ACKNOWLEDGEMENT OF ADDRESSED SAFETY RELATED MESSAGES   IEC 61993-2, CLAUSE 18.1.4

(1) Method of measurement
Repeat test under 18.1.2 with addressed safety related message.

(2) Required results
Same as 18.1.2

(3) Test results

Conditions	Results
Transmits msg 13 (ack)	√
Output to PI	√

The EUT satisfied the requirements of this test.

Software Used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 68, 89 to 91, 98, 100
....

Ambient temperature +23°C   Relative humidity 44%

INTERROGATION RESPONSES   IEC 61993-2, CLAUSE 18.2 (M.1371-1 A2/5.3)

(1) Method of measurement
Set up standard test environment and operate EUT in autonomous mode.
Apply an interrogation message (msg 15; EUT as destination) to the VDL according to table 7 for responses
with msg 5 and slot offset set to defined value on channel AIS 1.
Record transmitted messages on both channels.

(2) Required results
Check that EUT transmits the appropriate interrogation response message as requested on channel AIS1.
Repeat test for AIS2.

(3) Test results

Conditions	Results
on channel AIS1	√
on channel AIS2	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 86, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 65, 66, 68, 89 to 91, 98, 100
....

OTHER NON-PERIODIC MESSAGES   IEC 61993-2, CLAUSE 18.3 (M.1371-1 A2/5.3)

(1) Method of measurement
Set up standard test environment and operate EUT in autonomous mode.
Initiate the transmission of 5 binary broadcast messages (msg 8) by the EUT.
Record transmitted messages on both channels.

(2) Required results
Check that EUT transmits the msg 8 messages on channels A and B alternating.

(3) Test results

Conditions	Results
Tx 5 binary broadcast messages (msg8)	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 86, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 65, 66, 68, 89 to 91, 98, 100
....

(1) 19.1 General

The EUT (Equipment Under Test) including all necessary test equipment shall be set up and checked that it is operational before testing commences.
The manufacturer shall provide sufficient technical documentation of the EUT and its interfaces in particular.
The following tests shall be carried out under "Normal" environmental conditions as defined in IEC 60945.
Where appropriate, tests against different clauses of this and other chapters may be carried out simultaneously.

Supported interface sentences

	Indication	Sentence format	Supported sentence formatters		
1.	SENSOR1 SENSOR2 SENSOR3	IEC61162-1/2	Input data	Recommend	Optional
			Longitude/Latitude Position Accuracy Time of Position	GNS GLL	GGA RMC
			Datum Reference	DTM	
			RAIM Indicator	GBS	
			Speed Over Ground (SOG)	VBW	VTG OSD RMC
			Course Over Ground (COG)	RMC	VTG OSD
			Heading	HDT	OSD HDG
			Rate of Turn	ROT	
2.	AUX1 AUX2	IEC61162-2 IEC61993-2	Input: ABM, ACA, ACK, AIR, BBM, LRI, LRF, VSD, SSD Output: ABK, ACA, ALR, DSC, DSI, LRF, LR1, LR2, LR3, TXT, VDO, VDM		
3.	LONGRANGE	IEC61993-2	Input: LRI, LRF Output: LRF, LR1, LR2, LR3		
4.	DIFF	ITU-R M.823-2	Input: RTCM SC-104 Ver.2.0 Type 1, 2, 7, 9 Output: RTCM SC-104 Ver. 2.0 Type: depends on received message		

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 68, 89 to 91, 98, 100
………………………………………

Checks required:
The following checks for formal consistency and compliance shall be made for all ports

– approved sentences against IEC 61162

– proprietary sentences against IEC 61162

– usage of fields as required for different functions including provided default values or settings

– transmission intervals against IEC 61162

– configuration of hardware and software if this is relevant to the interface performance and port selection.

The following checks for compliance with IEC 61162

– output drive capability

– load on the line of inputs

– electrical isolation of input circuits

The EUT satisfied all the requirements listed in this clause.

Ambient temperature +22°C   Relative humidity 31%

ELECTRICAL TEST

(1) Method of test
Input/Output Ports configured as IEC 61162-1 or IEC 61162-2 shall be tested according to the relevant standard with regard to minimum and maximum voltage and current at the input terminals.

(2) Required results
The interfaces shall fulfil the requirements of the relevant standards.

(3) Test results

Conditions	Results
15 V dc applied between I/Ps, O/Ps & GND, all combinations and polarities.	Rx port √ Tx port √

Remarks:
The EUT input and output ports are configured to comply with the requirements of IEC 61162-2.
All input ports are identical electrically and all output ports are identical electrically.
Sensor 1 port (Rx) and Aux 1 port (Tx) were chosen for this test.

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 68, 89 to 91, 98, 100
....

TEST OF INPUT SENSOR INTERFACE PERFORMANCE   IEC 61993-2, CLAUSE 19.4 (7.6.2)

(1) Method of measurement
Connect all inputs and outputs of the EUT as specified by the manufacturer and simulate VDL-messages using test system.
Operate inputs with simulated sensor data that are both the relevant data and additional data with formatters not provided for the relevant input.
Each sensor input shall be loaded with 70 % to 80 % of the interface's capacity.
Record the VDL and output from the EUT's high speed port.

(2) Required results
Verify that the output on the VDL and the presentation interface agree with simulated input and all output data is transmitted without loss or additional delay.

(3) Test results

Conditions	Results
2750 cps, 3 ports, 7 sentences, x 10	√

See JRC's method sheet.on next page.

The EUT satisfied the requirements of this test.

Software used: 82, 83, 84, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 68, 89 to 91, 98, 100
....

Test condition for 19.4 Test input sensor interface performance

Interface's capacity: 38400[bps] = 3840[character per second (cps)]
70%: 3840*0.7 = 2688[cps]
80%: 3840*0.8 = 3072[cps]

	Baud rate [bps]	Input sentences	Input data	Filter	Output data
Sensor1	38400	$GPDTM,W84,,,,,,,W84*4A $GPRMC,121850,A,1000.000,N,11000.000,E,00.0,100,220402,00,E,A*12 $GPGLL,1000.000,N,11000.000,E,121850,A,A*49 $GPGGA,121850,1000.000,N,11000.000,E,1,7,01,+0050,M,+001,M,05,0686*5D $GPVTG,100,T,,,00.0,N,,,A*0A $TIROT,100.0,A*3A $HEHDT,100.0,T*2E	**S 10 00.00** **E110 00.00** **SOG:0** **COG:100** HDG:100 ROT:100	RMC	**S 10 00.00** **E 110 00.00** **SOG:0** **COG:100**
Sensor2	38400	$GPDTM,W84,,,,,,,W84*4A $GPRMC,122044,A,2000.000,N,12000.000,E,00.0,200,220402,00,E,A*1F $GPGLL,2000.000,N,12000.000,E,122044,A,A*47 $GPGGA,122044,2000.000,N,12000.000,E,1,7,01,+0050,M,+001,M,05,0686*53 $GPVTG,200,T,,,00.0,N,,,A*09 $TIROT,200.0,A*39 $HEHDT,200.0,T*2D	S 20 00.00 E120 00.00 SOG:0 COG:200 **HDG:200** ROT:200	HDT	**HDG:200**
Sensor3	38400	$GPDTM,W84,,,,,,,W84*4A $GPRMC,122106,A,3000.000,N,13000.000,E,00.0,300,220402,00,E,A*19 $GPGLL,3000.000,N,13000.000,E,122106,A,A*40 $GPGGA,122106,3000.000,N,13000.000,E,1,7,01,+0050,M,+001,M,05,0686*54 $GPVTG,300,T,,,00.0,N,,,A*08 $TIROT,300.0,A*38 $HEHDT,300.0,T*2C	S 30 00.00 E130 00.00 SOG:0 COG:300 HDG:300 **ROT:300**	ROT	**ROT:300**

	Number of characters + <CR><LF>
$GPDTM,W84,,,,,,,W84*4A	23+2=25
$GPRMC,121850,A,1000.000,N,11000.000,E,00.0,100,220402,00,E,A*12	64+2=66
$GPGLL,1000.000,N,11000.000,E,121850,A,A*49	43+2=45
$GPGGA,121850,1000.000,N,11000.000,E,1,7,01,+0050,M,+001,M,05,0686*5D	69+2=7
$GPVTG,100,T,,,00.0,N,,,A*0A	28+2=30
$TIROT,100.0,A*3A	17+2=19
$HEHDT,100.0,T*2E	17+2=19

Total:275[characters]

275[characters] *10[times] per second = 2750[cps] = 27500[bps] (71.6%)

1 character = 10 bits (1 start bit, 8 data bits and 1 stop bit).

Ambient temperature +24°C   Relative humidity 40%

TEST OF SENSOR INPUT   IEC 61993, CLAUSE 19.5 (7.6.2)

(1) Method of measurement
Set up standard test environment and operate inputs with simulated sensor data.
Record VDL output.
a) simulate sensor information for position, speed, heading, ROT
b) simulate invalid and unavailable data

(2) Required results
a) Verify that the recorded VDL message contents agree with the simulated sensor information.
b) Verify that affected data is set to default values.

(3) Test results

Conditions	Results
Valid data	√ see note 1
Invalid data	FAIL see note 2
	PASS after retest (see note 3)

See JRC's table of data tested (next page)

The EUT satisfied the requirements of this test.

Note 1: ROT display is inaccurate due to calculation rounding up to nearest unit (ITU R M1371 table 15a). JRC advised to publish this error in the specifications for the JHS-180 and to draw the user's attention to this error in the handbook table of Supported Interface Sentences (8.2.4)

Note 2: A value of 100 degrees South was sent to the EUT from the GPS simulator. This value was subsequently re-transmitted and displayed on the test targets. The software was revised to disallow transmission and display of nonsensical information.

Note 3: Software successfully modified to trap all invalid/nonsensical data, and disallow retransmission / display.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 68, 89 to 91, 98, 100
....

Table of data tested

Data	Formatter	Valid	Invalid	Unavailable data
Position	GNS	√	√	√
	GLL	√	√	√
	GGA	√	√	√
	RMC	√	√	√
Speed Over Ground (SOG)	VBW	√	√	*
	VTG	√	√	√
	OSD	√	√	√
	RMC	√	√	√
Course Over Ground (COG)	RMC	√	√	√
	VTG	√	√	√
	OSD	√	√	√
Heading	HDT	√	√	*
	OSD	√	√	*
Rate Of Turn (ROT)	ROT	√	√	√

Note: Items marked "*" are not possible to simulate.

TEST OF HIGH SPEED OUTPUT

IEC 61993-2, CLAUSE 19.6 (7.6.3)

(1) Method of measurement
Set up standard test environment and simulate VDL-position reports using test system.
Record output from the EUT high speed port (see table 11).

(2) Required results
Verify that the recorded message contents agree with the simulated VDL contents (VDM) and own transmitted data (VDO) and in accordance with the sentence specifications of IEC 61162-1.

(3) Test results

Conditions	Results
VDO sentence, 1 per second @ 38,400 bps	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 68, 89 to 91, 98, 100
....

HIGH SPEED OUTPUT INTERFACE PERFORMANCE   IEC 61993-2, CLAUSE 19.7 (7.6.3)

(1) Method of measurement
Set up standard test environment and operate EUT in autonomous mode.
Increase the VDL load to >90 %.
Record transmitted messages and check PI output of EUT on port for "external Display" and "auxiliary Display".

(2) Required results
Confirm that EUT outputs all received messages to the PI.
Repeat test for port "auxiliary display".

(3) Test results

Conditions	Results
External display (AUX1)	√
Auxiliary display (AUX2)	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 68, 89 to 91, 98, 100
....

TEST OF HIGH SPEED INPUT   IEC 61993-2, CLAUSE 19.8 (7.6.3)

(1) Method of measurement
Set up standard test environment.
Apply simulated input data, in accordance with the sentence specifications of IEC 61162-1 and 7.6.3.3 table 10, to the EUT and record VDL output.

(2) Required results
Verify that the VDL message contents agree with simulated input data.

(3) Test results

Conditions	Results
VSD	√
SSD	√
ABM	√
BBM	√
AIR	√
ACA (already tested 17.3)	√
ACK (already tested 14.9.2.5)	√
LRF (already tested 21.1)	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 86, 88

TEST EQUIPMENT USED:
1, 4 to 45, 68, 89 to 91, 98, 100
…………………………………………

DSC FUNCTIONALITY TESTS | IEC 61993-2, CLAUSE 20 (M.1371-1 A3)
GENERAL | IEC 61993-2, CLAUSE 20.1 (M.1371-1 A3/1)

(1) Method of measurement

For the tests in this clause (see also IEC 61993-1), set the EUT into autonomous mode using channels AIS1 and AIS2 with a reporting interval of 2 s.

Check with a sequence of valid calls consisting of a test signal number 1, a geographic call from ITU-R M.493, a test signal number 1, an individual call from ITU-R M.493 and a test signal number 1 that the EUT correctly receives and processes the three test calls and its correct AIS operation is not affected by the interleaved calls.

Check that the EUT does not respond to invalid calls – incorrect MMSI position outside addressed geographic area, different course, or ship's type.

Send to the EUT a standard test signal number 1 but with symbol numbers 104 and 03 followed by values 01 and 120 (Activate alternate system with group number 1 and sequence number 120).

Check that the EUT does not respond.

(2) Test results

Operation on 156.525 MHz

Method	Message	Reply Message	Result
General	Test signal 1, S103 (position), S111 (name).	S100, S115	√
EUT: AIS 1, 2 ch	VHF geographical call: (M493 lat36 dev10 lon139 dev10).	No response	√
Autonomous mode,	Test signal 1, S103 (position), S111 (name).	S100, S115	√
Reporting interval 2 sec.	VHF individual call (M493 MMSI 431100001).	No response	√
EUT POSITION	Test signal 1, S103 (position), S111 (name).	S100, S115	√
N 35.41.00	Test signal 1 with incorrect MMSI (431100002).	No response	√
E 139.20 SOG: 24 knots	Test signal 1 with position outside addressed geographical area: (N36 00 dev50, E139 40 dev50).	No response	√
COG: 90 degrees	Test signal 1 with different course (0).	No response	√
Ship type 61	Test signal 1 with different ship type (62).	No response	√
	Test signal 1 with symbol numbers: 104, 03, 01, 120.	No response	√

The EUT satisfied the requirements of this test.

Software used: 69, 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 58, 59, 61, 68, 89 to 91, 98, 100
....

SCHEDULING   IEC 61993-2, CLAUSE 20.3 (M.1371-1 A3/2)

(1) Method of measurement
Check that the time sequence of the TDMA messages is not changed when the EUT transmits a DSC signal.
Send a valid geographical call to the EUT.
Check that the response is transmitted after a random delay distributed over the range of 0 to 20 s and subject to the restrictions of ITU-R M.1371-1 A3/2.2.
Send a valid geographical call to the EUT followed by a signal consisting of test signal Number 1 with a signal level of −107 dBm at the receiver input of 25 s duration.
Check that the response is not transmitted.

(2) Test results

Conditions	Results
Time sequence of the TDMA when transmits a DSC signal	√
Reporting interval 2 seconds	√
A valid geographical call	√
Valid geographical call followed by a signal consisting of test signal Number 1 (25 s duration)	√

Test performed on 156.525 MHz

The EUT satisfied the requirements of this test.

Software used: 69, 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 58, 59, 61, 68, 89 to 91, 98, 100
....

Ambient temperature +23°C   Relative humidity 44%

REGIONAL AREA DESIGNATION   IEC 61993-2, CLAUSE 20.2 (M.1371-1 A3/5)

(1) Method of measurement
Perform the test specified in 17.2 using the following DSC command:
Send to the EUT a standard test signal number 1 but with symbol numbers appropriate to the geographical
regions and channels specified in the test. Note the transition boundary is 5 nm in this test.

(2) Required results
Check that the EUT transmits and receives on the primary channels assigned for each region alternating
channels and doubling reporting rate when passing through the transitional zones.
EUT shall revert to default autonomous operation on the regional channels after leaving the transitional zones.

(3) Test results

Conditions	Results
Default region	√
First transitional zone	√
Region 2	√
Second transitional zone	√
Region 1	√

Tests performed at 156.525 MHz

The EUT satisfied the requirements of this test.

Software used: 69, 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 58, 59, 61, 68, 89 to 91, 98, 100
....

POLLING   IEC 61993-2, CLAUSE 20.4 (M.1371-1 A3/3)

(1) Method of measurement
*Check that the EUT is capable of receiving, processing and automatically transmitting a response to the
following calls from ITU-R M.825: 101 (command to duplex-channel), 102, 103, 108, 109, 111, 112, and 116.
The sequence of calls consisting of test signals number 1 and valid geographic calls shall demonstrate the
capability of the EUT to operate on single frequency channels as well as on two frequency channels.*
*Verify through this test, that ships maritime mobile service identify (MMSI), ship name, ships length and type of
ship is programmed into the EUT.*
*Send a standard test signal number 1 with additional symbols number 109 and 116 and check that the reply
messages 100, 119 and 120 are programmed automatically.*
*Check that when information is not available to respond to a command the transmitted response is followed by
the symbol 126.*
Send a standard test signal number 1 with additional symbol 101 followed by channel number 87.
*Repeat the test with channel number 88 and with symbol 104 and 00 followed by channel number 2087 and
2088.*
Check in all cases that the response is made on channel 70.
*Send a DSI sentence to CH 4 and CH 5 (see annex D) with an individual station address and with command
sets 103 (report your position) and 111 (report ship name).*
Check that the EUT does not transmit a DSC message.
Set the RF output power of the EUT high/low using the appropriate DSC command.
Check that the output power is set accordingly.

(Continued..)

(2) Test results

Send message	Response message	Results
Switch to VHC channel (101)	Message acknowledged (110)	√
Report your position now and at intervals of ... minutes (102)	My position is .. at time .. (100)	√
Report your position (103)	My position is .. at time .. (100)	√
Report length of ship (108)	Length of ship is .. meters (124)	√
Report course of ship (109)	Course of ship is .. degrees (119)	√
Report ship's name / identification (111)	Ship's name/identification is .. (115)	√
Acknowledge message (112)	Message acknowledged (110)	√
Report speed of ship (116)	Speed of ship is .. knots (120)	√
standard test signal number 1 with symbols 109 and 116	(100),(115),(119),(120)	√
Report your position now and at intervals of ... minutes (102)	No information (126)	√
Report your position (103)	No information (126)	√
Report length of ship (108)	No information (126)	√
Report course of ship (109)	No information (126)	√
Report ship's name / identification (111)	No information (126)	√
standard test signal number 1 with 101 followed by channel number 87.	response is made on channel 70	√
with 101 followed by channel number 88.	response is made on channel 70	√
with symbol 104 and 00 followed by channel number 2087	response is made on channel 70	√
with symbol 104 and 00 followed by channel number 2088	response is made on channel 70	√
Send a DSI sentence to PI (CH4, CH5) with an individual station address and with command sets 103 and 111.	not transmit a DSC message	√
Set the RF output power Low (104)	output power is set to Low	√
Set the RF output power High (104)	output power is set to High	√

(Continued..)

The EUT satisfied the requirements of this test.

Software used: 69, 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 58, 59, 61, 68, 89 to 91, 98, 100
....

LONG RANGE FUNCTIONALITY TESTS   IEC 61993-2, CLAUSE 21 (9)
LR INTERROGATION   IEC 61993-2, CLAUSE 21.1 (9.2)

(1) Method of measurement
Set up standard test environment and operate EUT in autonomous mode.
Apply a LR addressed interrogation message to the LR-interface port of EUT; Record LR output port and AIS high-speed output port. Set EUT to
– automatic response
– manual response via MKD
– manual response via PI

(2) Required results
Check that EUT displays LR interrogation messages and sends to PI.
Check that EUT outputs a LR position report message
– automatically (and indicates action on display)
– after manual confirmation via MKD
– after manual confirmation via PI

(3) Test results

Conditions	Results
Automatic response	√
Manual response via MKD	√
Manual response via PI	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 68, 89 to 91, 98, 100
....

LR "ALL SHIPS" INTERROGATION   IEC 61993-2, CLAUSE 21.2 (9.2)

(1) Method of measurement
Set up standard test environment and operate EUT in autonomous mode.
Apply a LR "all ships" interrogation message to the LR-interface port of EUT defining a geographical area
which contains own ship's position; Record LR output port. Set EUT to:
– automatic response
– manual response.
Repeat check with own ship outside specified area.

(2) Required results
Check that EUT outputs a LR position report message
– automatically (and indicates action on display)
– after manual confirmation.
No response shall be output on the repeat check.

(3) Test results

Conditions	Results inside specified area	Results outside specified area
Automatic response	√	√
Manual response	√	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 68, 89 to 91, 98, 100
....

CONSECUTIVE LR "ALL SHIPS" INTERROGATIONS   IEC 61993-2, CLAUSE 21.3 (9.2)

(1) Method of measurement
Set up standard test environment and operate EUT in autonomous mode.
Set EUT to automatic mode.
Apply 5 LR "all ships" interrogation messages to the LR-interface port of EUT defining a geographical area
which contains own ship's position;
Record LR output port. Set the control flag in the LRI message to
– 0 (reply on first interrogation only)
– 1 (reply on all applicable interrogations).

(2) Required results
Check that EUT outputs a LR position report message
– on the first interrogation only
– on all interrogations.

(3) Test results

Conditions	Results
– 0 (reply on first interrogation only)	√
– 1 (reply on all applicable interrogations)	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 68, 89 to 91, 98, 100
....

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment, software and ancillaries are identified (numbered) by the Test Laboratory.

No	Instrument/Ancillary	Type	Manufacturer	Serial Number
1	Digital Multimeter	87 True RMS	Fluke	JRC INV 00-94290
2	Climatic Chamber	EC-850LHPS	Hitachi	U5971329
3	Vibration System	G-8230	Sinkenn	SG-1880-1
4	Power Supply Variable ac	PCR 1000	Kikusui	10100831
5	Power Supply 24 V dc	GP 035-15	Takasago	11984057
6	PC (Gyro and GPS)	PC-A435	Sharp	69039103
7	GPS Simulator	JLR-6800	JRC	KD22890
8	GPS Rx Ship 2	JLR-7700 Mk 2	JRC	KD92222
9	Power Supply	NBA-3581A	JRC	-----
10	RS422/232 converter	SI-20	Line Eye	62201006
11	RS422/232 converter	SI-20	Line Eye	62201007
12	PC	PCG505	Sony	S97-3151-0
13	RS422/232 converter	BRS422	BITS	1668
14	RS422/232 converter	CB-1D	Contec	------
15	PC (IEC 61162)	GXL 5133	Dell	961057
16	RS422/232 converter	SI-20A	Sekisui	72912028
17	RS422/232 converter	RC23	R A Systems Corp'n	205703
18	Ship 2 AIS Transponder	NTE-180	JRC	BB30002
19	Ship 3 AIS Transponder	NTE-180	JRC	BB30003
20	Ship 4 AIS Transponder	NTE-180	JRC	BB30004
21	Ship 5 AIS Transponder	NTE-180	JRC	BB30005
22	Ship 6 AIS Transponder	NTE-180	JRC	BB30006
23	Ship 6 AIS Controller	NCM-722	JRC	BB10002
24	Ship 3 AIS Controller	NCM-722	JRC	BB10003
25	Ship 4 AIS Controller	NCM-722	JRC	BB10004

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment, software and ancillaries are identified (numbered) by the Test Laboratory.

| No	Instrument/Ancillary	Type	Manufacturer	Serial Number
26	Ship 5 AIS Controller	NCM-722	JRC	BB10005
27	Ship 2 AIS Controller	NCM-722	JRC	BB10006
28	Connection Box	NQE-3111	JRC	BB20002
29	Connection Box	NQE-3111	JRC	BB20003
30	Connection Box	NQE-3111	JRC	BB20004
31	Connection Box	NQE-3111	JRC	BB20005
32	Connection Box	NQE-3111	JRC	BB20006
33	Power Supply Ship 2	NBD-577A	JRC	9803432
34	Power Supply Ships 3, 4	NBD-577A	JRC	9909968
35	Power Supply Ships 5, 6	NBD-577A	JRC	9909958
36	Ship 1 Dummy Load (EUT)	DL330A	Fujisoku	63263
37	Ship 2 Dummy Load	DL530A	Fujisoku	45286
38	Ship 3 Dummy Load	4D295	SPC	R23802
39	Ship 4 Dummy Load	N-TMP-10	HRS	16
40	Ship 5 Dummy Load	6*330R.PAR	JRC	NONE
41	Ship 6 Dummy Load	6*330R.PAR	JRC	NONE
42	Gyro Simulator	Software	JRC	None
43	Stopwatch	8A20-0010	Seiko	JRC INV 01-97234
44*	Digital Multimeter	79 Mk3	Fluke	74970620
45*	THG	A1	Rotronic	10400 016
46	Signal Generator	SMIQ 03B	Rohde & Schwarz	838288/064
47	Signal Generator	8658B	HP	2838U05656
48	Signal Generator	8648A	HP	3642U01016
49	Spectrum Analyser	8595A	HP	3039A00128
50	Termination Power Meter	TP-2503A	Fujisoku	64815

* Items owned by BABT

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment, software and ancillaries are identified (numbered) by the Test Laboratory.

No	Instrument/Ancillary	Type	Manufacturer	Serial Number
51	Frequency Counter	MF57A	Anritsu	M79035
52	FM Linear Detector	AK-5507B	Ando	73832101
53	Oscilloscope	9354TM	LeCroy	93542547
54	Frequency Analyser	5371A	HP	2842A00662
55	Fixed Attenuator	8498A	HP	1801A03283
56	Crystal Detector	423A	HP	1822A09353
57	T-Pad	Z-164A	Anritsu	M63986
58	Marine VHF Radiophone	JHS-32A	JRC	BH97877
59	DSC Modem	----	JRC	No. 1
60	DSC Modem	----	JRC	No. 2
61	Dummy Load	DI-30A	Diamond Antenna	None
62	Dummy Load	6*330R.PAR	JRC	None
63	PC	PC-5NV01-YA5DA	Hitachi	32120
64	PC	2609-82J	IBM	BA-YDZGM
65	AIS Transponder	NTE-180	JRC	BB30007
66	RS422/232 converter	SI-20A	Sekisui	72810028
67	Power Supply 24 V dc	GP035-5	Takasago	974831
68	Power Supply 5 V dc	PW18-1T	Kenwood	3090023
69	DSC Modem controller	Software	JRC	V 1.05E
70	AIS checker	Software	JRC	V 0.2.2
71	DotERT	Software	JRC	V 0.1.0
72	STS1ERT	Software	JRC	V 0.1.0
73	GMSK PERT	Software	JRC	V 0.1.1
74	Spectrum Analyser	8563A	HP	3220A01921
75	Resistance Attenuator	MN510C	Anritsu	M66490

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment, software and ancillaries are identified (numbered) by the Test Laboratory.

| No	Instrument/Ancillary	Type	Manufacturer	Serial Number
76	Signal Generator	8643A	Agilent Technology	3309A00724
77	Four Port Junction Pad	MP659A	Anritsu	-------
78	PC	2621	IBM	AA-FNWBP00/04
79	Signal Generator	SMIQ03B	Rohde & Schwarz	838288/064
80	Signal Generator	8664A	Agilent Technology	3438A00725
81	Universal Counter	TR5823	Advantest	00570613
82	GPS simulator	Software	JRC	Ver. 1.0
83	Gyro simulator	Software	JRC	Ver. 1.0
84	Sensor Simulator	Software	JRC	Ver. 1.0
85	VDO/VDM converter	Software	JRC	Ver. 1.0
86	AIS generator	Software	JRC	Ver. 1.0
87	Excel	Software	Microsoft	97 SR2
88	Tera Term Pro	Software	Free	Ver. 2.3
89	3dB coupler	HDH-01703CHD	Hirose	0437
90	DC Blocker	---	JRC	No.1
91	PC	A20m	IBM	97-932N7
92	Oscilloscope	DL-1200E	Yokogawa	23XF7318
93	DGPS Beacon Receiver	NRB-2J	JRC	BR88179
94	AIS BASE transponder	NTE-180	JRC	BB30008
95	AIS BASE controller	NCM-722	JRC	BB10007
96	AIS BASE connection box	NQE-3111	JRC	BB20007
97	AIS BASE power supply	NBD-577A	JRC	9910249
98	PC	PC-7DM08-KFOXB	Hitachi	981005
99	Signal Generator	MG3633A	Anritsu	MT11580
100	RS422/232 converter	PCI4147	Interface	----
101	DOTertg (bargraph)	Software	JRC	V1.0

* Items 44 and 45 are owned by BABT, all other items were supplied by JRC.
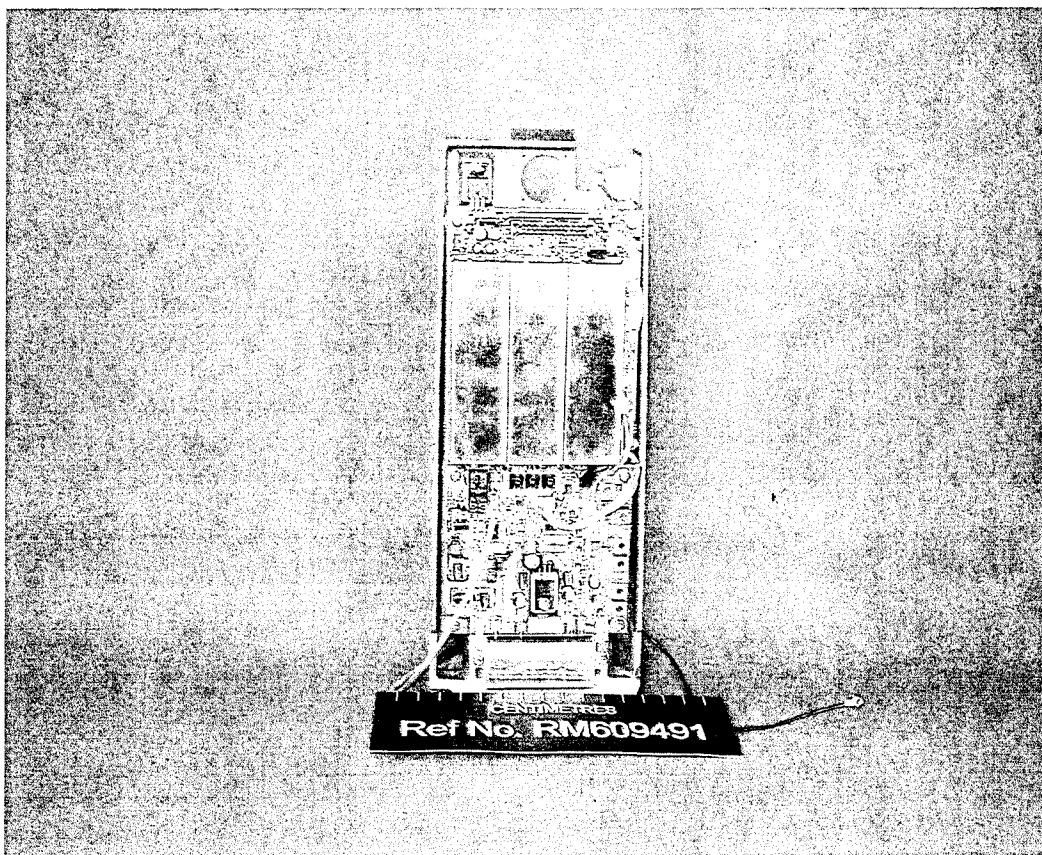
Remarks
For the test equipment listed above which was supplied by JRC Limited, the calibration certificates have been checked by BABT to ensure they meet UKAS requirements. Copies are held at BABT, Fareham.
Where test equipment is owned by BABT the calibration records are held at BABT, Fareham.
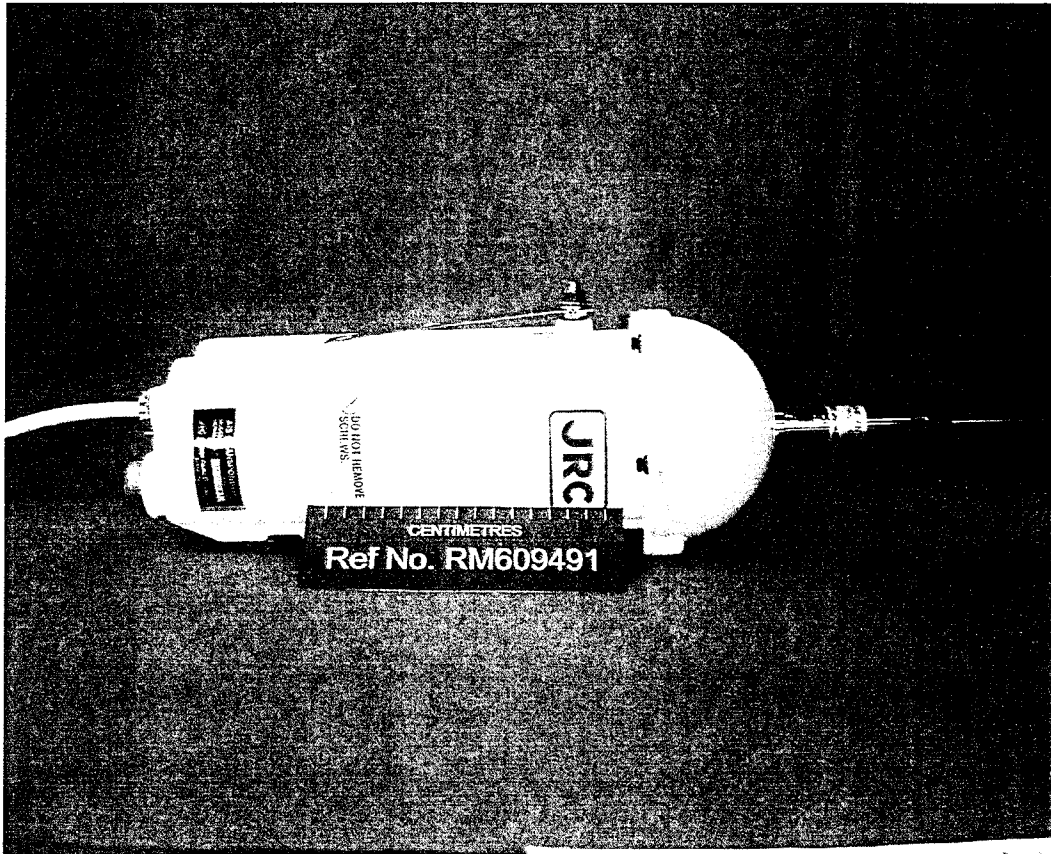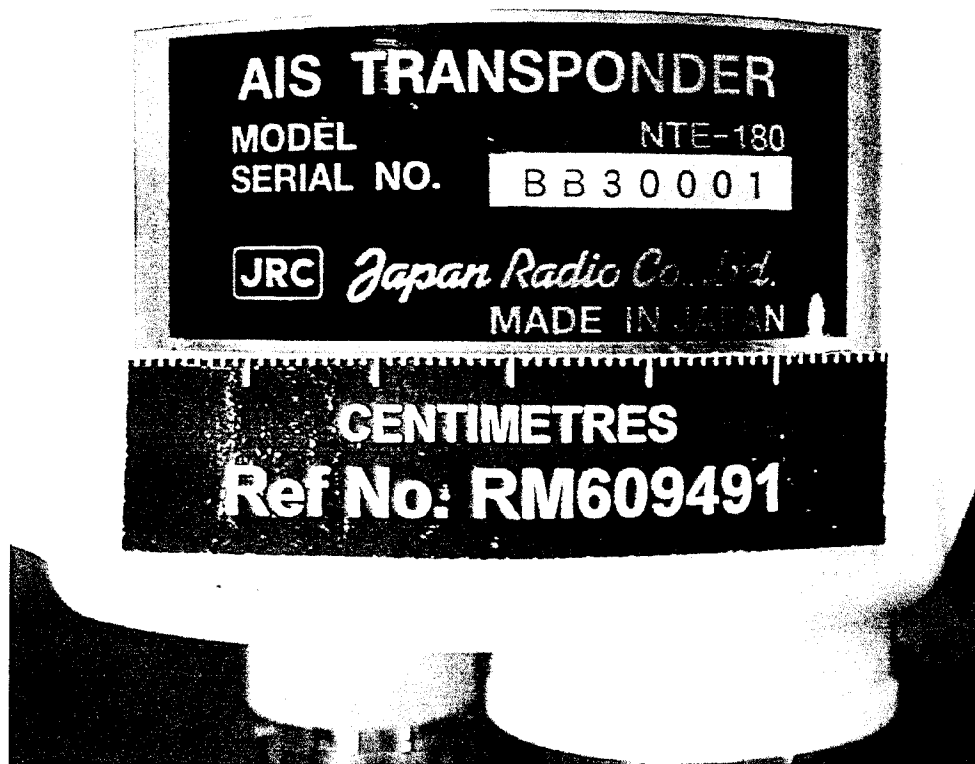
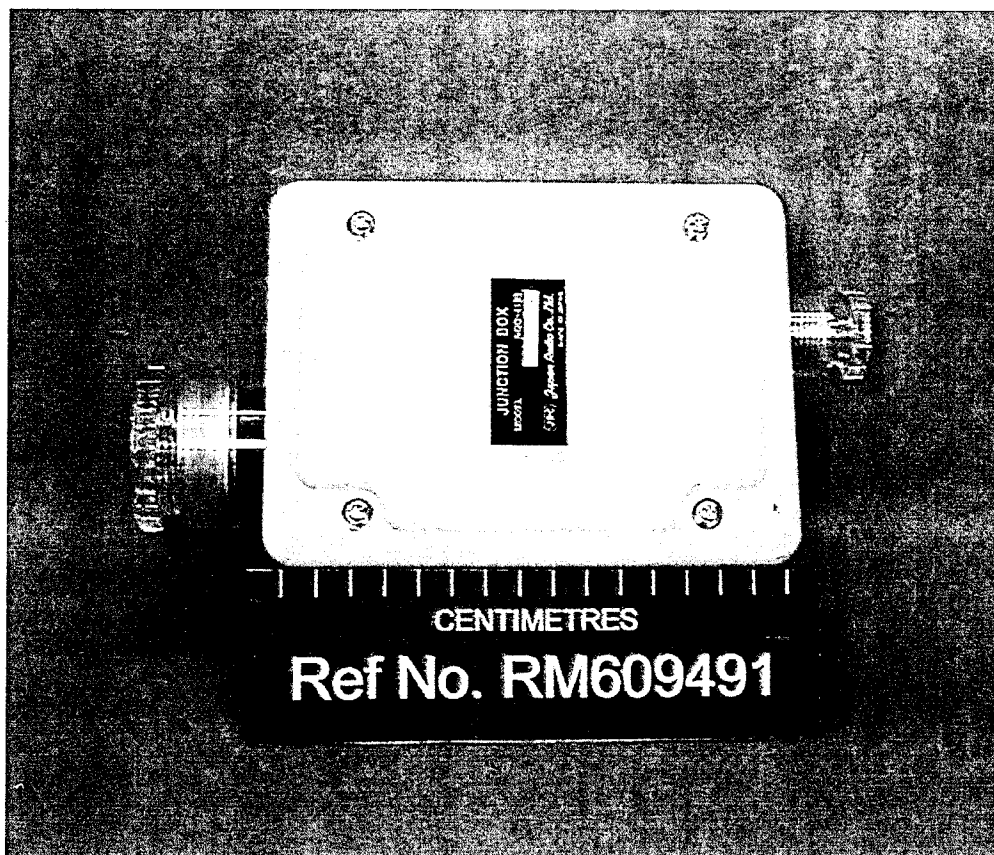NTE-180 Transponder – Front View
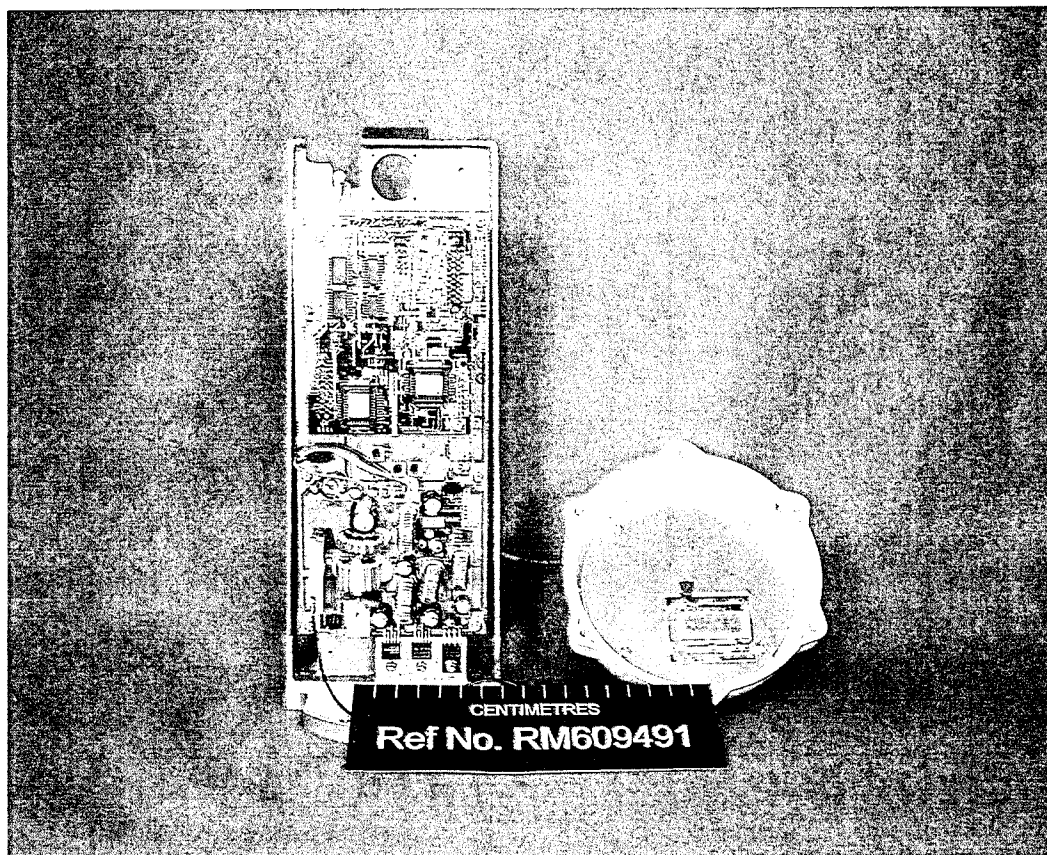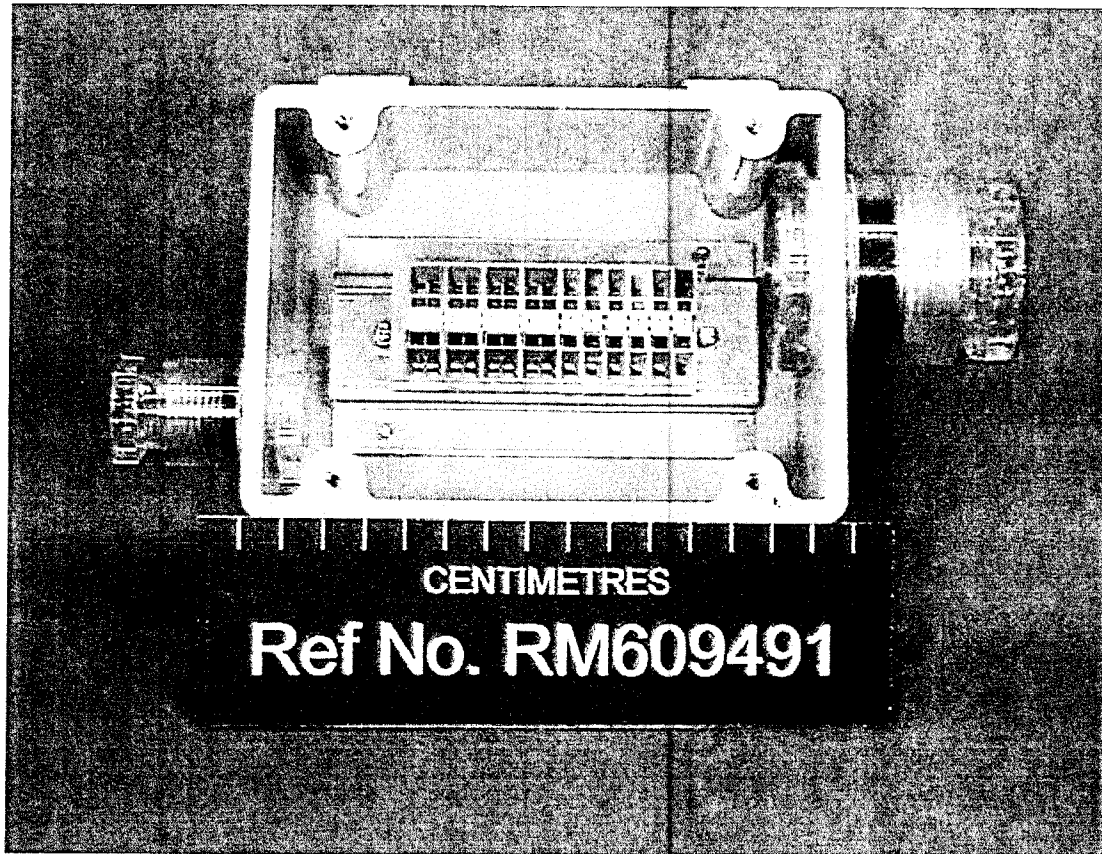
NTE-180 Transponder – Internal View 1
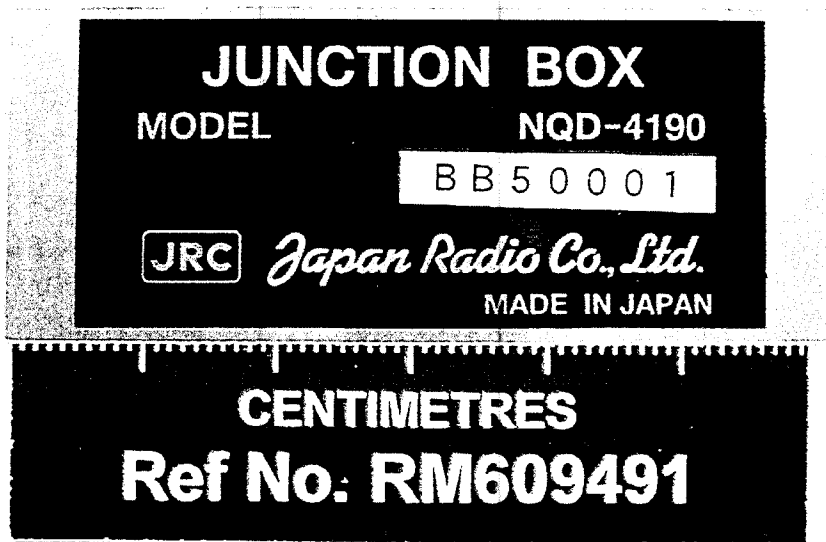
NTE-180 Transponder – Internal View 2

NTE-180 Transponder – Label View

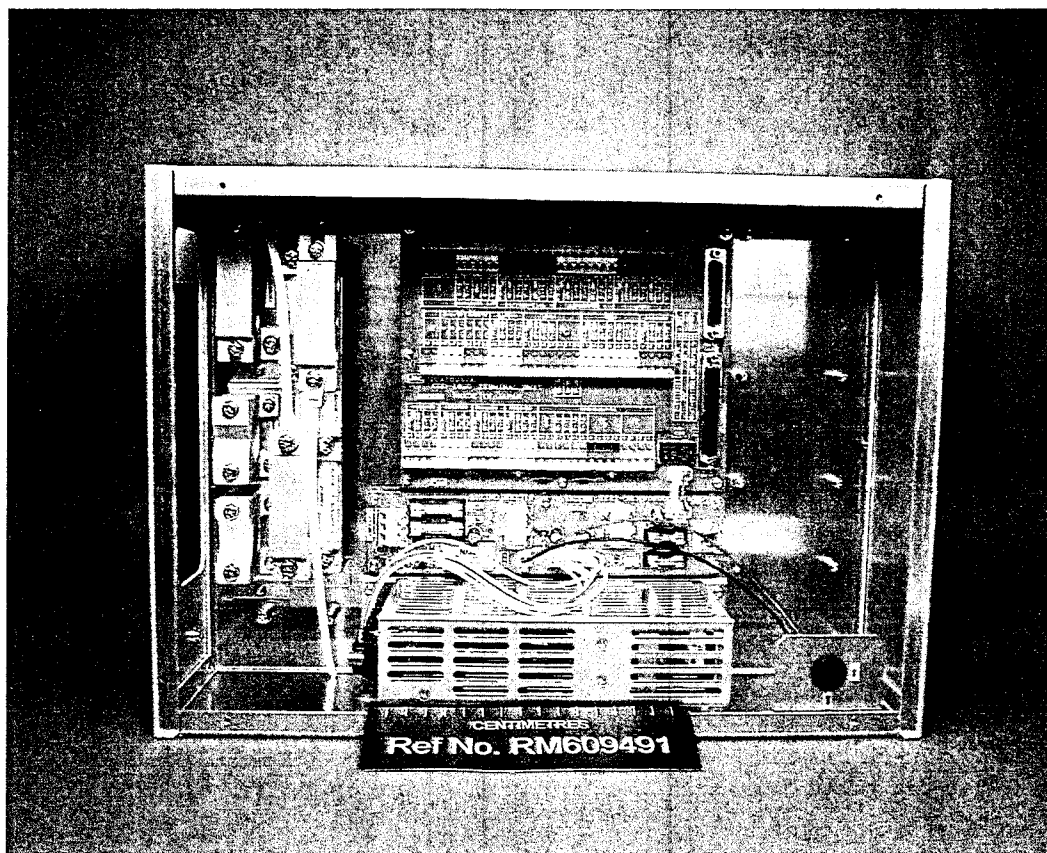NQD-4190 Junction Box – Front View

NQD-4190 Junction Box – Internal View
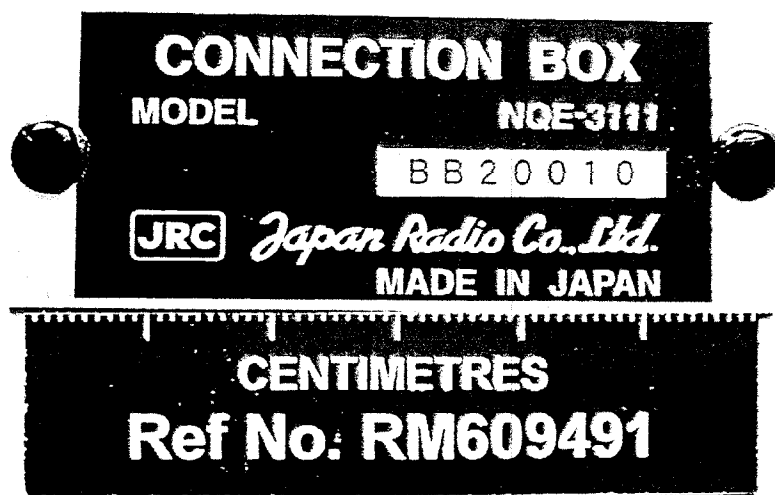
NQD-4190 Junction Box – Label View

NQE-3111 Connection Box – Front View

NQE-3111 Connection Box – Internal View

CONNECTION BOX
MODEL   **NQE-3111**
BB20010
JRC *Japan Radio Co., Ltd.*
MADE IN JAPAN
CENTIMETRES
Ref No. RM609491

NQE-3111 Connection Box – Label View