REON

SACRAMENTO PLANT

REPORT NO. RN-DR-0094

ASSEMBLY PROCEDURE FOR THE EXPERIMENTAL ENGINE
INSTRUMENTATION INSTALLATION AT AGC-SACRAMENTO

MASTER

JANUARY 1967

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ROCKET ENGINE OPERATIONS - NUCLEAR

JANUARY 1967

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S.K. Yoder
CLASSIFYING OFFICER

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AEROJET - GENERAL CORPORATION
A SUBSIDIARY OF THE GENERAL TIRE & RUBBER COMPANY

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- 1.0 GENERAL INSTRUCTIONS
- 1.1 This procedure shall be used in conjunction with REON Technical Memorandum 0361.
- 1.2 Scope of Assembly Procedures
 - 1.2.1 This technical memorandum defines the procedure to be followed during the installation of instrumentation and electrical harnessing at AGC, Sacramento. Experimental engines XECF and XE-1 are included with applicable exceptions noted. This memorandum represents a planned operational procedure, but the sequence can be varied to accommodate delivery schedules.
- 1.3 All transducers shall have instrument data log sheets completed and verified by Quality Assurance for all work performed.
- 1.4 In addition, all instrumentation, electrical harnessing and TV systems shall be verified upon installation, as noted within this procedure, by Quality Assurance.
- 1.5 All electrical checkout equipment shall bear evidence of valid calibration.
- 1.6 Electrical Equipment Requirements
 - 1.6.1 Insulation resistance - 50 volt megger for transducers.
 - 1.6.2 Resistance and continuity - Simpson Model 260 or its equivalent.
 - 1.6.3 Capacitance - 1 picofarad to 1 microfarad.
- 1.7 The reference junction, cables and impulse lines shall not be mounted on the external shield at Sacramento.
- 1.8 All WANL instrumentation received at AGC shall have checks performed as indicated in Section (2) of the receiving inspection portion of the appropriate data log sheets.

2.0 REFERENCES

2.1 Drawings

2.1.1 Arrangement and Component Drawings

<u>Drawing Title</u>	<u>Drawing No.</u>
Accelerometer, Piezoelectric	1117699
Strain Gage, Weldable	1117697
Resistance Temperature Transmitter	1117521
Thermocouple - Surface, Copper-Constantan	1117694
Thermocouple - Probe, Copper-Constantan	1117692
Thermocouple - Probe, Chromel-Alumel	1117695
Cable, Bearing Thermocouple	1117531
Thermocouple - Probe, Copper-Constantan	1117693
Cable, Speed Probe	299764

2.1.2 Assembly and Electrical Drawings

<u>Drawing Title</u>	<u>Drawing No.</u>
Instrumentation Installation - Test Stand Adapter	1117210-9
Instrumentation Installation - Upper Module (XE-1)	1117220-9
Instrumentation Installation - Upper Module (XECF)	1117220-19
Instrumentation Installation - Lower Module (XE-1)	1117230-9
Instrumentation Installation - Lower Module (XECF)	1117240-9
Electrical Installation - UTS	1117580-9

2.1.3 Documents

Termination Schedule, Instrumentation Cable, XE-1 & XECF AGC-90166

Process Specification, Cable Splice AGC-90162

<u>Instrument Data Log Sheet</u>	<u>Form No.</u>
Accelerometer - Piezoelectric	01
Pressure - AGC Pressure and Differential SG	08
Pressure - WANL Pressure and Differential SG	09
Speed Pickup Probe	11
Strain Gage - Full Bridge	12
Temperature - Thermocouple, Grounded Junction, Weldable	15
Temperature - Thermocouple, Grounded Junction, Probe	15
Temperature - RTT	16
Temperature - Thermocouple Exposed Junction	14

3.0 INSTALLATION DETAILS

Installation procedures are listed in three major subheadings as follow:

Test Stand Adapter - Instrumentation and electrical installation is to be accomplished after all other work has been completed in the TSA. If, due to delivery schedule, installation is started prior to completion of the TSA mechanical installation, adequate protection must be provided for all electrical and instrumentation assemblies.

Upper Module Assembly - Instrumentation and electrical installation is to be accomplished after all other work has been completed in the UTS. If, due to delivery schedule, installation is started prior to completion of the UTS mechanical installation, adequate protection must be provided for all electrical and instrumentation assemblies.

Lower Module Assembly - Partial installation of specific assemblies shall be installed on the external shield.

3.1 Test Stand Adapter

3.1.1 Electrical Installation - Electrical installation shall be completed in accordance with AGC drawing 1117210.

3.1.1.1	Assemble Modules A Thru G	<u>Date</u>	<u>Initial</u>
	Module A	_____	_____
	P/N 1117636-9 installed on J1	_____	_____
	P/N 1117637-9 installed on J2	_____	_____
	P/N 1117645-9 installed on J3	_____	_____
	P/N 1117652-9 installed on J4	_____	_____
	P/N 1117648-9 installed on J5	_____	_____
	P/N 1117648-9 installed on J6	_____	_____
	Module B		
	P/N 1117630-9 installed on J1	_____	_____
	P/N 1117631-9 installed on J2	_____	_____
	P/N 1117643-9 installed on J3	_____	_____
	P/N 1117659-9 installed on J4	_____	_____
	P/N 1117653-9 installed on J5	_____	_____
	P/N 1117656-9 installed on J6	_____	_____

Module C	<u>Date</u>	<u>Initial</u>
P/N 1117649-9 installed on J1	_____	_____
P/N 1117664-9 installed on J2	_____	_____
P/N 1117654-9 installed on J3	_____	_____
P/N 1117641-9 installed on J4	_____	_____
P/N 1117659-9 installed on J5	_____	_____
P/N 1117646-9 installed on J6	_____	_____
Module D		
P/N 1117653-9 installed on J1	_____	_____
P/N 1117655-9 installed on J2	_____	_____
P/N 1117635-9 installed on J3	_____	_____
P/N 1117657-9 installed on J4	_____	_____
P/N 1117657-9 installed on J5	_____	_____
P/N 1117658-9 installed on J6	_____	_____
Module E		
P/N 1117661-9 installed on J1	_____	_____
P/N 1117661-9 installed on J2	_____	_____
P/N 1117662-9 installed on J3	_____	_____
P/N 1117662-9 installed on J4	_____	_____
P/N 1117663-9 installed on J5	_____	_____
P/N 1117663-9 installed on J6	_____	_____
Module F		
P/N 1117660-9 installed on J1	_____	_____
P/N 1117631-9 installed on J2	_____	_____
P/N 1117638-9 installed on J3	_____	_____
P/N 1117632-9 installed on J4	_____	_____
P/N 1117651-9 installed on J5	_____	_____
P/N 1117634-9 installed on J6	_____	_____

Module G	<u>Date</u>	<u>Initial</u>
P/N 1117639-9 installed on J1	_____	_____
P/N 1117640-9 installed on J2	_____	_____
P/N 1117635-9 installed on J3	_____	_____
3.1.1.2 Install Modules A Thru G on the TSA (P/N 1117088-9)	_____	_____
3.1.1.3 Install Cable Assemblies		
P/N 1117642-9	_____	_____
P/N 1117644-9	_____	_____
P/N 1117650-9	_____	_____
3.1.1.4 Route and Terminate the following cables:		
<u>Parameter</u>	<u>Cable No.</u>	
SR-637	SB1245 SB1246	_____
DR-102	BB1370	_____
SV-801	SC2051 (Forward) SC2052 (Reverse)	_____
SV-802	SC2053 (Forward) SC2054 (Reverse)	_____
SV-803	SC2055 (Forward) SC2056 (Reverse)	_____
SV-804	SC2057 (Forward) SC2058 (Reverse)	_____
SV-805	SC2059 (Forward) SC2060 (Reverse)	_____
SV-806	SC2061 (Forward) SC2062 (Reverse)	_____
SV-807	SC2063 (Forward) SC2064 (Reverse)	_____
SV-808	SC2065 (Forward) SC2066 (Reverse)	_____
SV-809	SC2067 (Forward) SC2068 (Reverse)	_____

<u>Parameter</u>	<u>Cable No.</u>	<u>Date</u>	<u>Initial</u>
SV-810	SC2069 (Forward) SC2070 (Reverse)	_____	_____
SV-811	SC2071 (Forward) SC2072 (Reverse)	_____	_____
SV-812	SC2073 (Forward) SC2074 (Reverse)	_____	_____
SV-813	SC2081 (Forward) SC2082 (Reverse)	_____	_____
SV-814	SC2085 (Forward) SC2086 (Reverse)	_____	_____
SV-815	SC2089 (Forward) SC2090 (Reverse)	_____	_____
BV-813	SC2083	_____	_____
BV-814	SC2087	_____	_____
BV-815	SC2091	_____	_____

3.1.2 Instrumentation Installation

Instrumentation Installation shall be completed in accordance with AGC drawing 1117210. The pressure transducers listed shall be installed after the cryogenic test on XECF only. Prior to installation appropriate instrument data log sheets shall be initiated. Section ① shall be completed on all transducers. After installation Section ③ shall be completed on all units. Complete all other applicable sections.

<u>Part Number</u>	<u>Parameter</u>	<u>Use</u>	<u>Date</u>	<u>Initial</u>
404-2154-14DB	AT-801	XE-1 & XECF	_____	_____
MQ299507	AT-805	XE-1	_____	_____
MQ299507	AT-806	XE-1	_____	_____
1117165-29	PT-104	XE-1 & XECF	_____	_____
1117165-29	PT-106	XE-1 & XECF	_____	_____

<u>Part Number</u>	<u>Parameter</u>	<u>Use</u>	<u>Date</u>	<u>Initial</u>
1117165-29	PT-104	XE-1 & XECF	_____	_____
1116895-19	TE-848	XE-1 & XECF	_____	_____
1116474-19	TT-103	XE-1 & XECF	_____	_____
1116474-19	TT-105	XE-1 & XECF	_____	_____

3.1.2.1 Route and terminate the following cables. Complete Section ⑦ for the complete subassembly.

<u>Parameter</u>	<u>Cable No.</u>	<u>Use</u>	<u>Date</u>	<u>Initial</u>
AT-801	XC4001	XE-1 & XECF	_____	_____
AT-803	XA2080	XE-1(Cable Only)	_____	_____
AT-804	XA2081	XE-1(Cable Only)	_____	_____
AT-805	XX5001	XE-1 & XECF	_____	_____
AT-806	XX5002	XE-1 & XECF	_____	_____
PT-104	BR1407	XE-1 & XECF	_____	_____
PT-106	BB1564	XE-1 & XECF	_____	_____
PT-895	BB1409	XE-1 & XECF	_____	_____
TE-848	VA1869	XE-1 & XECF	_____	_____
TT-103	BB1410	XE-1 & XECF	_____	_____
TT-105	BB1579	XE-1 & XECF	_____	_____

3.1.2.2. Check continuity on all Modules (A thru F) on the completed TSA assemblies with Simpson Model 260 or its equivalent.

	<u>Date</u>	<u>Initial</u>
Module A	_____	_____
P/N 1117636-9 installed on J1	_____	_____
P/N 1117637-9 installed on J2	_____	_____
P/N 1117645-9 installed on J3	_____	_____
P/N 1117652-9 installed on J4	_____	_____
P/N 1117648-9 installed on J5	_____	_____

Module A (Cont)	<u>Date</u>	<u>Initial</u>
P/N 1117648-9 installed on J6	_____	_____
Module B		
P/N 1117630-9 installed on J1	_____	_____
P/N 1117631-9 installed on J2	_____	_____
P/N 1117643-9 installed on J3	_____	_____
P/N 1117659-9 installed on J4	_____	_____
P/N 1117653-9 installed on J5	_____	_____
P/N 1117656-9 installed on J6	_____	_____
Module C		
P/N 1117649-9 installed on J1	_____	_____
P/N 1117664-9 installed on J2	_____	_____
P/N 1117654-9 installed on J3	_____	_____
P/N 1117641-9 installed on J4	_____	_____
P/N 1117659-9 installed on J5	_____	_____
P/N 1117646-9 installed on J6	_____	_____
Module D		
P/N 1117653-9 installed on J1	_____	_____
P/N 1117655-9 installed on J2	_____	_____
P/N 1117635-9 installed on J3	_____	_____
P/N 1117657-9 installed on J4	_____	_____
P/N 1117657-9 installed on J5	_____	_____
P/N 1117658-9 installed on J6	_____	_____
Module E		
P/N 1117661-9 installed on J1	_____	_____
P/N 1117661-9 installed on J2	_____	_____
P/N 1117662-9 installed on J3	_____	_____
P/N 1117662-9 installed on J4	_____	_____

Module E (Cont)

P/N 1117663-9 installed on J5

P/N 1117663-9 installed on J6

Module F

P/N 1117660-9 installed on J1

P/N 1117631-9 installed on J2

P/N 1117638-9 installed on J3

P/N 1117632-9 installed on J4

P/N 1117651-9 installed on J5

P/N 1117634-9 installed on J6

Module G

P/N 1117639-9 installed on J1

P/N 1117640-9 installed on J2

P/N 1117635-9 installed on J3

3.2 Upper Module Assembly

3.2.1 Electrical Installation - Electrical installation for the Upper Module assembly for Modules A, C, D, E and F. Installation shall be per AGC drawing 1117580.

	<u>Date</u>	<u>Initial</u>
Module A	_____	_____
Module C	_____	_____
Module D	_____	_____
Module E	_____	_____
Module F	_____	_____

3.2.1.2 Check continuity for each cable assembly in all modules on the UTS. Continuity tolerances shall be established by the cognizant REON instrumentation engineer.

	<u>Date</u>	<u>Initial</u>
Module A	_____	_____
P/N 1117594-9 on P-1	_____	_____
P/N 1117595-9 on P-2	_____	_____
P/N 1117596-9 on P-3	_____	_____
P/N 1117597-9 on P-4	_____	_____
P/N 1117598-9 on P-5	_____	_____
P/N 1117599-9 on P-6	_____	_____
Module C	_____	_____
P/N 1117606-9 on P-1	_____	_____
P/N 1117607-9 on P-2	_____	_____
P/N 1117608-9 on P-3	_____	_____
P/N 1117609-9 on P-4	_____	_____
P/N 1117610-9 on P-5	_____	_____
P/N 1117611-9 on P-6	_____	_____
Module D	_____	_____
P/N 1117612-9 on P-1	_____	_____
P/N 1117613-9 on P-2	_____	_____
P/N 1117614-9 on P-3	_____	_____
P/N 1117615-9 on P-4	_____	_____
P/N 1117616-9 on P-5	_____	_____
P/N 1117617-9 on P-6	_____	_____
Module E	_____	_____
P/N 1117618-9 on P-1	_____	_____
P/N 1117619-9 on P-2	_____	_____
P/N 1117620-9 on P-3	_____	_____
P/N 1117621-9 on P-4	_____	_____
P/N 1117622-9 on P-5	_____	_____
P/N 1117623-9 on P-6	_____	_____

	<u>Date</u>	<u>Initial</u>
Module F	_____	_____
P/N 1117624-9 on P-1	_____	_____
P/N 1117625-9 on P-2	_____	_____
P/N 1117626-9 on P-3	_____	_____
P/N 1117627-9 on P-4	_____	_____
P/N 1117628-9 on P-5	_____	_____
P/N 1117629-9 on P-6	_____	_____

3.2.1.3 Install Modules B and G. For XE-1 use AGC drawing 1117220-9.

Installation of Modules B & G for XECF shall be completed as outlined below. Module B - Install Module at Station 42.89 at approximately the 90° module pass-thru. Installation shall be in accordance with AGC drawing 1117580 (View EE) Module C down to and including the first bracket (View S). The bracket shall be located at Station 54.89+1".

Module G - Install Module at Station 42.89 at approximately the 170° module pass-thru. Installation shall be in accordance with AGC drawing 1117580 (View CC) Module A down to and including the first bracket (View KK). The bracket shall be located at Station 54.89+1".

Note:

Cables are not to be terminated. They shall be looped (Minimum 12") within the segments to avoid any damage.

3.2.2 Instrumentation Installation - Instrumentation Installation shall be completed per the appropriate arrangement drawing for XECF and per AGC drawing 1117220-9 for XE-1. The pressure transducers listed shall be installed after the cryogenic test on XECF only. Prior to installation appropriate instrument data log sheets shall be initiated

with Section ① completed at this time. After installation Section ③ shall be completed on all units. Complete all other applicable sections.

3.2.2.1 Install the following parameters:

<u>Parameter</u>	<u>Arrangement Drawing</u>	<u>Date</u>	<u>Initial</u>
HT-102	1117699	_____	_____
HT-800R	1117699	_____	_____
HT-801R	1117699	_____	_____
HT-820L	1117699	_____	_____
HT-821R	1117699	_____	_____
HT-822T	1117699	_____	_____
HT-802L	1117699	_____	_____
HT-805R	1117699		
Bracket	1117136-9		
Screw	MS16997-13(2-4 in/lb)	_____	_____
MG-115L	1117697		
Insulator	1118618-1}	Install per _____	_____
Cover	1118634-1}		
		AGC Spec 90162	
MG-801L	1117697		
Insulator	1118618-1}	Install per _____	_____
Cover	1118634-1}		
		AGC Spec 90162	
MG-802L	1117697		
Insulator	1118618-1}	Install per _____	_____
Cover	1118634-1}		
		AGC Spec 90162	
MG-803L	1117697		
Insulator	1118618-1}	Install per _____	_____
Cover	1118634-1}		
		AGC Spec 90162	

<u>Parameter</u>	<u>Arrangement Drawing</u>	<u>Date</u>	<u>Initial</u>
MG-804L	1117697		
Insulator	1118618-1	Install per _____	_____
Cover	1118634-1	AGC Spec 90162	
MG-805L	1117697		
Insulator	1118618-1	Install per _____	_____
Cover	1118634-1	AGC Spec 90162	
MG-806L	1117697		
Insulator	1118618-1	Install per _____	_____
Cover	1118634-1	AGC Spec 90162	
TT-108	1117521		
Insulator	1118618-1	Install per _____	_____
Cover	1118634-1	AGC Spec 90162	
TT-109	1117521		
Insulator	1118618-1	Install per _____	_____
Cover	1118634-1	AGC Spec 90162	
TT-110	1117521		
Insulator	1118618-1	Install per _____	_____
Cover	1118634-1	AGC Spec 90162	
TT-881	1117521		
Insulator	1118618-1	Install per _____	_____
Cover	1118634-1	AGC Spec 90162	
TE-112	1117694	_____	_____
TE-160	1117694	_____	_____
TE-161	1117694	_____	_____
TE-856	1117694	_____	_____
TE-857	1117694	_____	_____
TE-859	1117694	_____	_____
TE-898	1117694		
Adhesive	RTV-731 (Bond with adhesive instead of welding)	_____	_____

<u>Parameter</u>	<u>Arrangement Drawing</u>	<u>Date</u>	<u>Initial</u>
TE-899	1117694		
Adhesive	RTV-731 (Bond with adhesive instead of welding)		
TE-813	1117692		
TE-814	1117692		
TE-834	1117695		
TE-835	1117695		
TE-890	1117692		
Insulator	1118618-1		
Cover	1118634-1 AGC Spec 90162		
N-840	1117220-9 (XE-1)		
N-841	1117220-9 (XE-1)		
N-842	1117220-9 (XE-1)		
U-801	2522-234		
	PT-500M		
U-802	2522-234		
	PT-550M		

3.2.2.2 Route and terminate the following cables. Routing shall be made to allow for an efficient disassembly operation. Install sheath cable per the appropriate arrangement drawing. Complete Section (7) for the completed subassembly if applicable.

<u>Parameter</u>	<u>Cable No.</u>	<u>Date</u>	<u>Initial</u>
HT-102	SA1105		
HT-800R	SA1106		
HT-801R	SA1107		
HT-820L	SA1110		

<u>Parameter</u>	<u>Cable No.</u>	<u>Date</u>	<u>Initial</u>
HT-821R	SA1111	_____	_____
HT-822T	SA1112	_____	_____
HT-802L	SA1108	_____	_____
HT-805R	SA1109	_____	_____
MG-115L	BB1483	_____	_____
MG-801L	BB1484	_____	_____
MG-802L	BB1485	_____	_____
MG-803L	BB1511	_____	_____
MG-804L	BB1512	_____	_____
MG-805L	BB1513	_____	_____
MG-806L	BB1514	_____	_____
TT-108	BB1361	_____	_____
TT-109	BB1566	_____	_____
TT-110	BB1565	_____	_____
TT-881	BB1363	_____	_____
TE-112	VA2175 (Break-out from A2)	_____	_____
TE-160	VA1825	_____	_____
TE-161	VA1826	_____	_____
TE-844	RA1950 (Break-out from C3)	_____	_____
TE-845	RA1951 (Break-out from C3)	_____	_____
TE-856	VA1809	_____	_____
TE-857	VA1810	_____	_____
TE-858	VA1811	_____	_____
TE-859	VA1812	_____	_____
TE-898	RA1905 (Break-out from A3)	_____	_____

<u>Parameter</u>	<u>Cable No.</u>	<u>Date</u>	<u>Initial</u>
TE-899	RA1906 (Break-out from A3)	_____	_____
TE-813	RA1882 (Break-out from C4)	_____	_____
TE-814	RA1883 (Break-out from C4)	_____	_____
TE-834	RA1949 (Break-out from C3)	_____	_____
TE-835	RA1987	_____	_____
TE-890	VA1852	_____	_____
N-840	BB1487 (XE-1 only)	_____	_____
N-841	BB1488 (XE-1 only)	_____	_____
N-842	BB1489 (XE-1 only)	_____	_____
U-801	CA-23 and CA-30	_____	_____
U-802	CA-23 and CA-30	_____	_____
EN-800	BB1365 (Dwg 299763)	_____	_____
EN-801	BB1366 (Dwg 299763)	_____	_____
TE-836	RA1988 (Dwg 1117531-9)	_____	_____
TE-837	RA1989 (Dwg 1117531-9)	_____	_____
TE-838	RA1991 (Dwg 1117531-9)	_____	_____
TE-839	RA1992 (Dwg 1117531-9)	_____	_____
TE-840	RA1993 (Dwg 1117531-9)	_____	_____
TE-841	RA1994 (Dwg 1117531-9)	_____	_____
TE-842	RA1995 (Dwg 1117531-9)	_____	_____
TE-843	RA1996 (Dwg 1117531-9)	_____	_____
DP-867	BB1372	_____	_____
DP-868	BB1373	_____	_____
DP-869	BB1374	_____	_____

<u>Parameter</u>	<u>Cable No.</u>	<u>Date</u>	<u>Initial</u>
DR-110W	BB1375	_____	_____
DR-110X	BB1376	_____	_____
DR-100W	BB1377	_____	_____
DR-100X	BB1378	_____	_____
DR-106W	BB1379	_____	_____
DR-106X	BB1380	_____	_____
DR-108W	BB1381	_____	_____
DR-108X	BB1382	_____	_____
DR-104W	BB1383	_____	_____
DR-104X	BB1384	_____	_____
SR-641	SB-1249 and SB1250	_____	_____
	SB-1251 and SB1252	_____	_____
SR-642	SB-1253 and SB1254	_____	_____
	SB-1255 and SB1256	_____	_____
SR-643	SB-1261 and SB1262	_____	_____
	SB-1263 and SB1264	_____	_____
SR-644	SB-1257 and SB1258	_____	_____
	SB-1259 and SB1260	_____	_____
SR-646	SC2095 and SC2096	_____	_____
	SC2097 and SC2098	_____	_____

Note:

The following appropriate cable clamps shall be used. Installation of clamps shall be per best commercial practice.

1/16-4 NA	Cable Clamp
3/32 - 4 NA	Cable Clamp
1/8 - 4 NA	Cable Clamp
3/16 - 4 NA	Cable Clamp
1/4 - 4 NA	Cable Clamp

5/16 - 4 NA	Cable Clamp
3/8 - 4 NA	Cable Clamp
7/16 - 4 NA	Cable Clamp
1/2 - 4 NA	Cable Clamp
24 - 167	Washer
AN340B6	Nut
AN515DD6-9	Screw (6-8 in/lbs Torque)

3.2.2.3 The transducer bracket assembly for the UTS shall be installed per the following AGC drawings:

XE-1	AGC 1117857
XECF	AGC 1118551

Note:

The XECF assembly shall be installed after the cryogenic test; however, tubing and fitting should be completed prior to the test.

3.3 Lower Module Assembly

3.3.1 Electrical Installation - Install the electrical module assemblies (AGC P/N 1117131-9, 1117132-9, 1117133-9, and 1117134-9) as shown on AGC drawing 1013372 and 1116957 (reference 1115763-9 thru 1115766-9) for XECF. For XE-1 install per AGC drawing 1117230-9.

3.3.2 Instrumentation Installation - Install the transducer assembly brackets (AGC P/N 1117177-9, 1117178-9, and 1117179-9) after the cryogenic test for XECF. For XE-1 install per AGC drawing 1117240-9.