

Procedure 166: Outline of Integration Procedure for the GTU-2 Readout Hardware into Probe B

Rev:-

Date: 7/1/97

Author: Barry Muhlfelder

Cc: J. Lockhart

Signoff List:

B. Muhlfelder D. Bardas B. Taller J. Turneure M. Luo

Prerequisites:

1. Verify that all parts are clean per procedure P0059 prior to this procedure. _____
2. Verify that GTU-2 integration procedures up to and including the installation of the caging lines have been completed prior to beginning this procedure. _____

Equipment:

1. Approved (non-magnetic) tools, except for 2-56 steel allen head wrench.
2. Cleanroom vacuum cleaner
3. BK388A and Fluke 77 ohmmeters
4. Non-magnetic cable bending tools

Note: All particulate generating operations (fastening of screws, etc.) require use of a cleanroom vacuum cleaner after operation is complete.

Procedure:

1. Record in Table 1, the round-trip resistance and resistance-to-ground of each readout cable kit ((25000-102), which is part of the gyro assy 23185-n).

Table 1

Gyro #	Round-trip Res. (before routing)	Resistance-to-Ground (before routing)
1	7.38 Kohms	> 40 Mohms
2	> 40 Mohms	> 40 Mohms
3	144 ohms	> 40 Mohms
4	5.48 Kohms	> 40 Mohms

Note: The high resistance on gyro readout cable #2 is out-of-spec. This gyroscope was subsequently removed (as part of a different procedure) from the probe. It was then discovered that the loop had been broken by what appeared to be an ESD event. Discrepancy report #61 gives a complete description of this finding.

Gyro 1 has a GTU-2 style readout cable and 4 turn pickup loop. Gyro 3 has a GTU-1 style readout cable and a 1 turn pickup loop. Gyro 4 has a GTU-1 style readout cable and a 5 turn pickup loop.

2. Install two SQUID bracket assemblies (25475-101) into the +X and -X positions on Probe B.

S/N 2 is in +x position.

S/N 4 is in -x position.

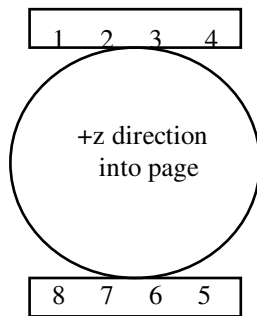
Route the instrumentation wires/connectors as needed.

Note: The GRT on the -x bracket, +y position is not thermally well connected to the bracket.

3. Attach the output cable assembly (25042-106) designated for SQUID position #4 (see Table 2 below) to a dummy SQUID package.

Notes: A. The containers for the SQUID packages and output cables are serialized 1-8.

B. SQUID position #1 is on the +y side of the -x bracket and SQUID position #5 is on the -y side of the +x bracket. The designations for the other SQUID positions increase monotonically as you move away from positions #1 and #5. See diagram below.



4. Install the dummy SQUID package and output cable onto SQUID position #4 of the -X bracket.

Table 2

Cable Ser. #	Cable part #	SQUID Pos. on the Probe	SQUID Pack. Ser. #	Carrier # & type	gyro #
4	25042-106	4	3	16B, GTU2	1
5	25042-107	5	1	26A, SM	3
6	25042-108	8	2	12A, GTU2	shorted input
8	25042-109	6	5	28B, SM	4

Notes: Lead foil and a readout cable flange were attached to the input end of the SQUID package in position #8.

5. Bend the output cable so that it can be mated to the Probe Lemo connectors as shown in Table 3. Use only non-magnetic bending tools.

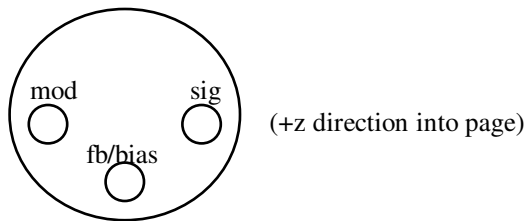
Note: all references from this point forward in this document refer to SQUID position rather than SQUID package #.

Table 3

SQUID position	Cable Function	Probe Cable	Pins	Resistance to Ground	Round-trip Resistance
4	signal	SR12	(1,2)	> 20 Mohms	6.7 ohms
	mod	MR21	(1,2)	> 20 Mohms	8.25 Kohms
	feedback/bias	TR51	(1,2)	> 20 Mohms	3.07 Kohms
			(3,4)	> 20 Mohms	404 ohms
5	signal	SR15	(1,2)	shorted	7.2 ohms
	mod	FR44	(1,2)	> 20 Mohms	8.13 Kohms
	feedback/bias	TR52	(1,2)	> 20 Mohms	3.43 Kohms
			(3,4)	> 20 Mohms	380 ohms
6	signal	SR18	(1,2)	shorted	6.8 ohms
	mod	BR34	(1,2)	> 20 Mohms	7.67 ohms
	feedback/bias	BR33	(1,2)	> 20 Mohms	3.13 Kohms
			(3,4)	> 20 Mohms	366 ohms
8	signal	SR14	(1,2)	> 20 Mohms	7.1 ohms
	mod	FR45	(1,2)	> 20 Mohms	9.05 Kohms
	feedback/bias	MR23	(1,2)	> 20 Mohms	3.81 Kohms
			(3,4)	> 20 Mohms	410 ohms

Pins (1,2) of the signal Lemo connector carry the signal function, pins (1,2) of the mod Lemo connector carry the modulation function, pins (1,2) of the feedback/bias Lemo connector carry the feedback function, and pins (3,4) carry the bias function. (In all cases pins (1,2) at the bottom of the probe are connected to pins (1,2) of the 6 pin vacuum feedthrough at the top of the probe, and pins (3,4) at the bottom of the probe are connected to pins (4,5) at the top of the probe). All of the signal and mod probe cables contain 2 wires. All of the feedback/bias probe cables contain 4 wires.

An end-on view of the SQUID package as seen from the outside of the package shows the bias/feedback cable located between the other two cables. The modulation cable is located clockwise from the bias/feedback cable and the signal cable is located counter-clockwise from the bias/feedback cable.



Note: dummy SQUID package not used for packages with SM carriers.

6. Rotate the Probe so that output cables 25042-107, 25042-108, and 25042-109 can be routed (per steps 2-4 of this procedure) to their appropriate connectors as shown in Table 3.

7. Mate each SQUID Package Assembly (25017-101) to its appropriate output cable as shown in Table 2. Each cable/package assembly is checked for electrical continuity and isolation from ground. The results are recorded in Table 3. No indium was used between the SQUID package and the output cable.

8. Turn on probe ion sprayer.

9. Install each output cable/package assembly into its appropriate location in Probe B as given in Table 2. Each package is checked for electrical isolation from the probe. 2 ea of 25341-101 were used for SQUID positions 5,6, and 8. All packages had more than 20 Mohms of resistance to ground.

10. Install probe rails. Add 0.001” kapton film to 25236-101 to allow electrical isolation. Tie down each of the readout cables from each of the 4 gyroscopes with a thermal ground clip kit (25236-101) and an on/off thermal ground clip kit (25326-101). The on/off clip kit is located closer to the gyro end of the readout cable. The on/off clip kit requires the attachment of the gyro’s gyro and readout cable heater assy (23550-101). The cable to SQUID 4 has 3 tiedowns, a heater in-between 2 thermal ground clips. The gyro readout cables get routed to the SQUIDs as shown in Table 2. The probe is rotated as required to allow the routing of the readout cables.

11. The resistance of each SQUID package input is measured and recorded in Table 4 below. The resistance of each readout cable is measured and verified to be consistent with the values quoted in Table 1. Each superconductive readout cable (25000-102) is attached to the appropriate SQUID package assembly (25017-101). This is accomplished by first attaching a SQUID capacitor kit (25375-101) to the readout cable. A resistance measurement is made to ensure that each side of the capacitor is connected to the cable. Next the readout cable and capacitor kit are connected to the appropriate SQUID. The resistance as measured at the input to each SQUID is measured and recorded in Table 4 below. The resistance to ground of each readout cable is measured after the cable is attached to the SQUID. Cables to gyros 3 and 4 had 2 Mohms to ground, the cable to gyro 1 had more than 20 Mohms to ground.

Table 4

Gyro #	SQUID #	Resistance (before hookup)	Resistance (after hookup)	Resistance of cable to capacitor
1	4	108.9	107.5	< 10 ohms
3	5	108.7	99.4	< 10 ohms
4	6	not recorded	106.7	< 10 ohms
-	8	110 ohms (before short)	98 ohms (after short)	NA

12. Connect each cable as given in Table 3. The round-trip resistance of each cable and resistance-to-ground of each cable as measured at the tophat is recorded in Table 5 below. Secure each output cable as needed to the probe at the upper stockade assembly (1C34589-101) and lower stockade assembly (1C34588-101).

Table 5

Cable #	Pin #	Resistance-to-Ground	Round-trip Res. (measured)	Round-trip Res. (acceptable range)
SR12	1,2	>20 Mohms	10.7 ohms	8-12 ohms
MR21	1,2	>20 Mohms	8.30 Kohms	6-10 Kohms
TR51	1,2	>20 Mohms	3.10 Kohms	3-4 Kohms
	3,4	>20 Mohms	420 ohms	350-500 ohms
SR15	1,2	10.2 ohms	11.2 ohms	8-12 ohms
FR44	1,2	> 20 Mohms	8.16 Kohms	6-10 Kohms
TR52	1,2	> 20 Mohms	3.411 Kohms	3-4 Kohms
	3,4	> 20 Mohms	396 ohms	350-500 ohms
SR18	1,2	shorted	10.9 ohms	8-12 ohms
BR34	1,2	> 20 Mohms	7.71 Kohms	6-10 Kohms
BR33	1,2	> 20 Mohms	3.165 Kohms	3-4 Kohms
	3,4	> 20 Mohms	415 ohms	350-500 ohms
SR14	1,2	> 20 Mohms	11.2 ohms	8-12 ohms
FR45	1,2	> 20 Mohms	9.08 Kohms	6-10 Kohms
MR23	1,2	> 20 Mohms	3.85 Kohms	3-4 Kohms
	3,4	> 20 Mohms	461 ohms	350-500 ohms

Notes: A. Lead resistance of ohm meter found to be 0.4 ohms.

B. These resistance values were rechecked after the lemo connector back nuts were tightened and the cables resecured to the stockades. All values were found to be consistent with the above quoted values.

13. Table 6 gives the pinouts and associated functions for the SQUID bracket thermometers, the locations on each bracket for these thermometers, and the serial number for each thermometer. The procedure to connect these thermometers are covered in another procedure. The pinouts for the bracket and readout cable heaters are given in PCB 247.

Table 6

GRT Serial #	Probe B Pinout	Bracket Position	Function
27539	I1 (47,48)	-x (#1)	drive
27539	I3 (42,43)	-x (#1)	sense
27540	I1 (49,50)	-x (#1)	drive
27540	I3 (44,45)	-x (#1)	sense
27541	I1 (51,52)	+x (#2)	drive
27541	I3 (47,48)	+x (#2)	sense
27550	I1 (53,54)	+x (#2)	drive
27550	I3 (49,50)	+x (#2)	sense