center conductor (130)*, type N insulators (112 & 111)* and support beads (97)*. Install type N Insulators as shown. Split beads and install on center conductor.

7.9.57 Install center conductor assembly (130) into outer conductor ch. 3 stator (73). Install connector type N female (113) into outer conductor ch. 3 (73). Measure this assembly and choke outer (127) and machine center conductor assembly (130) as indicated, to achieve a .060 + .020, —.010 Gap between (130) and (107). Apply a bead of epoxy (342) to base of connector threads.

7.9.58 Carefully install channel 3 encoder extension (127) being sure to align center conductor. Secure using four #4-40 x 1/2 hex socket screws (176), four split lockwashers (198) and four flatwashers (199).

7.9.59 Install o'ring (167)* onto outer conductor ch. 3 stator (73). Install o'ring (164)* into encoder housing (106). Install encoder housing (106) as shown using twenty-four #6-32 x 3/4 hex socket screws (184), twenty-four split lockwashers (200) and twenty-four flat washers (201).

7.9.60 Before installing two encoders (74) open backlash gears to full capacity, back off two teeth, then place rubber bands to hold gears in place.

7.9.61 Install encoders (74) with anti-backlash gears (147) loose on encoder shaft into the encoder housing (233), clamp in place using cleats (140), eight split lockwashers (200), and eight #6-32 x 3/8 hex socket screws (185).

7.9.62 Position pinion gear (146) and anti-backlash gears (147) in place. Lock pinion gear and both anti-backlash gears by tightening the retaining screw.

7.9.63 Place encoder connector assemblies (77), (78) into encoder housing (106).

7.9.64 Attach encoder connector assemblies (77), (78) to encoder (74) by tightening retainer screws.

7.9.65 Install two o'rings (165)* and encoder access cover (102) using twenty-four #10-32 x 3/4 slotted head screws (173), twenty-four split lockwashers (204) and twenty-four flat washers (205).

7.9.66 Perform mechanical performance test of paragraph 7.10.

7.9.67 Perform electrical performance tests per paragraph 7.11.

7.10 MECHANICAL PERFORMANCE TEST PROCEDURES.—

7.10.1 Rotation.—The Rotary Joint should turn freely by hand. Any excessive torque, roughness, or unusual noises should be investigated and reference made to the troubleshooting chart of table 7-3.

CAUTION

Do not exceed 5 psig. Pressure greater than 5 psig may cause damage to the equipment.

7.10.2 Pressurization.—Verify that all protective caps are installed. Attach air fitting on stationary part of rotary joint. Slowly open valve and allow air pressure to stabilize at 5 psig. Close valve and observe pressure gauge for any decrease in pressure. Rotate rotary joint slowly while observing pressure gauge. The pressure drop rate should not exceed limits specified in table 4-1.

7.11 ELECTRICAL PERFORMANCE TEST PROCEDURES.—

The following procedures are used in isolating electrical failures or out-of-tolerance conditions in the rotary joint before rotary joint disassembly and in verifying that the rotary joint meets the performance requirements

of table 4-1 after repair and reassembly are completed. (If any of the following electrical characteristics cannot be obtained, refer to paragraph 7.5 for probable causes.)

NOTE

Use recently calibrated test equipment.

7.11.1 Tools and Test Equipment Requirements.—The standard tools and test equipment required for the tests described in this section is listed in table 7-1, along with test equipment accuracies.

7.11.2 VSWR Test for Channels 1 and 2.—The following paragraphs detail the procedure for testing the VSWR and VSWR WOW (VSWR variation with rotation) of channels 1 and 2 of the rotary joint.

7.11.2.1 Assemble test equipment as shown in Figure 7-4.

7.11.2.2 Set for a level sweep from 2.7 to 2.9 GHz.

7.11.2.3 Calibrate Analyzer for a O dB reference on one channel, (Chan. 1) of HP 8753B. Dual Channel Calibration.

7.11.2.4 Connect the rotary joint as shown in Figure 7-4.

7.11.2.5 Rotate the rotary joint slowly through 360 degrees to the position of minimum VSWR. Record. Store trace to memory of Analyzer.

7.11.2.6 Rotate the rotary joint 360 degrees and observe and record the maximum VSWR/Return Loss. Plot trace and record.

7.11.2.7 Subtract minimum from maximum VSWR values at the frequency of maximum difference and record the "(Max.–Min.) Difference (WOW)" (Record).

7.11.2.8 Connect the rotary joint Channel #2.

7.11.2.9 Repeat 7.11.2.5 through 7.11.2.7 for Channel #2 under test.

7.11.2.10 The maximum VSWR shall not exceed 1.20:1 and maximum VSWR WOW shall be 0.05 or less.

7.11.3 VSWR Test for Channel 3.—The following paragraphs detail the procedure for testing the VSWR and VSWR WOW (VSWR variation with rotation) of channel 3 of the rotary joint.

7.11.3.1 Connect test equipment as shown in Figure 7-5.

7.11.3.2 Set for a level sweep from 2.7 to 2.9 GHz.

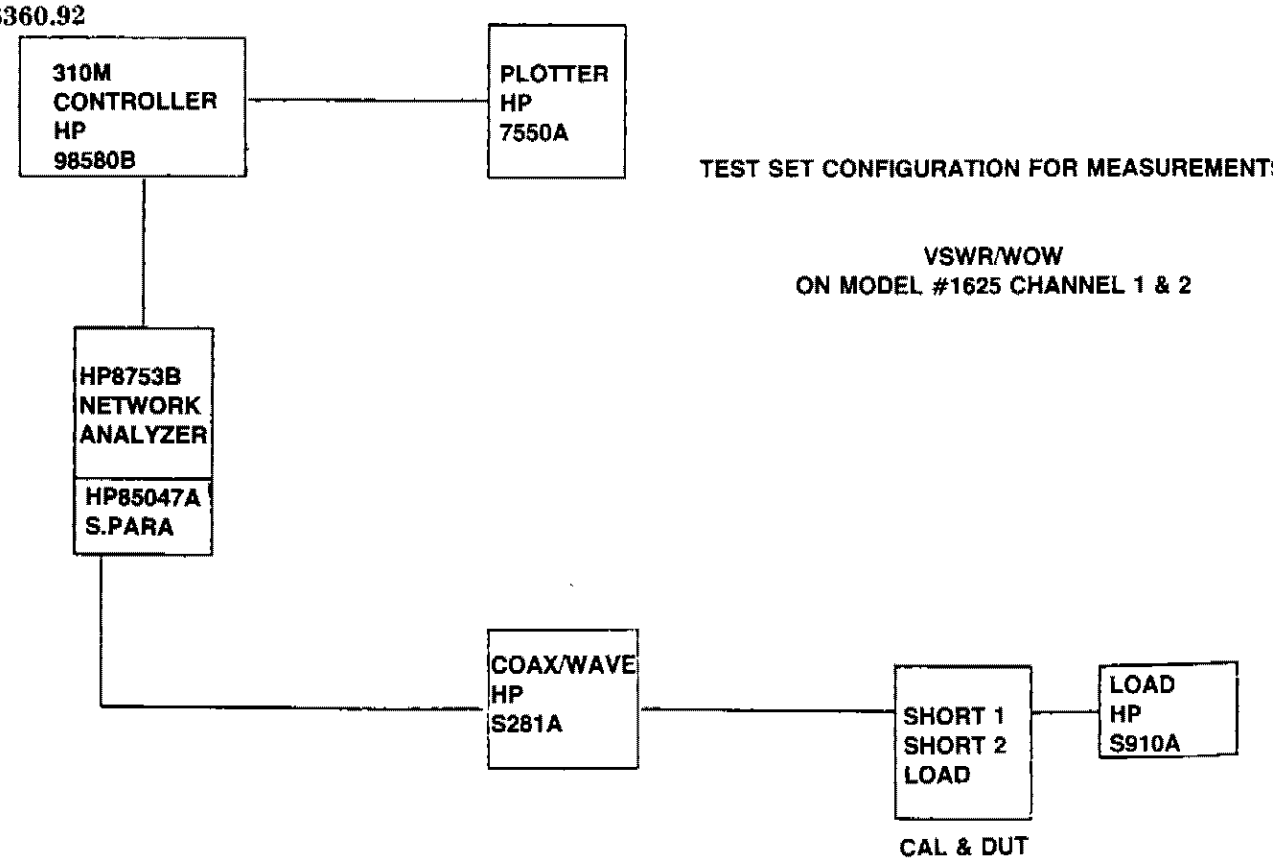
7.11.3.3 Calibrate the Analyzer for a zero dB reference on one channel (Channel 1 of HP 8753B dual channel calibration). Connect the rotary joint as in Figure 7-5.

7.11.3.4 Rotate the rotary joint slowly through 360 degrees to the position of minimum VSWR. (Record) Store trace to memory of Analyzer.

7.11.3.5 Rotate the rotary joint 360 degrees and observe and record the maximum VSWR, (Record). Plot trace and record.

7.11.3.6 Subtract minimum from maximum VSWR values at the frequency of Maximum difference and record as "(Max.–Min.) Difference (WOW)" (Record).

7.11.3.7 The mazimum Channel 3 VSWR shall not exceed 1.20:1 and maximum VSWR WOW shall be 0.05 or less.

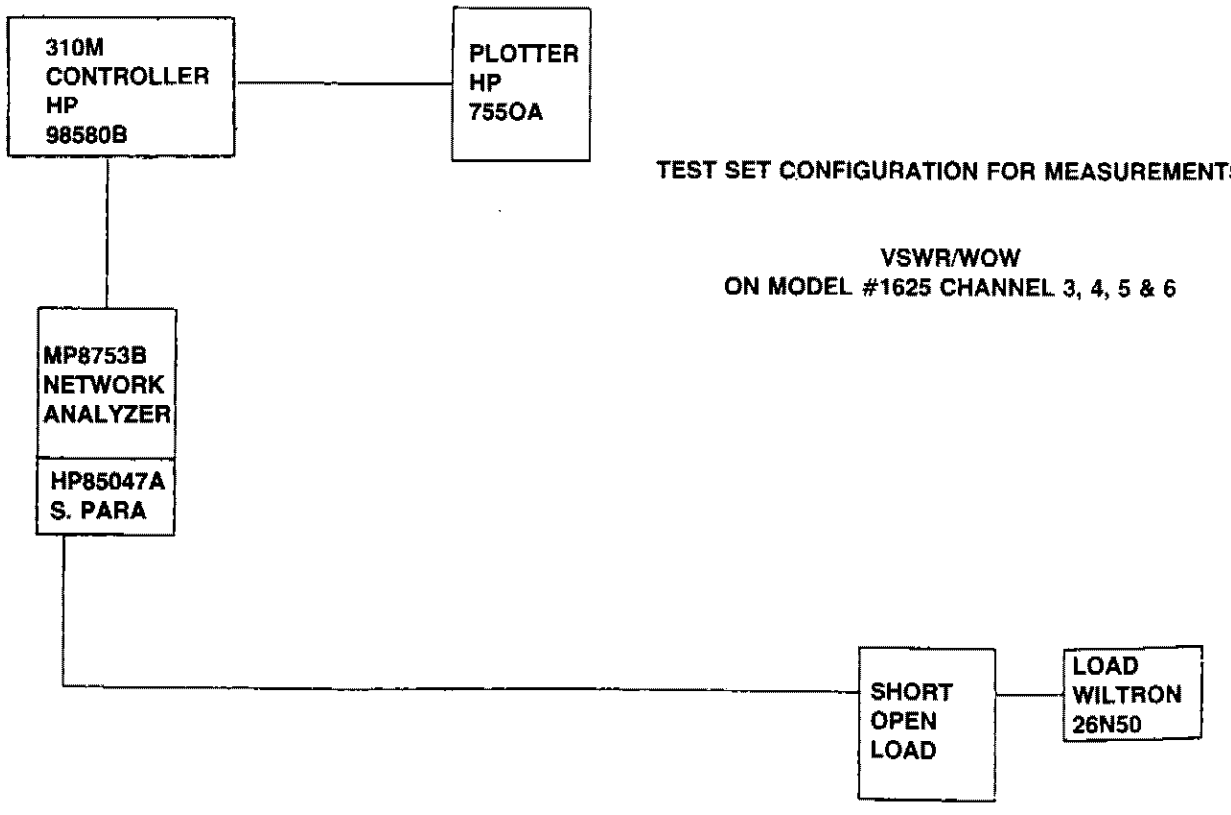


TEST SET CONFIGURATION FOR MEASUREMENTS

VSWR/WOW
ON MODEL #1625 CHANNEL 1 & 2

FIGURE 7-4

DUT is The Device Under Test Which is the Rotary Joint.
CAL is The Odb Reference Calibration with the Short 1, 2 and Load



TEST SET CONFIGURATION FOR MEASUREMENTS

VSWR/WOW
ON MODEL #1625 CHANNEL 3, 4, 5 & 6

FIGURE 7-5

7.11.4 VSWR Test for Channels 4, 5, and 6.—The following paragraphs detail the procedure for testing the VSWR and the VSWR WOW (VSWR variation with rotation) of channels 4, 5, and 6 of the rotary joint.

7.11.4.1 Connect the test equipment as shown in Figure 7-5 for Channel 4.

7.11.4.2 Set Ch. 1 of Analyzer for a level sweep from 1.025 to 1.035 GHz, set Ch. 2 of Analyzer for Level Sweep from 1.085 to 1.095 GHz.

7.11.4.3 Calibrate the Analyzer for a zero dB reference on both channels. (Channel 1 and 2 of the HP8753B Dual channel calibration). Connect the rotary joint as shown in Figure 7-5.

7.11.4.4 Rotate the rotary joint slowly through 360 degrees to the position of minimum VSWR. Record. Store trace to memory of Analyzer.

7.11.4.5 Rotate the rotary joint through 360 degrees and observe and record the Maximum VSWR. Plot trace and record.

7.11.4.6 Subtract minimum from maximum values in the two test bands at the frequency of Maximum Difference and record as "(Max.–Min.) Difference (WOW)."

7.11.4.7 Repeat 7.11.4.3 thru 7.11.4.6 for Channel 5.

7.11.4.8 Repeat 7.11.4.3 thru 7.11.4.6 for Channel 6.

7.11.4.9 The maximum VSWR specification is 1.20:1. The maximum VSWR WOW specification is 0.07

7.11.5 Insertion Loss Test for Channels 1 and 2.—The following paragraphs detail the procedure for measuring the insertion loss of channels 1 and 2 of the rotary joint.

7.11.5.1 Connect the test equipment as shown in Figure 7-6.

7.11.5.2 Set for a level sweep from 2.7 to 2.9 GHz, set source power to +20 dbm.

7.11.5.3 Connect the Waveguide Pads together and calibrate the Analyzer for a zero dB reference.

7.11.5.4 Insert Channel 1 into the test set-up and rotate the rotary joint to the point of maximum loss. Set Marker Search to show Maximum Loss Value of trace. Plot this data.

7.11.5.5 The specification for Channel 1 Insertion Loss is 0.20 dB.

7.11.5.6 Remove Channel 1 from the test set-up and insert Channel 2.

7.11.5.7 Repeat 7.11.5.4 for Channel 2.

7.11.5.8 The specification for Channel 2 Insertion Loss is 0.50 dB.

7.11.6 Insertion Loss Test for Channel 3.—The following paragraphs detail the procedure for measuring the insertion loss of channel 3 of the rotary joint.

7.11.6.1 Connect the test equipment as shown in Figure 7-7.

7.11.6.2 Set for a level sweep from 2.7 to 2.9 GHz. Set source power to +20 dbm.

7.11.6.3 Connect the two 10 dB Pads together and calibrate the analyzer for a zero dB reference.

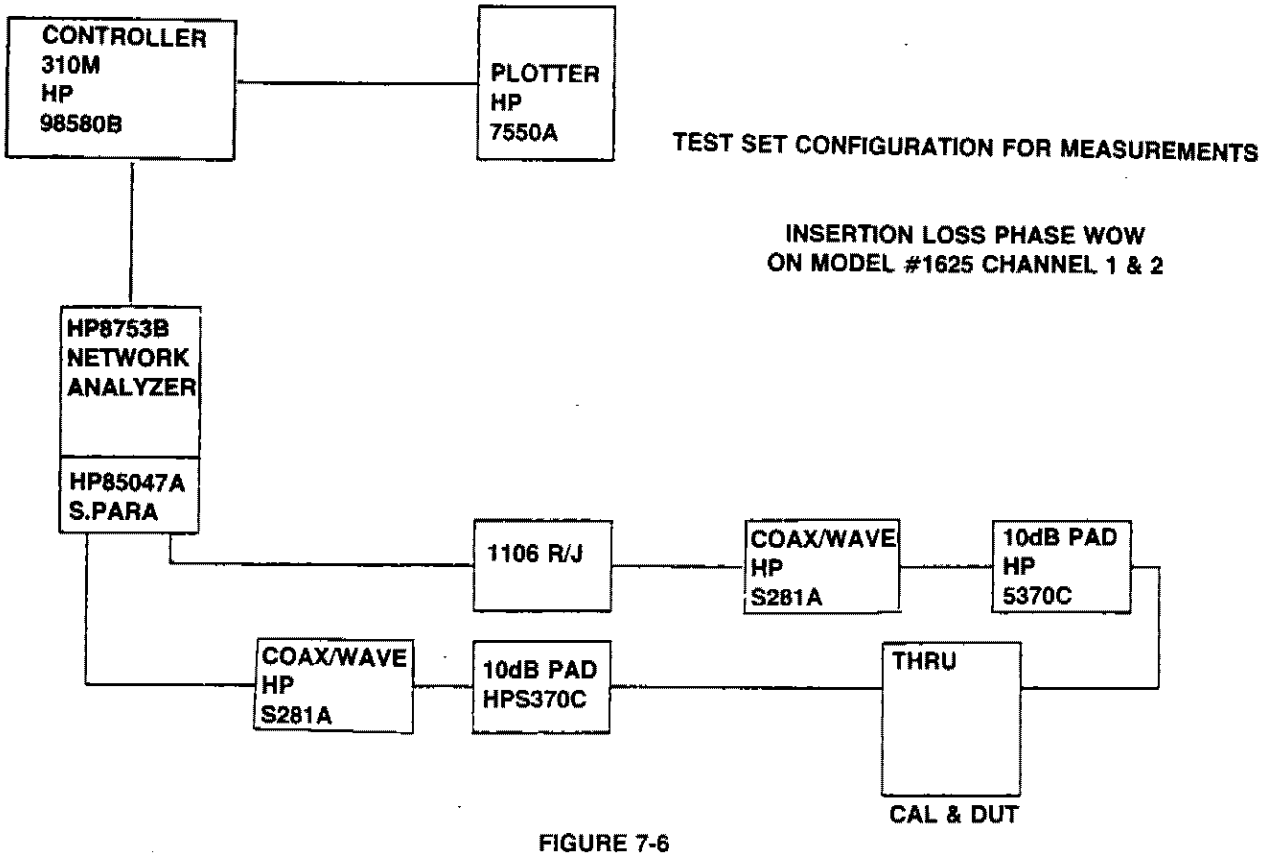


FIGURE 7-6

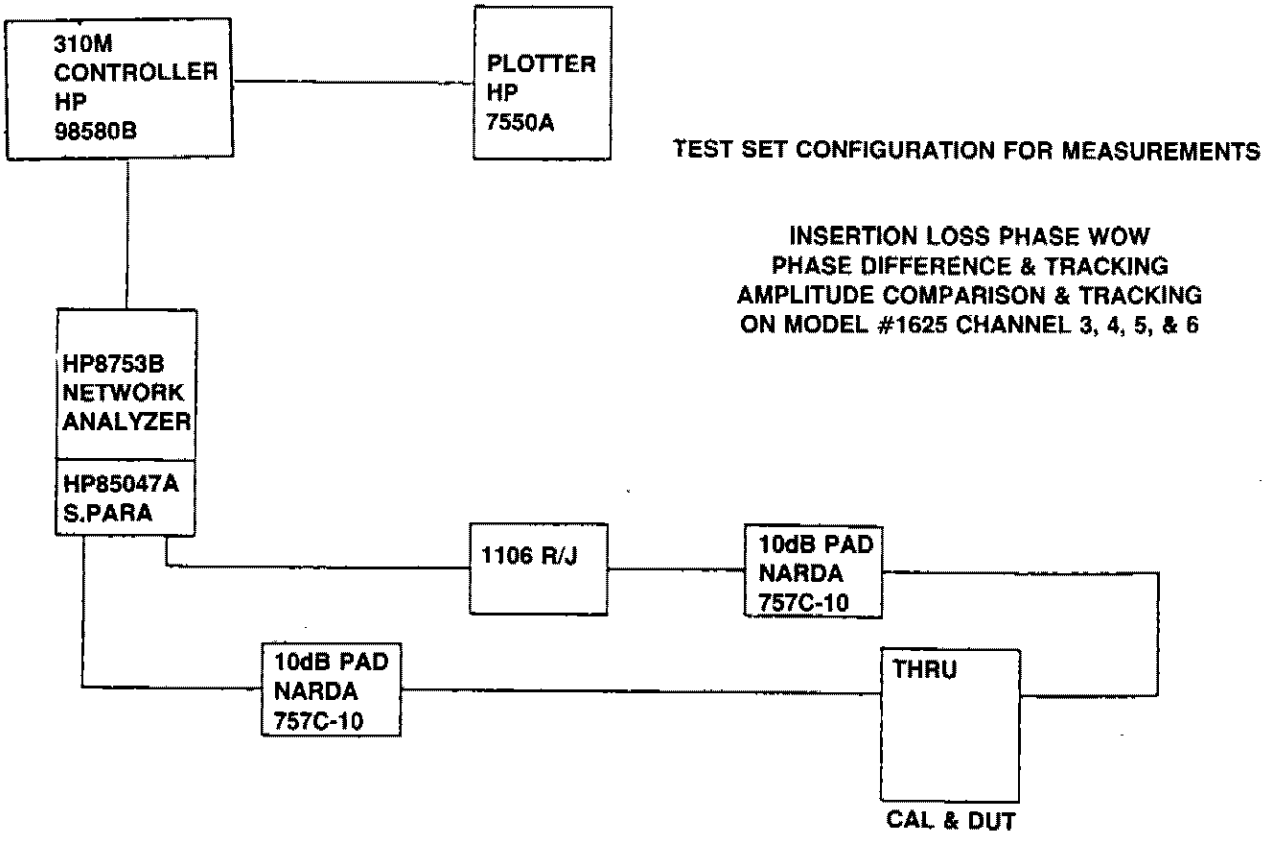


FIGURE 7-7

7.11.6.4 Insert Channel 3 into the test set-up and rotate to the point of maximum insertion loss.

7.11.6.5 Set Marker Search to show maximum loss value. Plot this data.

7.11.6.6 The specification for Channel 3 maximum Insertion Loss is 0.75 dB.

7.11.7 Insertion Loss Test for Channels 4, 5, and 6.—The following paragraphs detail the procedure for measuring the insertion loss of channels 4, 5, and 6 of the rotary joint.

7.11.7.1 Connect the test equipment as shown in Figure 7-7.

7.11.7.2 Set for a level sweep from 1.025 to 1.095 GHz. Set frequency markers at 1.035 and 1.085 GHz.

7.11.7.3 Connect the 10 dB Pads together and calibrate the Analyzer for a zero dB reference.

7.11.7.4 Insert Channel 4 into the test set-up and rotate the rotary joint to the point of maximum loss.

7.11.7.5 Set Marker Search to find the maximum loss values for each of the two bands. Record these values on the Plotted Data Sheet.

7.11.7.6 Remove Channel 4 from the test set-up and insert Channel 5. Repeat 7.11.7.4 and 7.11.7.5.

7.11.7.7 Remove Channel 5 from the test set-up and insert Channel 6. Repeat 7.11.7.4 and 7.11.7.5.

7.11.7.8 The specification for Channel 4, 5 and 6 maximum Insertion Loss is 1.0 dB. (Note 1)

NOTE 1: Throughout the frequency range from 1025.0 to 1035.0 MHz, the insertion loss of sections 4 and 5 shall be the same to within 0.2dB and the phase match through each of these sections shall be the same to within 2.0 degrees. Throughout the frequency range from 1085 to 1095 MHz, the insertion loss of sections 4 through 6 shall be the same to within 0.2dB and the phase match through each of these sections shall be the same to within 2.5 degrees.

7.11.8 Phase Difference Change over 360° Rotation.—(Channels 1, 2, 3, 4, 5 and 6)

7.11.8.1 Connect the test equipment as shown in Figure 7-6.

7.11.8.2 Set for a level sweep from 2.7 to 2.9 GHz, set Source Power to +20 dbm.

7.11.8.3 Set the HP 8753B for Parameter "S21". Adjust the phase scale to .50°/div. Connect Ch. 1 of Rotary Joint to the test set-up. Set the Rotary Joint to 0° angle, calibrate Channel 1 to read 0° phase reference. Rotate the Rotary Joint 360° and find the minimum phase reading and store under memory. Rotate the Rotary Joint 360° and find the maximum phase reading and plot trace. Maximum specification of the phase difference between MAX + MIN phase readings is 5° per 360° and Max rate of change in 30° rotation.

7.11.8.4 Disconnect Channel 1 and connect Channel 2 of Rotary Joint to the test set and repeat 7.11.8.3.

7.11.8.5 Connect equipment as in Figure 7-7 and connect Channel 3 of Rotary Joint to the test set-up and repeat Para. 7.11.8.2 and 7.11.8.3.

7.11.8.6 Set for a Level Sweep from 1.025 to 1.095 GHz, set source power to +20 dbm.

7.11.8.7 Repeat 7.11.8.3 for Channel 4 with the specification: 4° Max. Phase Difference and Max rate of change in 30° rotation.

7.11.8.8 Disconnect Channel 4 and connect Channel 5 and repeat 7.11.8.3.

7.11.8.9 Disconnect Channel 5 and connect Channel 6 and repeat 7.11.8.3.

7.11.9 Phase and Amplitude Tracking Test Setup for Channels 4, 5, and 6.—The following paragraphs detail the procedure for measuring the phase and amplitude tracking errors between channels 4 and 5 and between channels 4 and 6.

NOTE: The following Test is designed to compare the relative difference in rotating Phase Length of Channels 4, 5, and 6.

7.11.9.1 Connect the test equipment as shown in Figure 7-7. This is the test for Channel 4 Phase Length as a reference against which the other two channels are compared. (Channels 5 & 6)

7.11.9.2 Set for a level sweep from 1.025-1.095 GHz, set source power to +20 dbm. Set frequency markers at 1.035 and 1.085 GHz.

7.11.9.3 Set the HP 8735B for Parameter "S21". Set the 8753B display to split screen to show phase on top and Amplitude on bottom. Adjust the Phase scale to .5 degree/div, AMP. Scale .05dB/div. Connect Channel 4, calibrate channel 4 to provide a 0° phase reference. This establishes Channel 4 Phase Length as the reference against which Channels 5 and 6 Phase Lengths will be compared.

7.11.9.4 Connect to Channel 5. Without changing any control settings, read the Phase Angle. Plot trace and record. The specification for maximum Phase Difference is 2.5 degrees between 1.085-1.095 GHz and 2.0 degrees between 1.025-1.035 GHz.

7.11.9.5 For Amplitude Comparison, set markers at maximum values in both bands. Plot trace and record under Amplitude Comparison Channel 4 to 5. The specification is .2dB max.

7.11.9.6 For phase tracking, rotate the rotary joint through 360 degrees. Store in memory, the maximum phase difference then rotate to the minimum phase difference. Plot this on the test data sheets and record as Ch 4. to 5 Phase tracking. The specification is 2.0 degrees @ 1.025-1.035 GHz and 2.5 @ 1.085-1.095 GHz.

7.11.9.7 For Amplitude tracking, calibrated for Amplitude on the split screen. Plot on test data sheet and record under Amplitude tracking. The specification is .2 dB max.

7.11.9.8 Connect to Ch. 6 and repeat paragraph 7.11.9.3—7.11.9.7. Specification for MAX phase difference is 2.0 @ 1.025-1.035 GHz and 2.5 @ 1.085-1.095 GHz.

7.11.9.9 Review the LOSS data under 7.11.7.5-7.11.7.7.

7.11.9.10 Review the data of 7.11.9.5-7.11.9.8 Amplitude Comparison and compare LOSS DATA and record the largest values as MAXIMUM LOSS DIFFERENCE.

7.11.9.11 The maximum loss difference specification is 0.20 dB.

7.11.9.12 It should be noted that the Amplitude Tracking Data is the maximum loss variation between channels through 360 degress rotation.

7.11.10 Slip Ring Test.—The following paragraphs detail the procedure for measuring continuity and channel to channel isolation of the rotary joint slip ring.

7.11.10.1 Verify continuity of each of the 12 slip ring channels of the stator and rotor slip ring connectors. Using a multimeter measure the resistance between pin A of 8A1J1 and pin A of 8A1J2. (See Fig. 10-1) The resistance should be nominally zero ohms. Repeat for pin B to pin B, etc., through pin M to pin M.

7.11.10.2 Verify isolation between adjacent slip rings by measuring the resistance between adjacent pins on the stator slip ring connector. Using an insulation tester measure the resistance between pins A and B of 8A1J1. (See Fig. 10-1) The resistance should be 100 megohms or higher. Repeat for pins B and C, C and D, etc., through pins L and M.

7.11.11 Azimuth Pulse Generator (APG) Tests—The following paragraphs detail the procedure for measuring jitter.

7.11.11.1 Connect Encoder Test Set (FA-10256) to the two connectors at the bottom of the rotary joint as shown in Figure 7-8. Apply power (5 volt power supply). Observe the volt-meter reading. It must read 5.00 volts plus or minus .05 volts.

7.11.11.2 Set selector switch to "APG 1". Rotate the rotary joint at 12.5 RPM plus or minus 1 RPM. (1 revolution every 4.8 seconds.)

7.11.11.3 Adjust counter to measure "Period" with 12 bit ACP Cable connected to counter Channel A.

7.11.11.4 Observe count reading for at least 2 minutes, counting at a rate of approximately 1 per second for a minimum of 120 counts. Note and record maximum and minimum count values. Read corresponding jitter values from the 12 bit chart (Figure 7-9) for each and subtract the two values. Record jitter on the test data sheet. The jitter specification is +/-10% (plus or minus 10%).

7.11.11.5 Readjust counter for "Ratio" with (APG1) 12 bit ARP pulse connected to Channel B as well as 12 bit ACP Pulse on Channel A.

7.11.11.6 The counter will read "4096". Record on data sheet.

7.11.11.7 Adjust counter to measure "Period" with 14 bit ACP cable connected to counter Channel A.

7.11.11.8 Observe count reading for at least 2 minutes to get a minimum of 120 counts. Note and record maximum and minimum count values. Find corresponding jitter values from 14 bit chart (Figure 7-10) for each and subtract the two. Record jitter data on test data sheet. The specification is +/-10 (plus or minus 10%).

7.11.11.9 Readjust the counter for "Ratio" with (APG1) 14 bit ARP Pulse connected to Channel B as well as 14 bit ACP Pulse on Channel A.

7.11.11.10 The counter will read "16,384." Record on test data sheet.

7.11.11.11 Set Selector Swith to "APG2".

7.11.11.12 Repeat Paragraphs 7.11.11.3 through 7.11.11.10 replacing reference to (APG1) with (APG2).

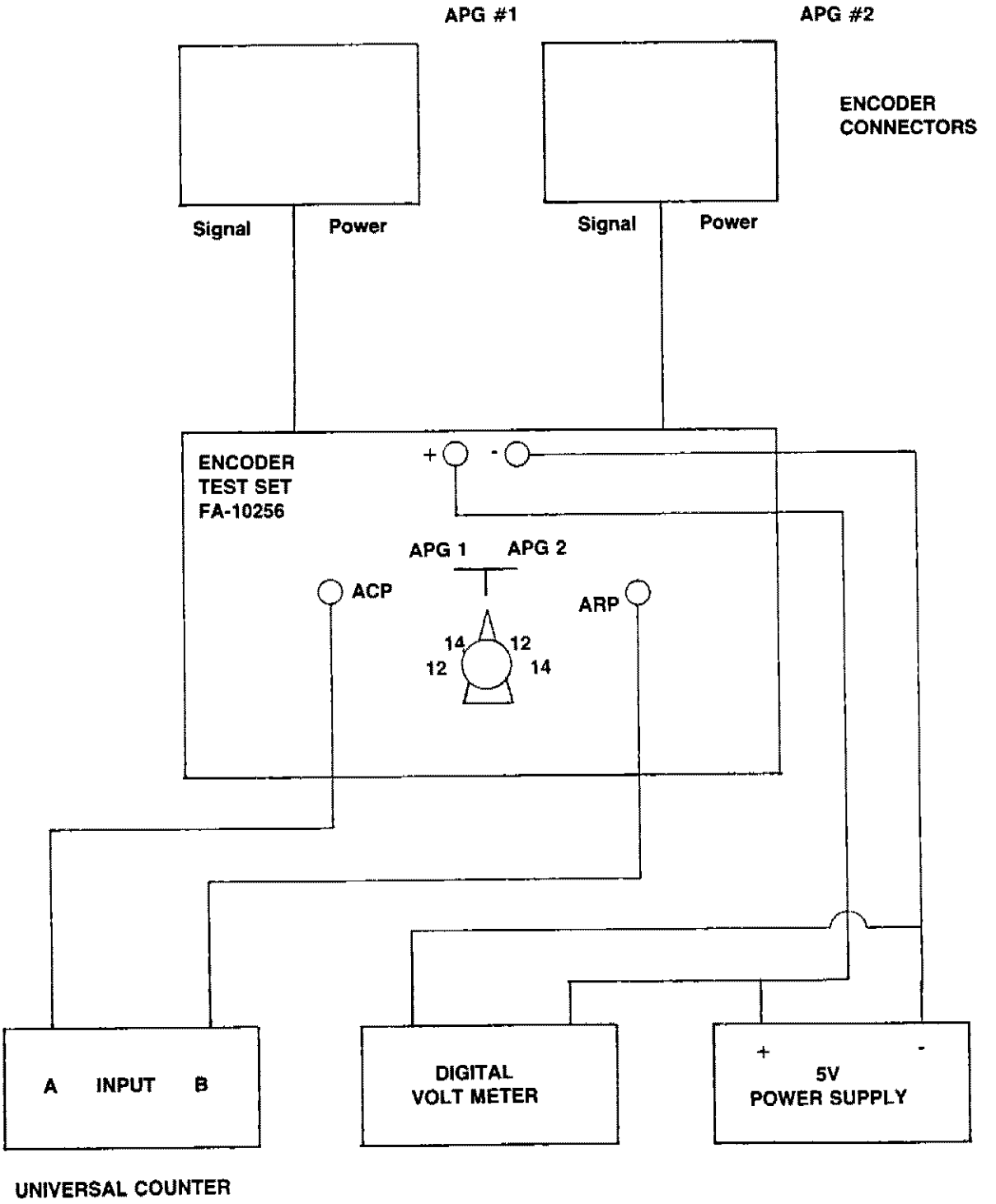
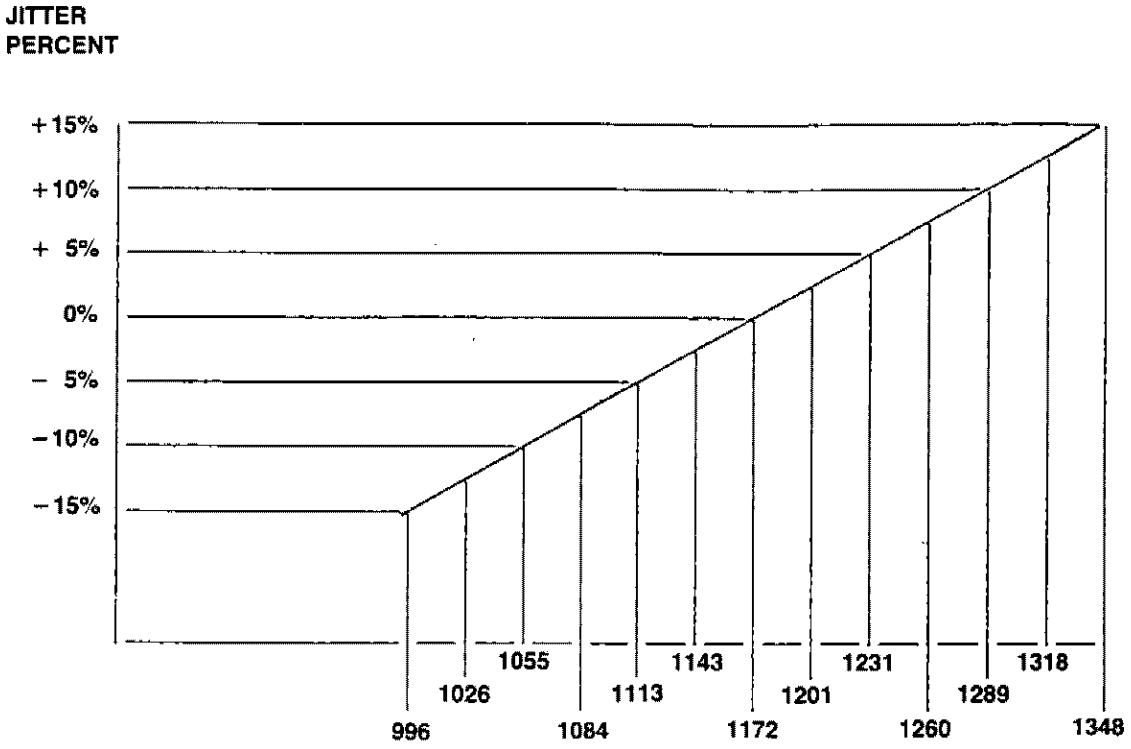


FIGURE 7-8
APG TEST CONFIGURATION



PULSE PERIOD (MICROSEC.) 12 BIT

FIGURE 7-9

PULSE PERIOD VS. JITTER

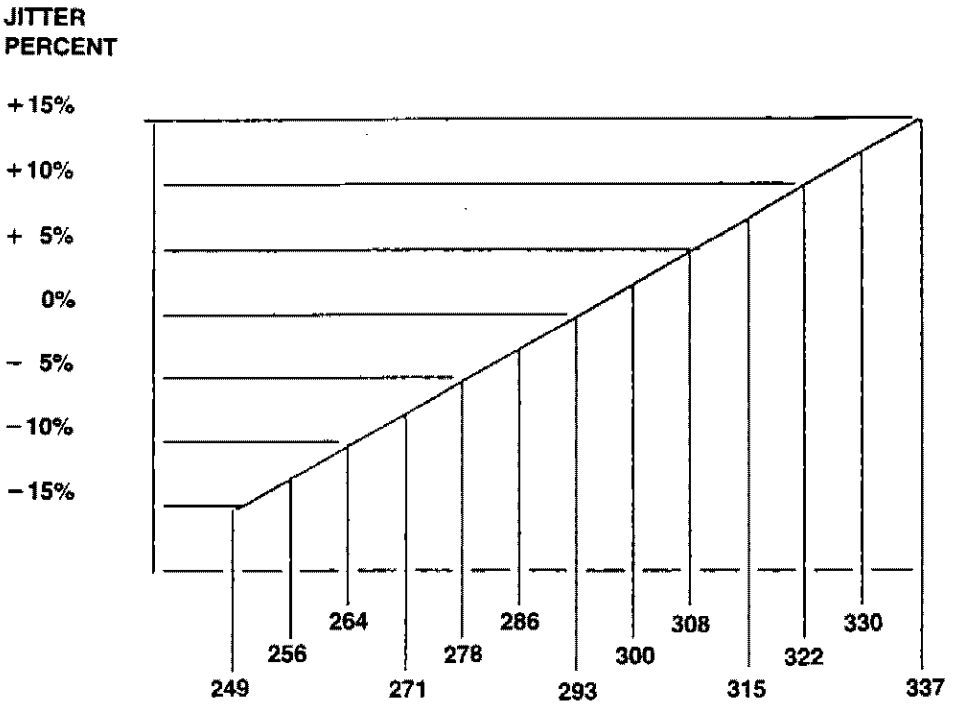


FIGURE 7-10

PULSE PERIOD VS. JITTER

SECTION 8
PARTS LIST

8.1 GENERAL.—

This section contains a list of all assemblies, subassemblies, electrical components and certain mechanical parts used in the six-path ASR rotary joint for depot maintenance (overhaul).

8.2 LIST OF MANUFACTURERS.—

The manufacturers are listed by Federal Supply Code in table 8-1. The name and address of each manufacturer is provided opposite the corresponding manufacturer's code.

TABLE 8-1. LIST OF MANUFACTURERS

Code		Code		Code	
02310	ABSCOA Industries 1071 West Arbor Vitae Street Inglewood, CA 90301	79136	Waldes Truarc 29-01 Borden Ave Long Island City, NY 11101	02697	Parker Corporation O-Ring Division 2360 Palumbo Drive Lexington, KY 40509
13511	AMPHENOL Conn. Systems 900 Commerce Drive Oak Brook, IL 60521	92180	Tru Connector Corp. 245 Lynnfield Street Peabody, MA 01960	53421	Tyton Corp. Milwaukee, WI 53224
25634	Kevlin Microwave Corp. 5 Cornell Place Wilmington, MA 01887	13201	Helical Products Company Inc. P.O. Box 1460, 901 McCoy Lane Santa Maria, CA 03456		
06540	Mite Corp. (Amatom Division) 446 Blake Street New Haven, CT 06515	11649	Cajon Company 32550 Old South Miles Road Solon, OH 44139		
00141	PIC P.O. Box 335, Benrus Center Ridgefield, CT 06877				

8.3 PARTS LIST.—

The parts list of Table 8-2 contains the information necessary to identify and order electrical components and replaceable mechanical parts used in the rotary joint for depot maintenance.

8.3.1 Reference Designation (column 1).—The column headed REFERENCE DESIGNATION contains a reference designation number for each item referenced in text or in illustrations in this volume. The reference numbers, minus the prefix "8A1", are included in Figure 10-3.

8.3.2 Indenture Letter (column 2).—This column is used to show the top down breakdown. The end item is indicated by "A". All other items are then ident related to the end article.

8.3.3 Name of Component and Description (column 3).—This column describes each item in the parts list.

8.3.4 Manufacturer's Code (column 4).—This column contains the Federal Supply Code Number for the manufacturer of the component. Table 8-1 contains the name and address of the manufacturer associated with a particular code.

8.3.5 Manufacturer's Part Number (column 5).—This column contains the part number or specification control drawing number assigned by the manufacturer or fabricator of each component. Certain items in the system have a "type" or "style" number that is applied by the vendor but may not be sufficient for ordering replacement parts. Kevlin Microwave Specification Control Drawing Numbers are listed immediately below these type numbers and should be referenced when replacement parts are ordered, or the parts may be ordered from Kevlin by using only the Kevlin Specification Control Drawing Number.

TABLE 8-2. PARTS LIST (For Figure 10-3).

Ref. Desig.	Indent	NAME OF PART/ DESCRIPTION	Mfrs. Code #	JAN/MIL Mfrs. Part #	QTY.
8A1	A	Six-Path ASR Rotary Joint	25634	1625	1
8A1MP1	B	Stator Slip Ring Hsg. Comp.	25634	J1618-1G1	1
8A1MP2	B	Rotor Housing	25634	J1618-2G1	1
8A1MP3	B	Post Assy Ch #1	25634	C1618-70G1	1
8A1MP4	B	Post Assy Ch #1	25634	C1618-70G2	1
8A1MP5	B	Cstg. W/G Trans. Ch. 2 Comp.	25634	J1618-4G1	1
8A1MP6	B	Cstg. W/G Trans. Ch 2 Comp.	25634	J1618-28G1	1
8A1MP7	B	Slip Ring Access Cover	25634	C1618-7	1
8A1MP8	B	Housing Choke Ch #1	25634	C1618-9	1
8A1MP9	B	Sleeve, Choke Ch #2, #1	25634	B1618-11	1
8A1MP10	B	Sleeve, Choke Ch. #2 #2	25634	B1619-12	1
8A1MP11	B	Sleeve, Choke Ch. #1, #2	25634	B1618-13	1
8A1MP12	B	Slip Ring Support	25634	D1618-14G1	1
8A1MP13	B	Bearing Support Clamp	25634	C1618-15	1
8A1MP14	B	Locking Ring	25634	B1618-16	1
8A1MP15	B	Cstg. Conn. Hsg. Rotor Comp.	25634	J1618-17G1	1
8A1MP16	B	Sleeve, Choke Assy	25634	C1618-8G1	1
8A1MP17	B	Bearing Retainer	25634	D1618-18G1	1
8A1MP18	B	Gasket, Terminal Ring	25634	C1618-19	1
8A1MP19	B	Cover, Connector	25634	B1618-20P1	6
8A1MP20	B	Interface Plate	25634	D1618-21	1

Ref. Desig.	Indent	NAME OF PART/ DESCRIPTION	Mfrs. Code #	JAN/MIL Mfrs. Part #	QTY.
8A1MP21	B	Bearing, Ball Duplex Pair	25634	C1619-31	1
8A1MP22	B	Bearing, Ball Conrad Type	25634	B1619-23	1
8A1MP23	B	Locking Ring	25634	B1618-24	1
8A1MP24	B	Ctr Cond Assy Ch #1	25634	D1618-25G1	1
8A1MP25	B	Heat Shrinkable Tubing	25634	C8000-389P5	3
8A1MP26	B	Housing Bearing	25634	D1618-5G1	1
8A1MP27	B	Pad, Interface Plate	25634	B1618-34	1
8A1MP28	B	Gasket, Interface Plate	25634	C1618-35	1
8A1MP29	B	Shield	25634	C1618-36	1
8A1MP30	B	Outer Conductor Ch 3 Stator	25634	C1619-27	1
8A1MP31	B	Encoder 12/14 Bit	25634	C1624-110	2
8A1MP32	B	Encoder Connector Assembly	25634	D1625-15G1	1
8A1MP33	B	Encoder Connector Assembly	25634	D1625-15G2	1
8A1MP34	8	Insulator, Teflon	25634	A1619-85	1
8A1MP35	B	Insulator, Teflon	25634	A1619-86	1
8A1MP36	B	Sleeve, Teflon	25634	A1619-41	1
8A1MP37	B	Support, Teflon	25634	A1618-42	4
8A1MP38	B	Center Conductor Assy. Ch 2	25634	C1619-43G1	1
8A1MP39	B	Access Cover, Gear Box	25634	D1619-46	2
8A1MP40	B	Module Locating Bar	25634	C1618-68	1
8A1MP41	B	Cover W/G Flange	25634	C1618-48P1	3
8A1MP42	B	Termination Waveguide	25634	B1618-66G1	1
8A1MP43	B	Casting, Encoder Housing Comp	25634	J1619-54G1	1
8A1MP44	B	Ctr. Cond. Assy. Ch. 3, Rotor	25634	B1619-55G1	1
8A1MP45	B	Bead, Teflon .118/.390 D Type N	25634	A416A-29P2	2
8A1MP46	B	Bead, Teflon .118/.390 D Type N	25634	A416A-30	2
8A1MP47	B	Conn Shell Type "N" Female	25634	B8000-1P5	2
8A1MP48	B	Plate Identification	25634	C1625-72	1
8A1MP49	B	Rd. Hd. Drive Screw (All Metal)	25634	1/4 × 3/16 LG	4

TABLE 8-2. PARTS LIST (Continued)

Ref. Desig.	Indent	NAME OF PART/ DESCRIPTION	Mfrs. Code #	JAN/MIL Mfrs. Part #	QTY.
8A1MP50	B	Ring, Terminal	25634	D1618-101G1	1
8A1MP51	B	12 Cir Slip Ring Assy	25634	D1618-100P1	1
8A1MP52	B	6 Cir Brush Block Odd #1-#11	25634	D1618-100P2	1
8A1MP53	B	6 Cir Brush Block Even #2-#12	25634	D1618-100P3	1
8A1MP54	B	Choke, Outer	25634	B1619-24G1	1
8A1MP55	B	Ctr Cond Assy Ch 3, Stator	25634	B1619-25G1	1
8A1MP56	B	Cap & Chain "AN" 1 3/4-18UNEF	25634	MS25043-28D	2
8A1MP57	B	Gasket, MS Conn Fluorosilicone	25634	A8000-442	2
8A1MP58	B	Carbon Face Seal, Cup Assy.	25634	D8000-305P1	1
8A1MP59	B	Carbon Face Seal, Wear Ring	25634	D8000-305P2	1
8A1MP60	B	Spring Pin .062D × .250L (PIC)	00141	C3-4	2
8A1MP61	B	Encoder Cleat	25634	A1619-84	8
8A1MP62	B	1/4 Male //Hex Nipple (Cajon)	11649	-4-HN-SS	2
8A1MP63	B	1/4 Female Pipe Cap (Cajon)	11649	-4-CP-SS	2
8A1MP64	B	Retaining Ring (Waldes)	79136	N5000-112H	2
8A1MP65	B	Pinon Gear Clamp Type Hub	25634	C1619-21	1
8A1MP66	B	Anti-Backlash Gear CL Type Hub	25634	C1619-20	2
8A1MP67	B	Cap & Chain "N" (Amphenol)	13511	82-106	6
8A1MP68	B	Cap (MS3181-14CA) & Chain 5, 5L	25634	C1639-35G1	2
8A1MP69	B	O'Ring, Fluorosilicone, (Parker)	02697	2-033L946-60	1
8A1MP70	B	O'Ring, Fluorosilicone, (Parker)	02697	2-023L946-60	6
8A1MP71	B	O'Ring, Fluorosilicone, (Parker)	02697	2-030L946-60	1
8A1MP72	B	O'Ring, Fluorosilicone, (Parker)	02697	2-032L946-60	2
8A1MP73	B	O'Ring, Fluorosilicone, (Parker)	02697	2-034L946-60	2
8A1MP74	B	O'Ring, Fluorosilicone, (Parker)	02697	2-036L946-60	1
8A1MP75	B	O'Ring, Fluorosilicone, (Parker)	02697	2-038L946-60	1
8A1MP76	B	O'Ring, Fluorosilicone, (Parker)	02697	2-140L946-60	2
8A1MP77	B	O'Ring, Fluorosilicone, (Parker)	02697	2-154L946-60	1
8A1MP78	B	O'Ring, Fluorosilicone, (Parker)	02697	2-156L946-60	1

Ref. Desig.	Indent	NAME OF PART/ DESCRIPTION	Mfrs. Code #	JAN/MIL Mfrs. Part #	QTY.
8A1MP79	B	O'Ring, Fluorosilicone, (Parker)	02697	2-160L946-60	2
8A1MP80	B	O'Ring, Fluorosilicone, (Parker)	02697	2-025L946-60	1
8A1MP81	B	O'Ring, Fluorosilicone, (Parker)	02697	2-166L946-60	1
8A1MP82	B	O'Ring, Fluorosilicone, (Parker)	02697	2-278L946-60	1
8A1MP83	B	O'Ring, Fluorosilicone, (Parker)	02697	2-275L946-60	2
8A1MP84	B	O'Ring, Fluorosilicone, (Parker)	02697	2-346L946-60	4
8A1MP85	B	O'Ring, Fluorosilicone, (Parker)	02697	2-027L946-60	1
8A1MP86	B	O'Ring, Fluorosilicone, (Parker)	02697	2-132L946-60	1
8A1MP87	B	#10-32UNF × 1.00 Capt (Amatom)	06540	6240-SS-1032	8
8A1MP88	B	Seal Screw	25634	A1618-65	4
8A1MP89	B	1/4-28 × 1.53 Hex Seal SC (Abscoa)	02310	AB1504K14	3
8A1MP90	B	#10-32UNF × .750 Capt (Amatom)	06540	6238-SS-1032	22
8A1MP91	B	#4-40UNC × .188 Pan Hd SI		MS35233-12	6
8A1MP92	B	#4-40UNC × .375 Hex Soc Hd		MS16995-10	26
8A1MP93	B	#4-40UNC × .500 Hex Soc Hd		MS16995-11	24
8A1MP94	B	#4-40UNC × 2.00 Hex Soc Hd		4-40X2.00HS	4
8A1MP95	B	#6-32UNC × .375 Fl Hd Ph		MS51959-28	4
8A1MP96	B	#6-32UNC × .250 Fl Hd SI		MS35249-33	4
8A1MP97	B	#4-40UNC × .375 Fl Hd Ph (For initial assy. at KMC only.)		MS51959-15	6
8A1MP98	B	#6-32UNC × .375 Hex Soc Hd		MS16995-17	4
8A1MP99	B	#6-32UNC × .500 Hex Soc Hd		MS16995-18	4
8A1MP100	B	#6-32UNC × .750 Hex Soc Hd		MS16995-20	28
8A1MP101	B	#6-32UNC × .375 Hex Soc Hd		MS16995-17	8
8A1MP102	B	#8-32UNC × .375 Hex Soc Hd		MS16995-25	4
8A1MP103	B	#8-32UNC × .500 Hex Soc Hd		MS16995-26	1
8A1MP104	B	#10-32UNF × .500 Hex Soc Hd		MS16996-10	4
8A1MP105	B	#10-32UNF × .750 Fill Hd	25634	A8000-347-265	1
8A1MP106	B	1/4-28UNF × .875 Hex Hd		MS35308-307	6

TABLE 8-2. PARTS LIST (Continued)

Ref. Desig.	Indent	NAME OF PART/ DESCRIPTION	Mfrs. Code #	JAN/MIL Mfrs. Part #	QTY.
8A1MP107	B	1/4-28UNF × 1.000 Hex Hd		MS35308-308	19
8A1MP108	B	1/4-28UNF × 1.125 Hex Hd		MS35308-309	12
8A1MP109	B	1/4-28UNF × 1.250 Hex Hd		MS35308-310	4
8A1MP110	B	1/4-28UNF × 1.500 Hex Hd		MS35308-312	8
8A1MP111	B	#4 Med. Lockwasher		MS35338-135	50
8A1MP112	B	#4 Flat Washer, Reduced O.D.		NAS620C4	42
8A1MP113	B	#6 Med. Lockwasher		MS35338-136	44
8A1MP114	B	#6 Flat Washer, Reduced O.D.		NAS620C6	36
8A1MP115	B	#8 Med. Lockwasher		MS35338-137	3
8A1MP116	B	#8 Flat Washer, Reduced O.D.		NAS620C8	1
8A1MP117	B	#10 Med. Lockwasher		MS35338-138	35
8A1MP118	B	#10 Flat Washer, Reduced O.D.		NAS620C10	35
8A1MP119	B	1/4 Med. Lockwasher		MS35338-139	85
8A1MP120	B	1/4 Flat Washer, Reduced O.D.		NAS620C416	85
8A1MP121	B	1/4-20UNC × .750 Hex Hd		MS35307-306	32
8A1MP122	B	Bearing Conrad Type	25634	B1618-29	1
8A1MP123	B	Bearing Conrad Type	25634	B1619-30	2
8A1MP124	B	Single Ch. R/J (L-Band Module)	25634	21032	3
8A1MP125	B	Chain & Coupler Assy 6.0 LG	25634	C8000-390E8L5	2
8A1MP126	B	Gear Housing	25634	J1619-93G1	1
8A1MP127	B	Encoder Housing	25634	J1619-94G1	1
8A1MP128	B	Slip Ring Conn. Assy. Rotor	25634	C1387-28G1	1
8A1MP129	B	Slip Ring Conn. Assy. Stator	25634	C1387-29G1	1
8A1MP130	B	Termination, Coaxial (TRU)	92180	978	2
8A1MP131	B	Cable Assy Stator Ch. 5	25634	C1625-77G1	1
8A1MP132	B	Cable Assy Stator Ch. 4	25634	C1625-78G1	1
8A1MP133	B	Cable Assy Stator Ch. 6	25634	C1625-78G2	1
8A1MP134	B	Cable Assy Stator	25634	C1625-79G1	1
8A1MP135	B	Cable Assy Stator	25634	C1625-79G2	1

Ref. Desig.	Indent	NAME OF PART/ DESCRIPTION	Mfrs. Code #	JAN/MIL Mfrs. Part #	QTY.
8A1MP136	B	Cable Assy Stator	25634	C1625-79G3	1
8A1MP137	B	Connector Assy Rotor	25634	C1618-37G1	1
8A1MP138	B	Connector Assy Rotor	25634	C1618-37G2	1
8A1MP139	B	Connector Assy Rotor	25634	C1618-37G3	1
8A1MP140	B	Cable Assy Rotor Ch #6 & #5	25634	C1618-53G1	1
8A1MP141	B	Cable Assy Rotor Ch #6 & #5	25634	C1618-53G2	1
8A1MP142	B	Cable Assy Rotor Ch #4	25634	C1618-52G1	1
8A1MP143	B	Self-Sealing Screw	25634	A1619-120	3
8A1MP144	B	1/4-28UNF × 1.250 Hex Soc Hd		MS16996-25	4
8A1MP145	B	Shim	25634	A1639-30	1
8A1MP146	B	Adapter Plate-Encoder	25634	B1625-13	2
8A1MP147	B	1/2-20UNF, Hex Nut		MS35650-3394	2
8A1MP148	B	1/2" Med. Lockwasher		MS35338-148	2
8A1MP149	B	1/2" Flat Washer		MS15795-819	2
8A1MP150	B	O'Ring, Fluorosilicone, (Parker)	02697	2-122L946-60	2
8A1MP151	B	Plug	25634	B1625-17	2
8A1MP152	B	Encoder Clamp Assemby	25634	B1625-14G1	2
8A1MP153	B	#8-32UNC × .750 Soc Hd St Sc Rad		AN565FC8H12	2
8A1MP154	B	Adjustment Stop-Encoder	25634	A1625-11	2
8A1MP155	B	#2-56UNC × .375 Hex Soc Hd		MS16995-3	4
8A1MP156	B	#2 Med. Lockwasher		MS35338-134	4
8A1MP157	B	Motor Mount (PIC or Eq.)	00141	L2-2	8
8A1MP158	B	Mounting Ties (Schaal or EQ.)	53421	T18L	2

SECTION 9
INSTALLATION, INTEGRATION AND CHECKOUT

9.1 GENERAL.—

This section is not applicable as the function of the depot maintenance volume is the complete disassembly and replacement of parts not installation, integration and checkout.

SECTION 10
TROUBLESHOOTING SUPPORT DATA

10.1 GENERAL.—

This section contains exploded views, and wiring diagrams for components of the rotary joint. Illustration in this section are arranged in ascending reference designation sequence and are also assigned figure numbers.

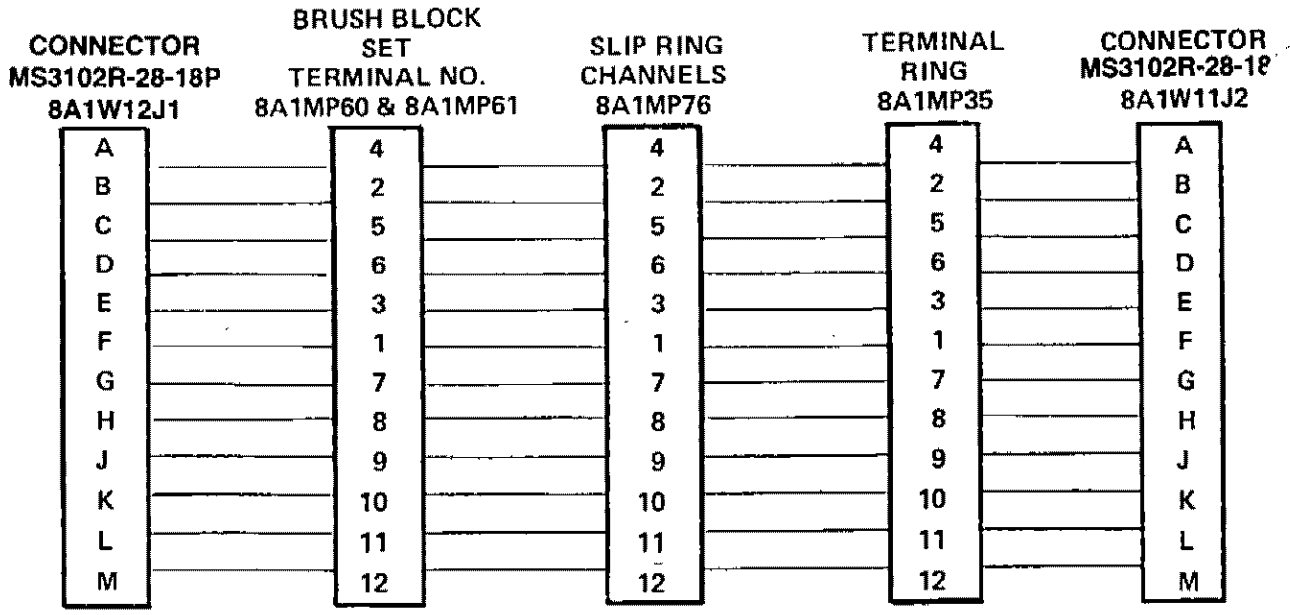


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Figure 10-1. Slip Ring Wiring Diagram

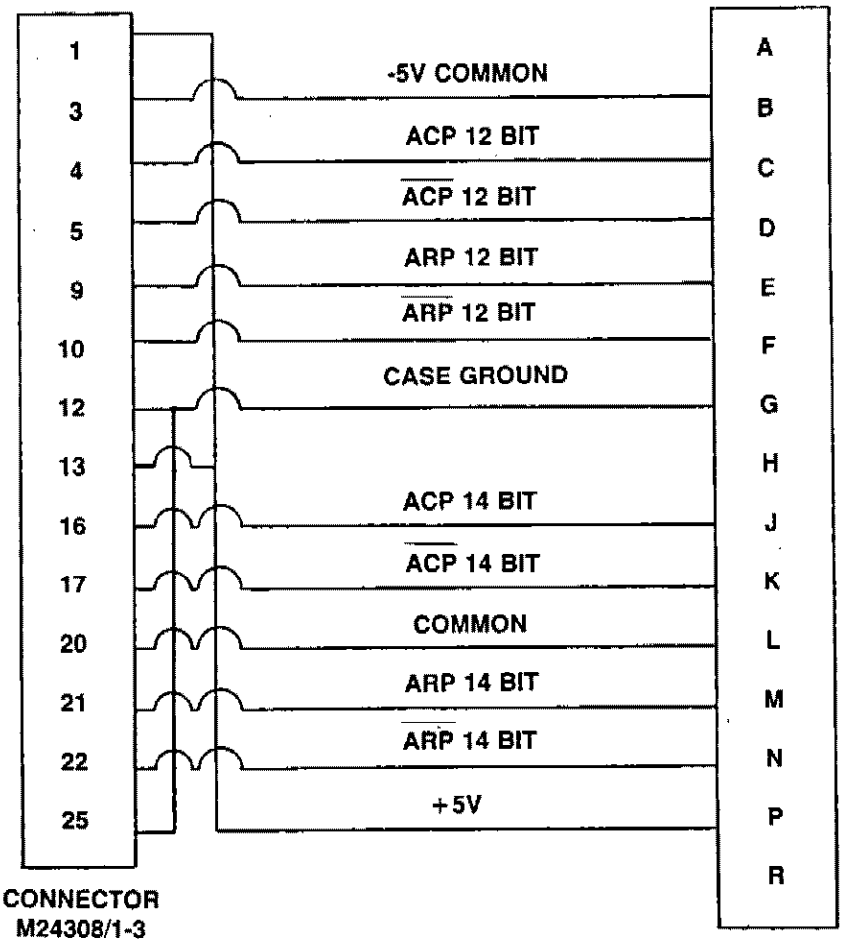

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Figure 10-2. Encoder Wiring Diagram

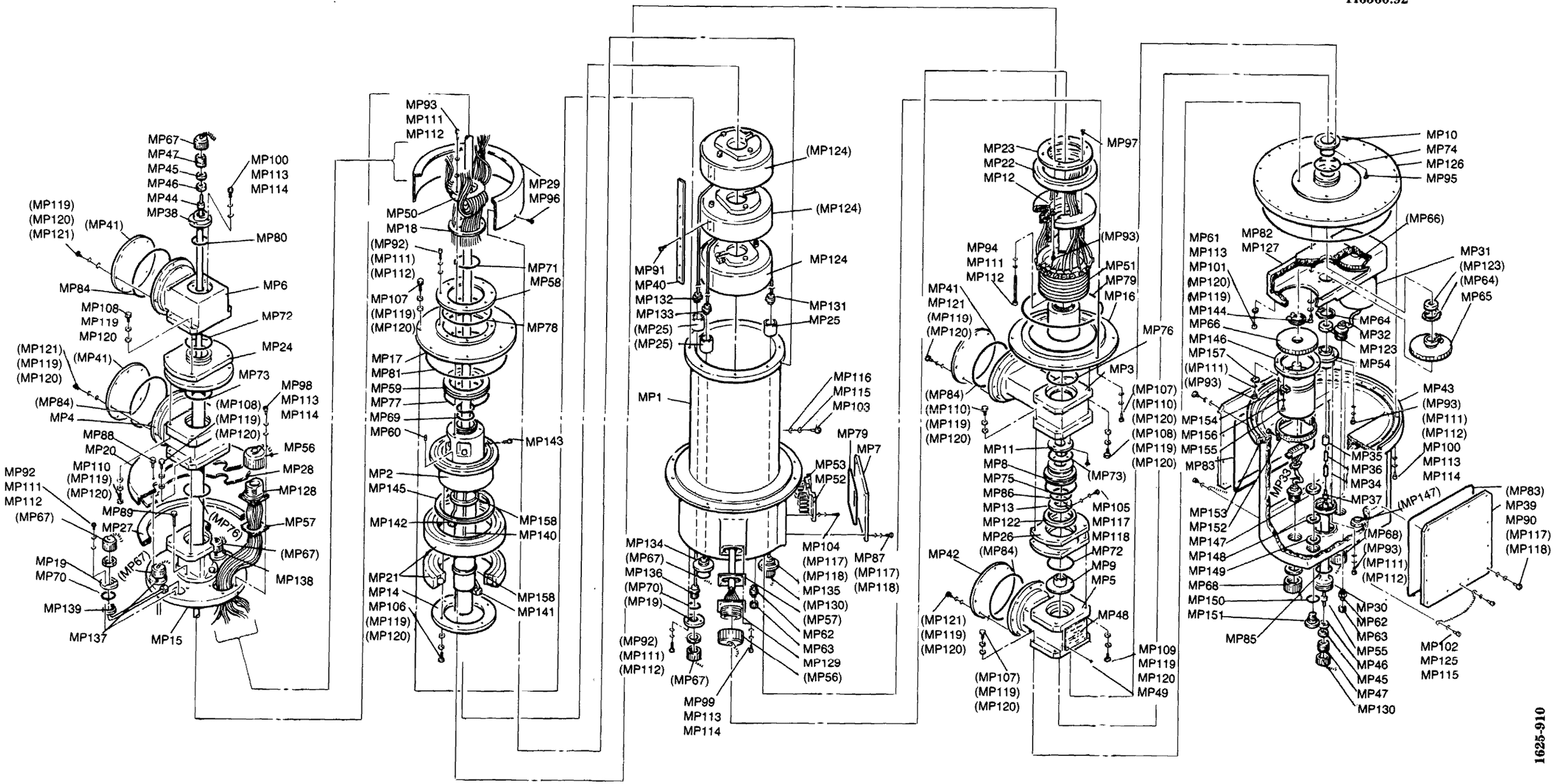

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FIG. 10-3 SIX PATH ROTARY JOINT PARTS LOCATION

SECTION 11
COMPUTER SOFTWARE

11.1 GENERAL.—

This section is not applicable.

SUGGESTED IMPROVEMENTS TO EQUIPMENT INSTRUCTION BOOKS

DATE:

SUBJECT:

FROM:

TO:

a. Present Problems—

b. Recommended Improvements—

Signature

Facility Identifier and Address