Chapter 8 Trouble Shooting And On Board Servicing

This chapter covers simplified fault locating procedures to enable faulty areas to be identified on your vessel.

8.1 Information required for service

Please advise the following details:
(1) Name of vessel, Satcom number if available.
(2) Equipment type name
(3) Equipment serial number
(4) Software type name, shown on the standby screen and stated in this manual.
(5) Next port of call, ETA and ship's agent
(6) Faulty conditions and the result of on board check

8.2 Self diagnosis functions provided

The equipment provides on-screen alarm messages and the status indicator inside the display unit.

8.2.1 Alarm messages

The following alarm messages will be shown as a result of diagnosis by the built-in self-check function if the equipment becomes faulty. Details are as follows:

Table 8.1 Alarm messages shown on the screen

Alarm messages	Faults detected
ANTENNA ABNORMAL (NO RESPONSE)	Communication between Antenna and Processor is faulty. Suspect no Antenna connection.
AZIMUTH ABNORMAL	The azimuth pulse signal is erratic in timing or frequency or no signal input to the processor.
HEADING LINE ABNORMAL	The Heading Line signal is erratic or no signal input to the processor.
TRIGGER ABNORMAL	Master trigger pulse is erratic in timing and level or, not present at all.
MAGNETRON CURRENT ABNORMAL	Magnetron current is not within specified range.
250V ABNORMAL	High voltage supply for Modulator Unit is not within specified range.
MAGNETRON HEATER CURRENT ABNORMAL	Magnetron heater current is not within specified range.

(Alarm messages)

Alarm messages	Faults detected
RADAR VIDEO ABNORMAL	Video signal sent from the transceiver unit is erratic or not present at all.
GYRO HDG XXX	No bearing data is applied to the display unit.
LOG SPD XXX	No speed data is applied to the display unit.

8.2.2 Status indicators

Two LEDs (Light Emitting Diodes) are provided on the Logic board fitted inside the processor unit. These LEDs indicate the operational status of the software and hardware used in this system. Details of the indications are as follows:

Table 8.2 Status indications

LED No.	Usage	Operational status	LED status
DS1	Software check	Normal	ON
		Failure	OFF
DS2	Hardware check	Normal	ON
		Failure	OFF

Location of the status indicators

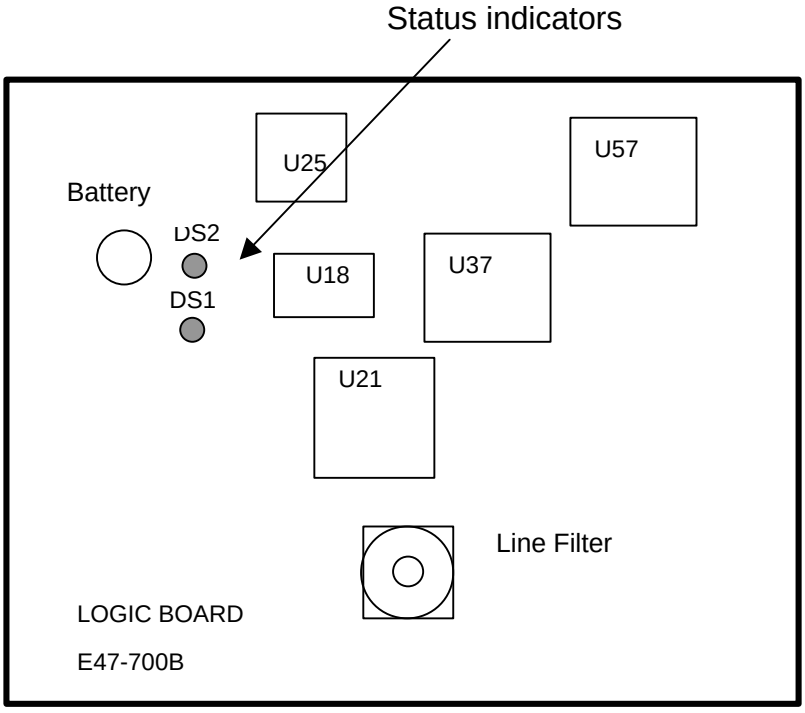


Figure 8.1 Location of status indicators

8.3 Trouble shooting

This section provides information required to fix or diagnose the faulty part in RA83/84/85/93/94/95 radar systems.

8.3.1 First-line faultfinding

Use the following tables that show brief diagnosis schedule to assist first-line servicing on board the ship.

Table 8.3 Primary faults

Description of fault	Possible cause of failure	Corrective measures
Radar does not turn on	1. Power cable is disconnected. 2. Power supply voltage is outside of the specified value. 3. Main fuse is blown.	1. Connect the power cable and secure the cable plug connection. 2. Use properly rated power supply. 3. Replace the fuse with new one.
Radar turns on but nothing displayed on the screen	1. Brilliance control is set at minimum position. 2. LCD is defective. 3. LCD driving circuits are defective.	1. Turn the brilliance control CW to set proper brilliance. 2. Call for service. 3. Call for service.

Table 8.4 Possible faults

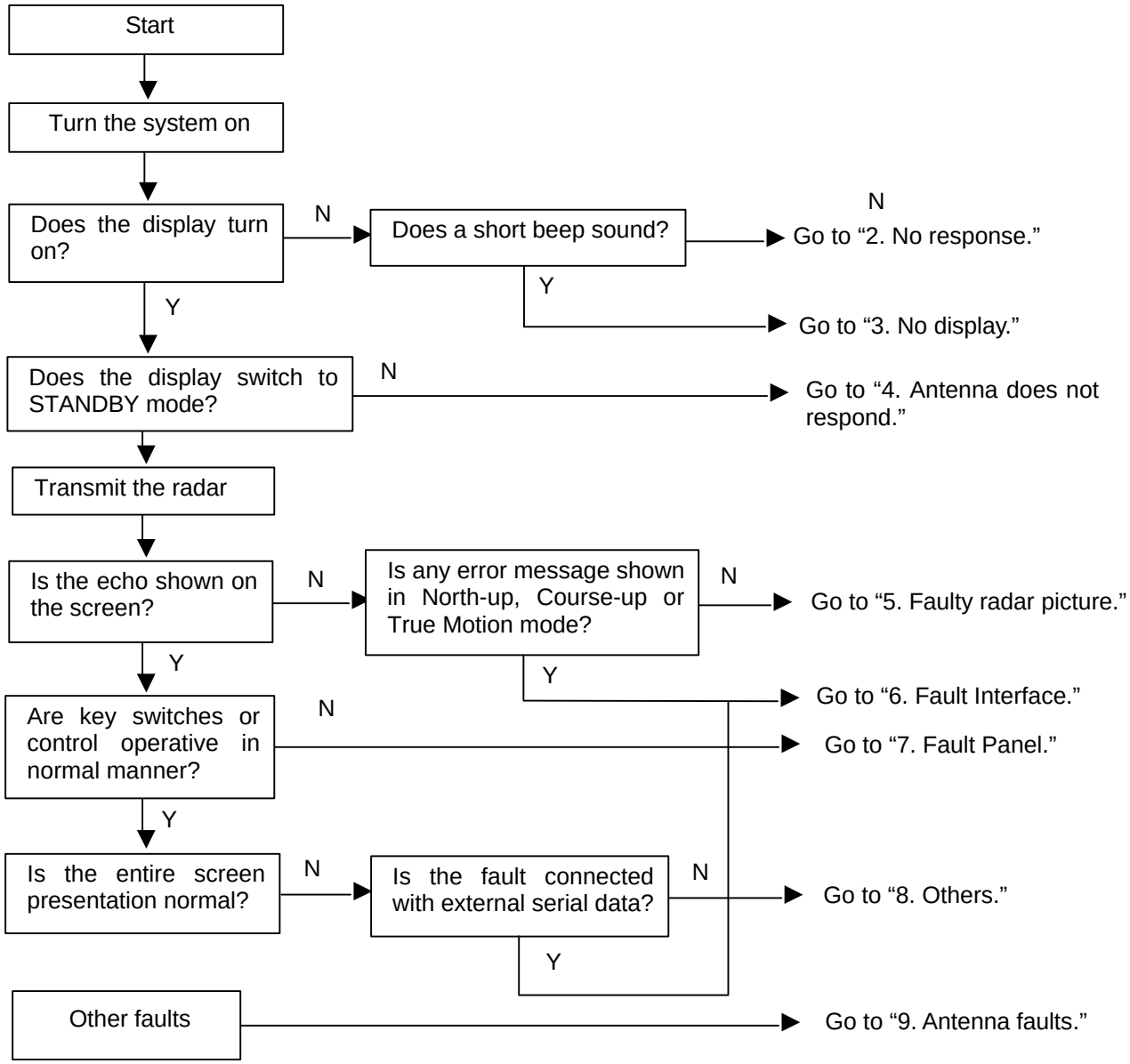
Description of faults	Possible cause of failures	Corrective measures
Screen is dark	1. Brilliance of the screen is not properly set. 2. LCD driving circuits are defective.	1. Turn the brilliance control CW to set proper brilliance. 2. Call for service.
No targets shown	1. Tuning is deviated. 2. Video contrast is poor. 3. Transceiver is defective.	1. Re-adjust tuning referring to para 6.2.14 and 6.2.15 in this manual. 2. Re-adjust contrast referring to para 6.2.1 3. Turn on Performance Monitor to isolate the faulty section. 4. Call for service.
Targets are weak	1. Tuning has drifted. 2. Magnetron or MIC is faulty.	1. Re-adjust tuning referring to para 6.2.14 and 6.2.15 in this manual. 2. Call for service.
No markers (HL, EBL, VRM, Range Rings, Parallel Index Line, Alarm Zone)	1. Marker video contrast is not properly set. 2. Logic board is defective.	1. Re-adjust Marker contrast referring to para 6.2.2. 2. Call for service.
Heading Line is missing	1. Heading Line signal is not applied to the display.	1. Check for cable connections for HL signal at antenna and display units.

Description of faults	Possible cause of failures	Corrective measures
Aerial does not rotate	1. Motor fuse is blown. 2. Turning motor is not powered. 3. Turning motor brushes are worn out.	1. Replace the motor fuse with new one. 2. Check the connections for motor power supply line. 3. Replace the motor brushes.

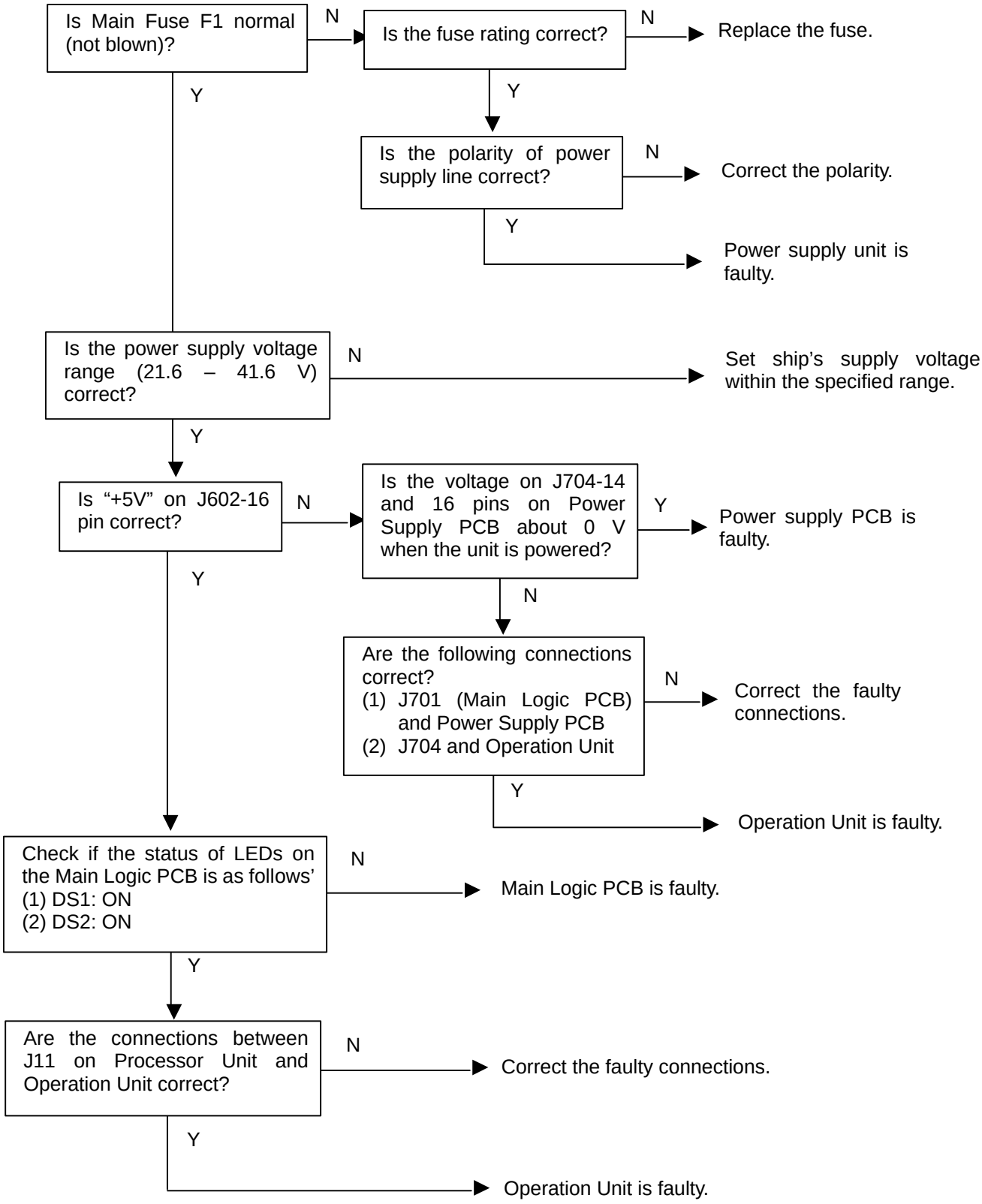
8.3.2 Faultfinding chart

The following faultfinding charts are prepared for a service engineer to allow him to diagnose and locate a faulty part on a module basis. The charts are systematically arranged from primary fault analysis to finding a path to a detailed flow chart that follows.

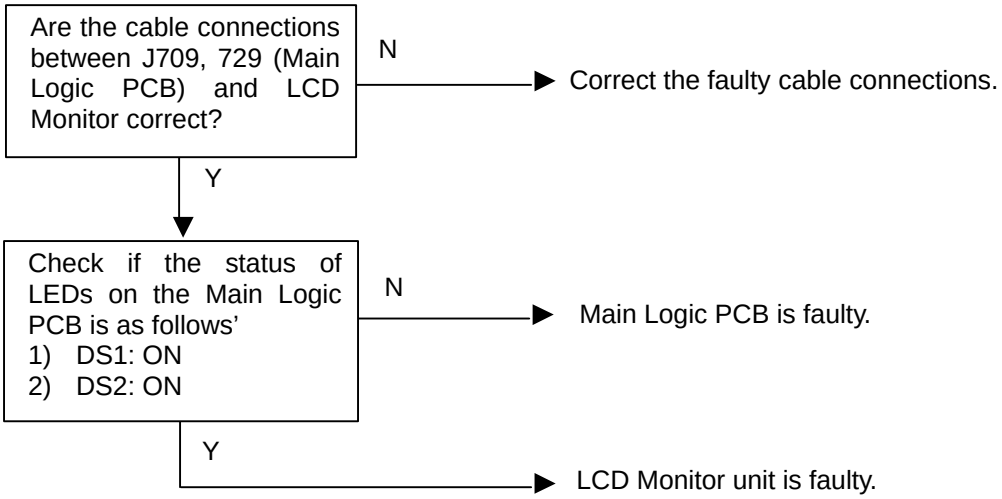
1. Fault analysis



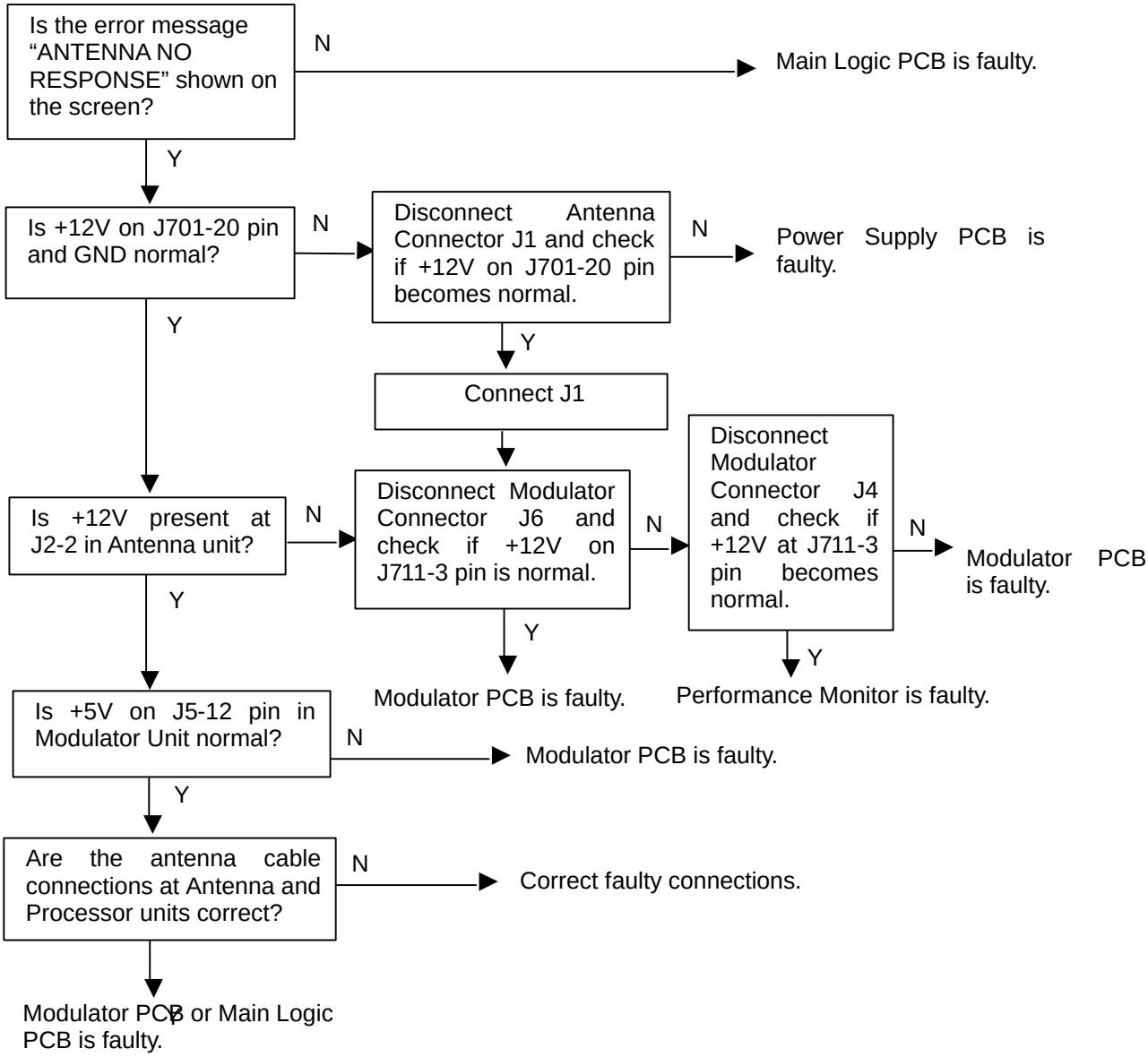
2. No response



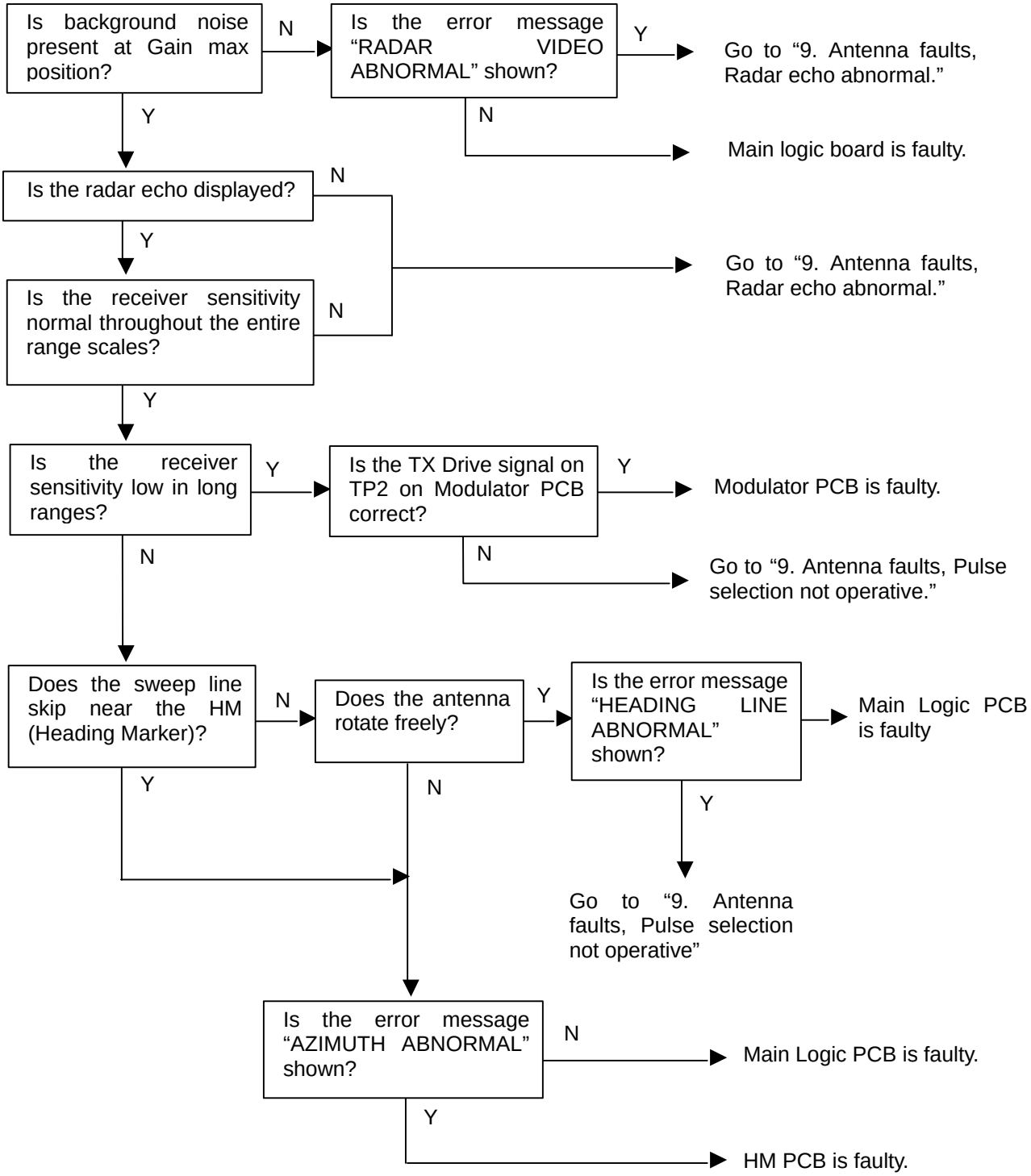
3. No display



4. Antenna does not respond

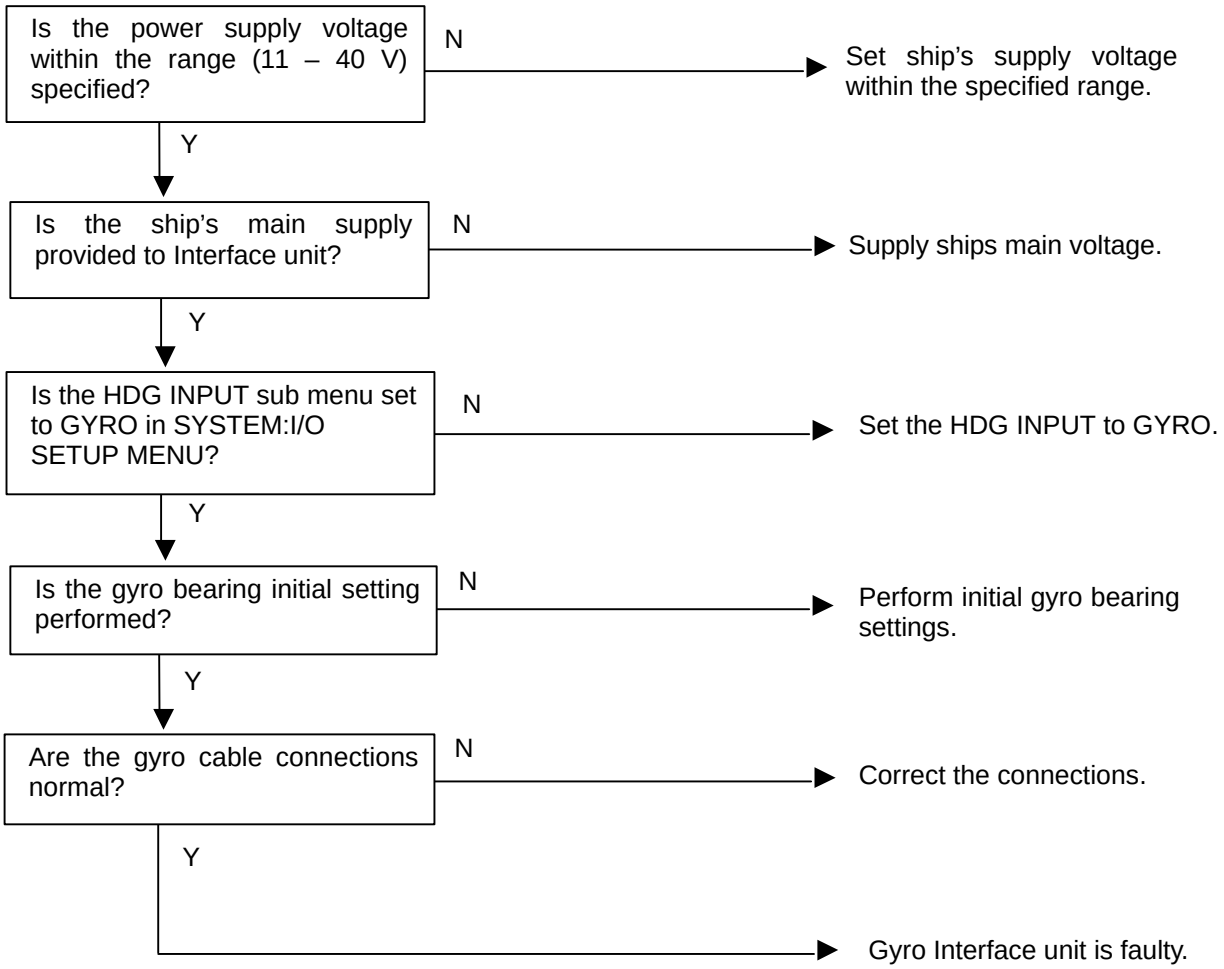


5. Faulty radar picture

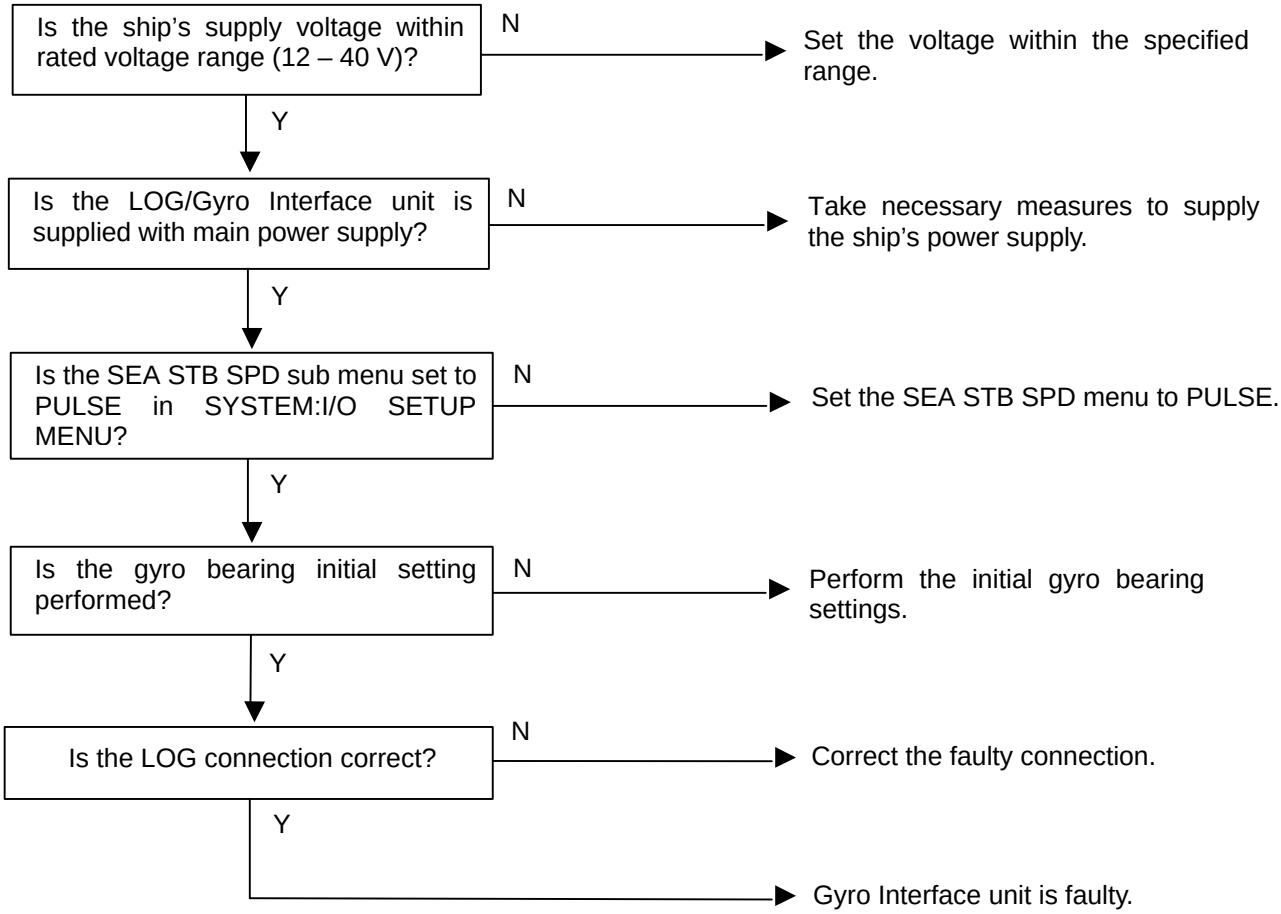


6. Interface

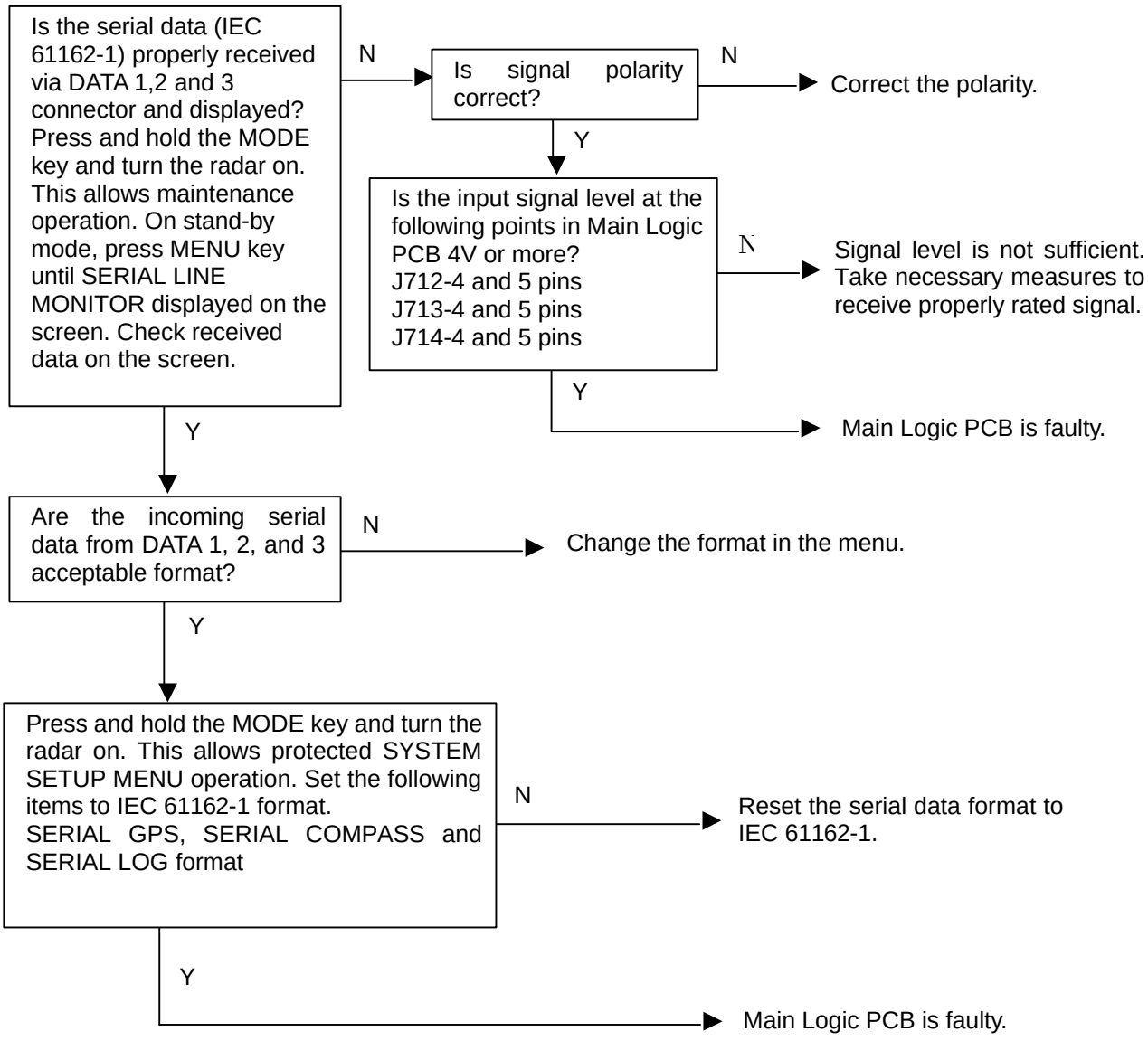
(1) Gyro Interface



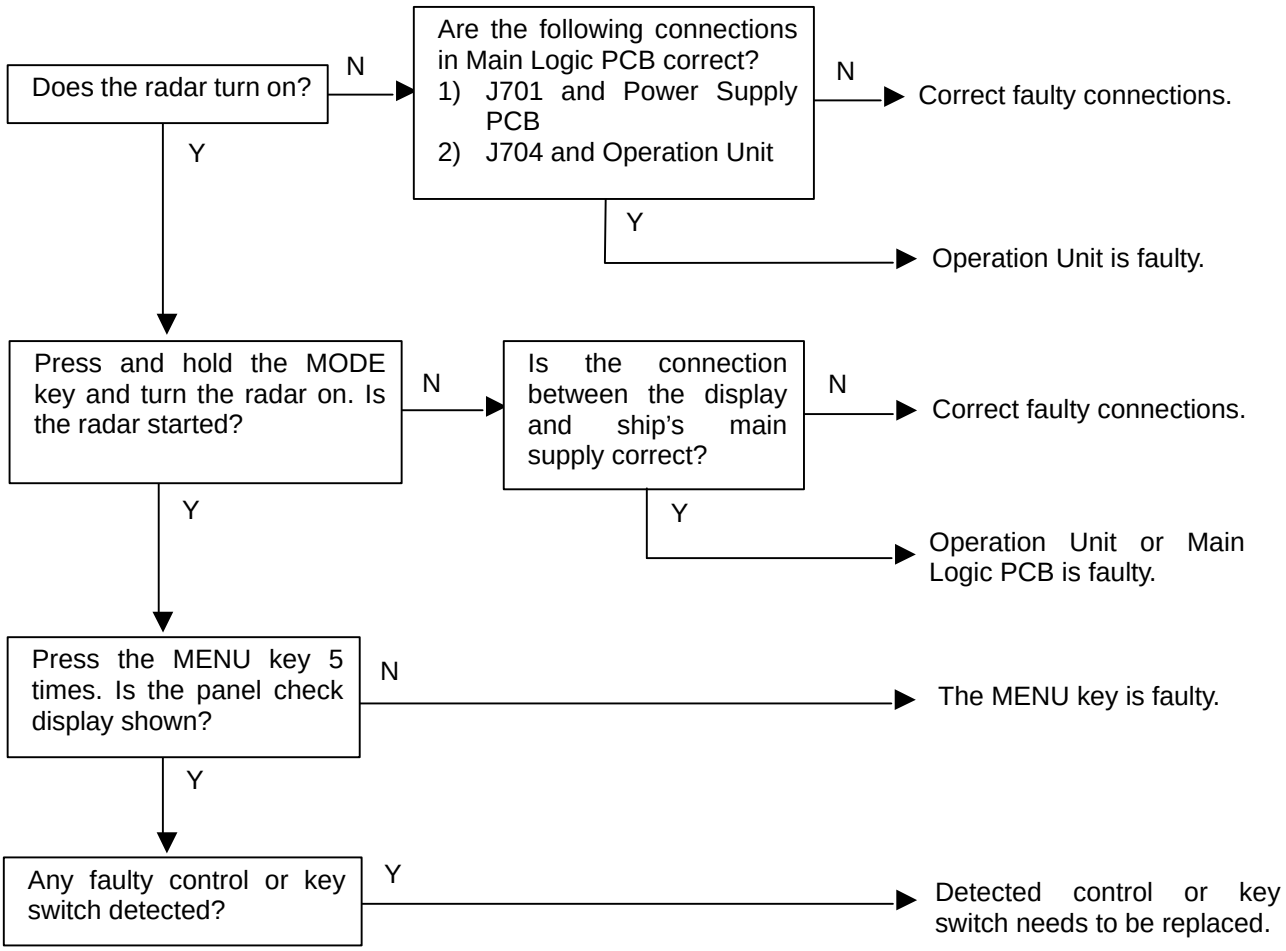
(2) LOG Interface



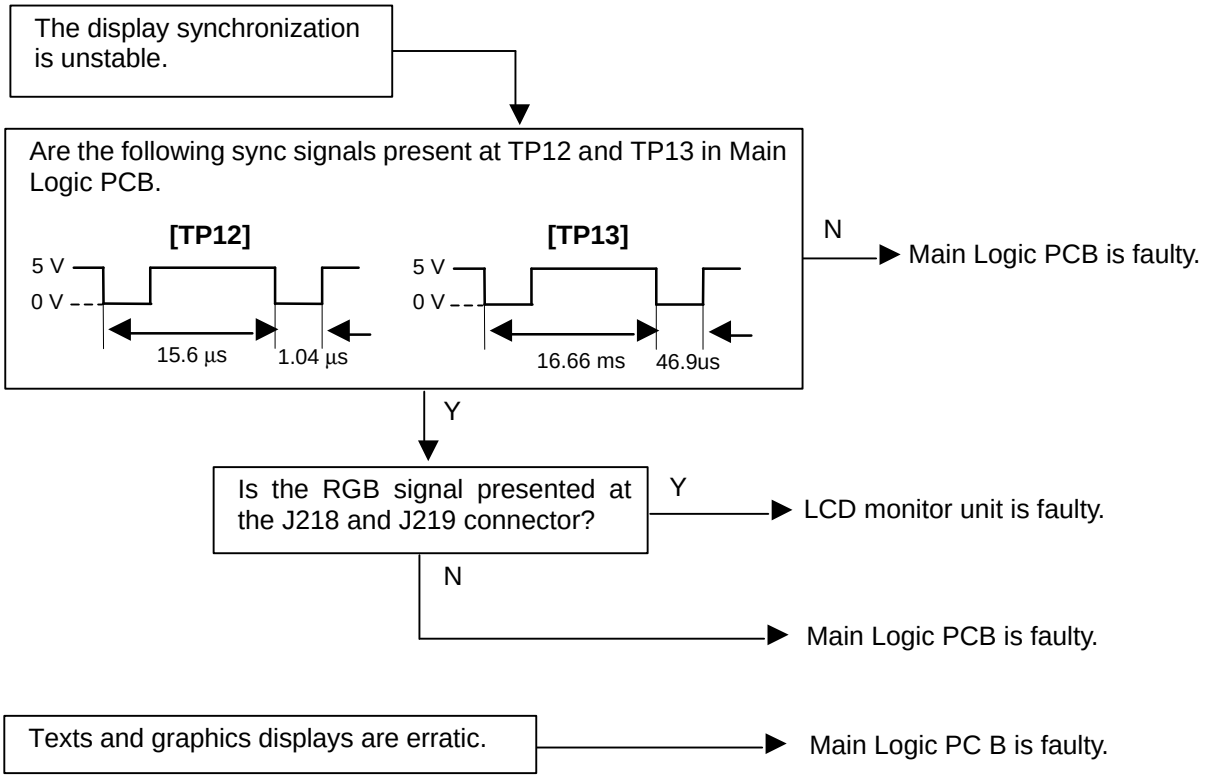
(3) IEC 61162-1 Interface



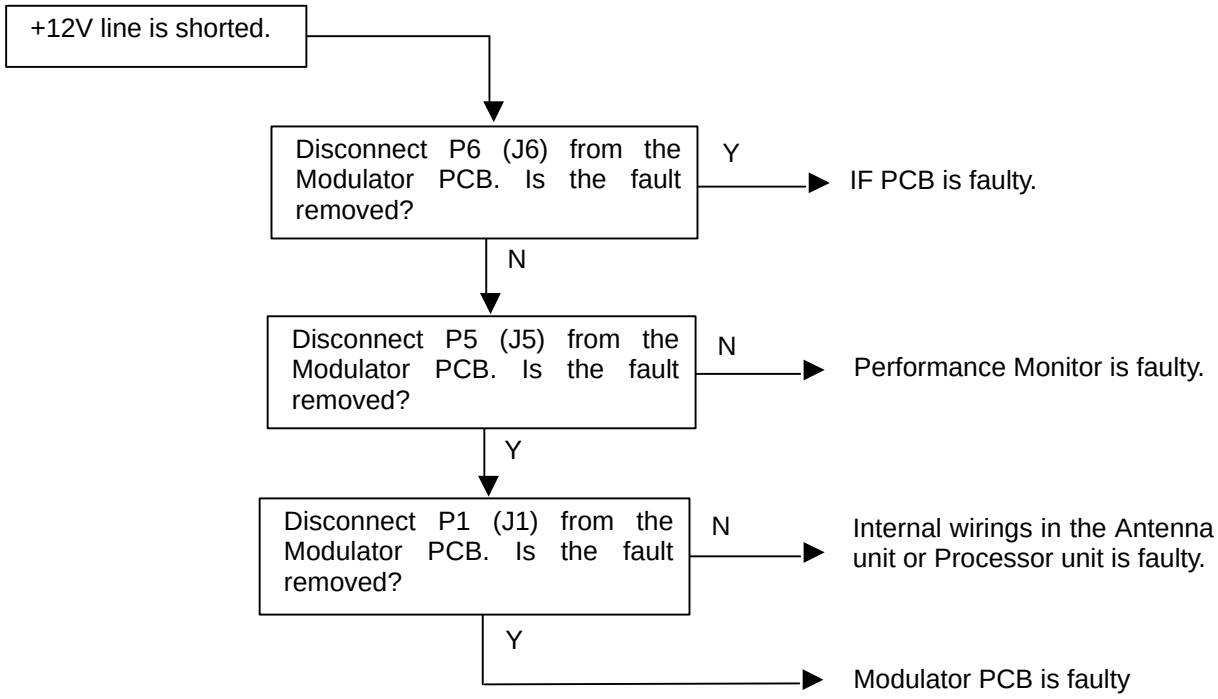
7. Operation Unit



8. Others



9. Antenna unit



+250 V line is shorted

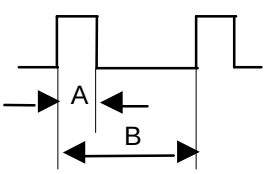
Disconnect J2 from the Modulator PCB. Is the fault removed?

N → Internal wiring in the Antenna unit or Processor unit is faulty.

Y → Modulator PCB is faulty.

Pulse selection function is faulty

Waveform on TP2



Pulse length	A (ns)	B (ms)
SP	100	0.5
M1	200	0.67 or 0.77
M2	550	1 or 1.25
LP	1050	2 or 2.5

Is the TX drive signal on TP2 (Modulator PCB) normal?

Y → Modulator PCB is faulty.

N

Is +24V present on J1-1 pin (Modulator PCB) normal?

N → Internal wiring in the Antenna unit or Processor unit is faulty.

Y → Modulator PCB is faulty.

Antenna does not rotate

Is the Motor Fuse F2 normal (not blown)?

N → Replace the fuse with new one.

Y

Is the fault corrected?

N

Finished

Can the antenna be rotated manually?

N → Check if the following conditions are observed:
1) The antenna gets caught with a rope.
2) Turning gear mechanism gets stuck.

Y

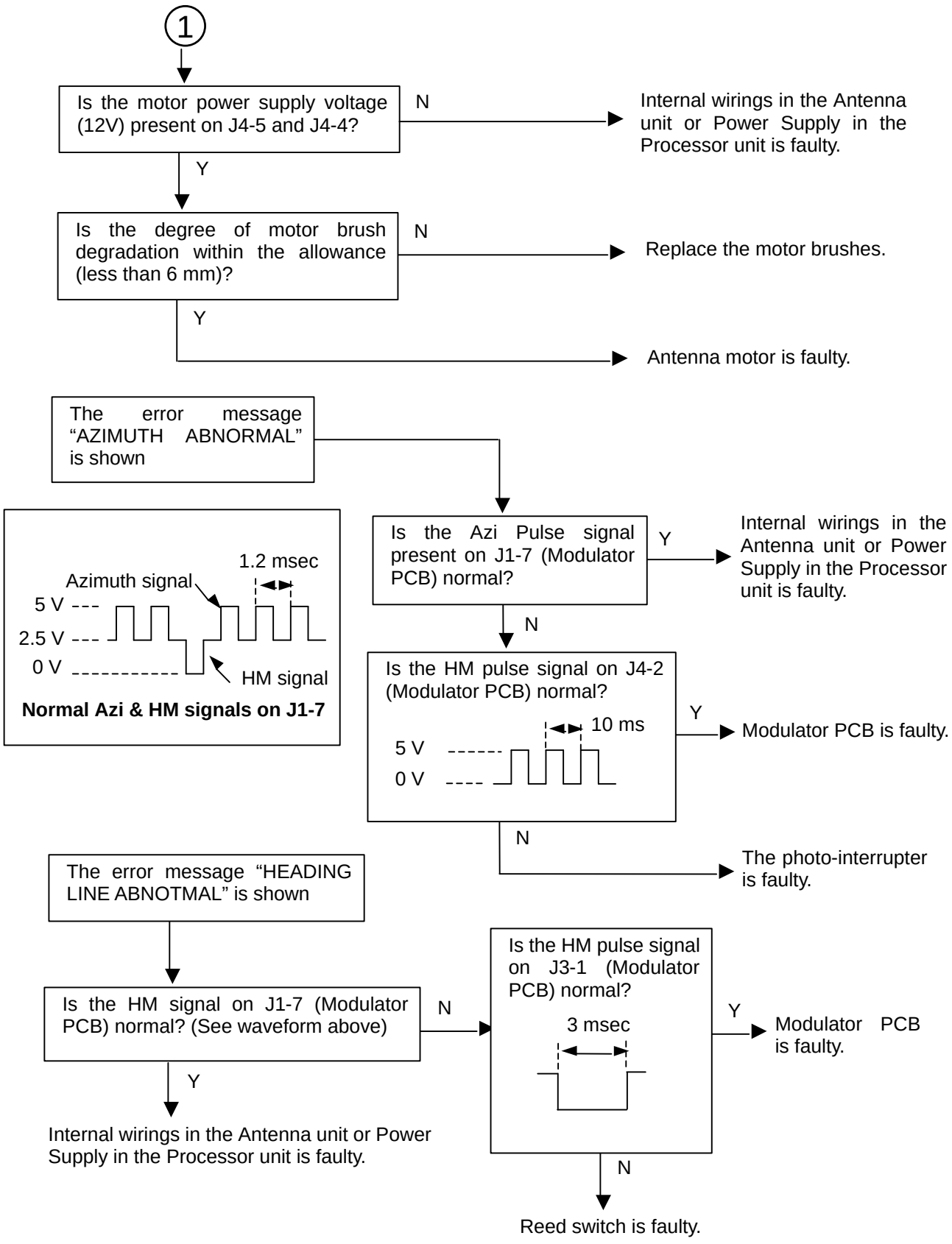
Disconnect P4 (J4) from the Modulator PCB. Is the fault removed?

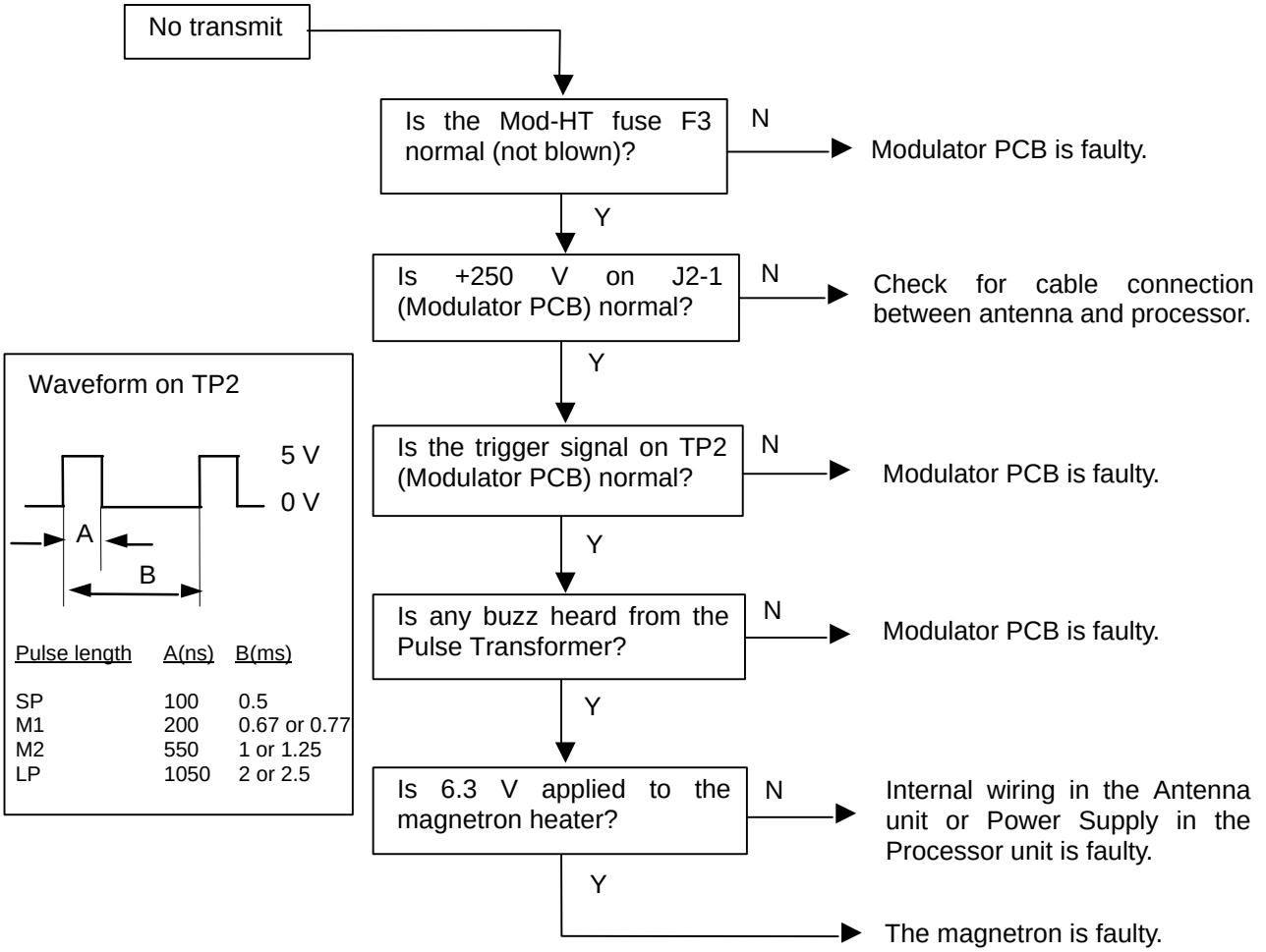
N → Internal wirings in the Antenna unit or Power Supply in the Processor unit is faulty.

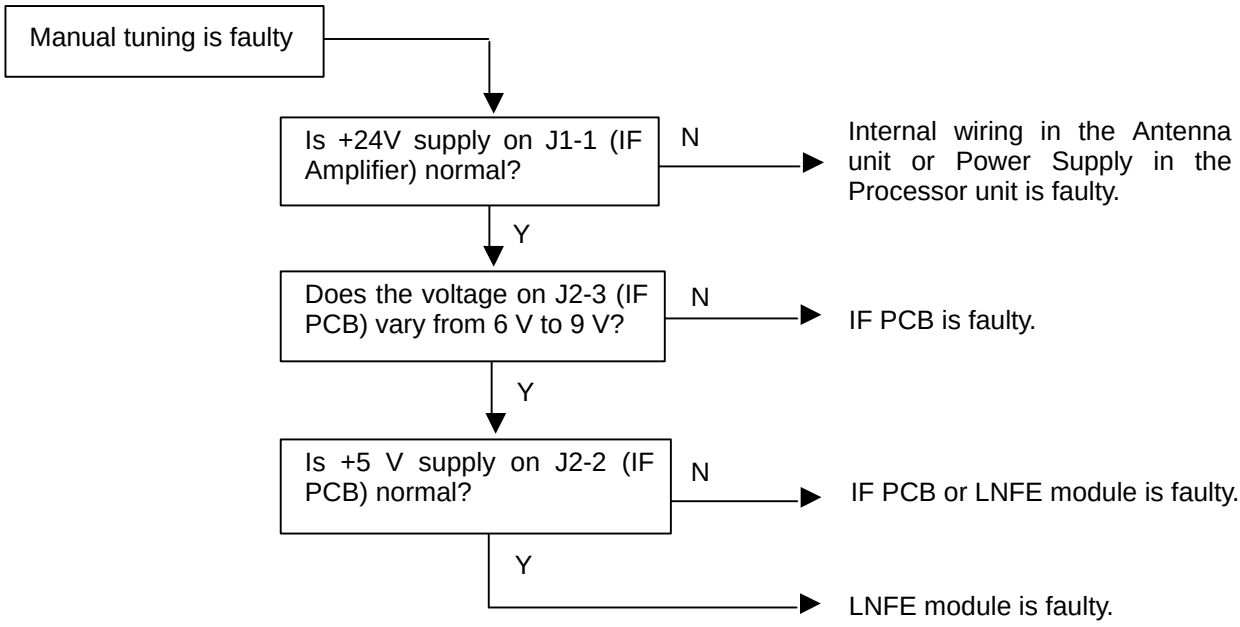
Y

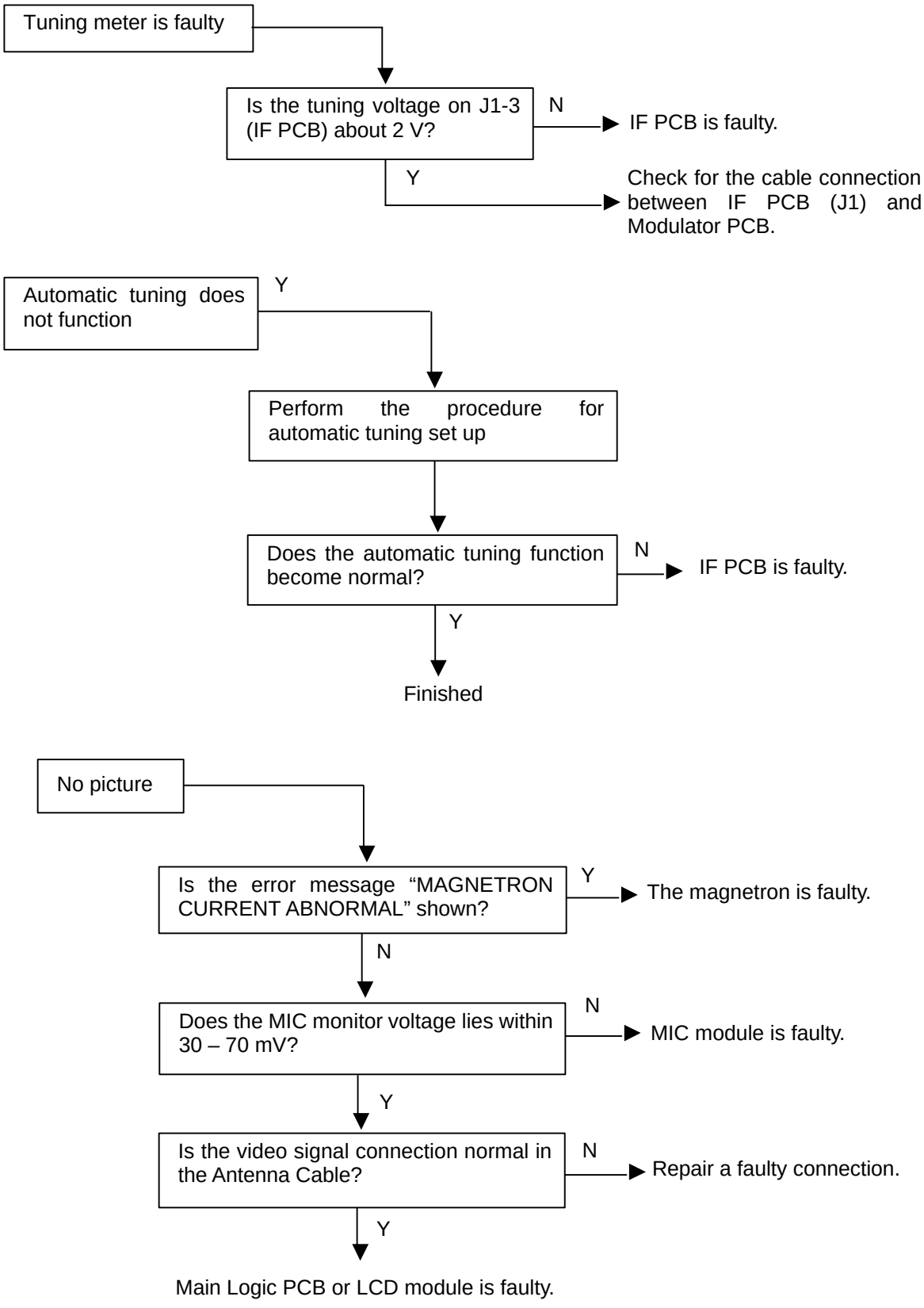
(1)

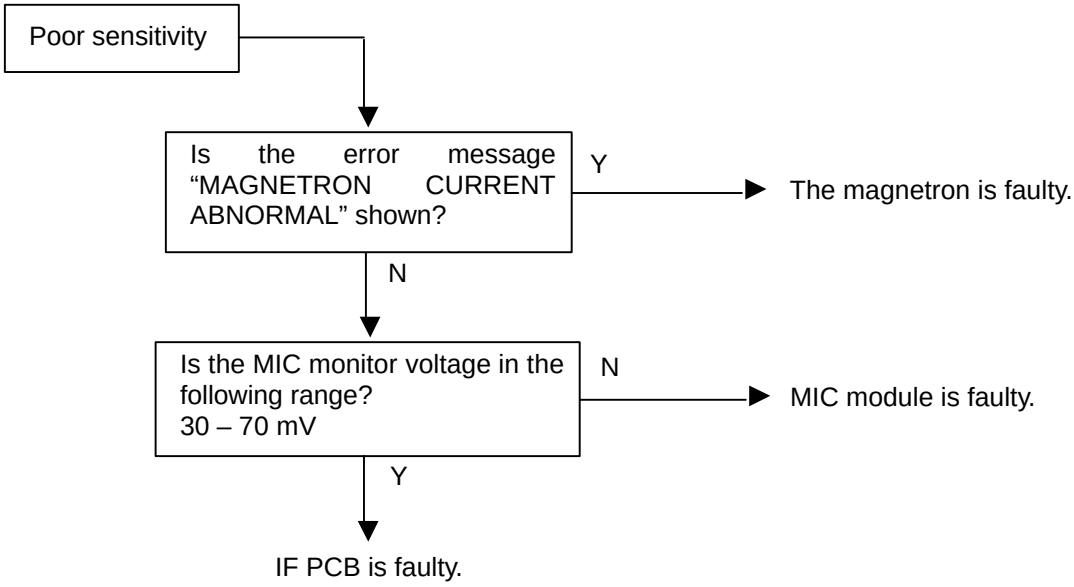
Motor is faulty.


1
Is the motor power supply voltage (12V) present on J4-5 and J4-4?
N
Internal wirings in the Antenna unit or Power Supply in the Processor unit is faulty.
Y
Is the degree of motor brush degradation within the allowance (less than 6 mm)?
N
Replace the motor brushes.
Y
Antenna motor is faulty.
The error message "AZIMUTH ABNORMAL" is shown
Azimuth signal
1.2 msec
5 V
2.5 V
0 V
HM signal
Normal Azi & HM signals on J1-7
Is the Azi Pulse signal present on J1-7 (Modulator PCB) normal?
Y
Internal wirings in the Antenna unit or Power Supply in the Processor unit is faulty.
N
Is the HM pulse signal on J4-2 (Modulator PCB) normal?
10 ms
5 V
0 V
Y
Modulator PCB is faulty.
N
The photo-interrupter is faulty.
The error message "HEADING LINE ABNOTMAL" is shown
Is the HM signal on J1-7 (Modulator PCB) normal? (See waveform above)
N
Is the HM pulse signal on J3-1 (Modulator PCB) normal?
3 msec
Y
Modulator PCB is faulty.
Y
Internal wirings in the Antenna unit or Power Supply in the Processor unit is faulty.
N
Reed switch is faulty.


No transmit
Is the Mod-HT fuse F3 normal (not blown)?
N
Modulator PCB is faulty.
Y
Is +250 V on J2-1 (Modulator PCB) normal?
N
Check for cable connection between antenna and processor.
Y
Is the trigger signal on TP2 (Modulator PCB) normal?
N
Modulator PCB is faulty.
Y
Is any buzz heard from the Pulse Transformer?
N
Modulator PCB is faulty.
Y
Is 6.3 V applied to the magnetron heater?
N
Internal wiring in the Antenna unit or Power Supply in the Processor unit is faulty.
Y
The magnetron is faulty.
Waveform on TP2
5 V
0 V
A
B
Pulse length A(ns) B(ms)
SP 100 0.5
M1 200 0.67 or 0.77
M2 550 1 or 1.25
LP 1050 2 or 2.5


Manual tuning is faulty
Is +24V supply on J1-1 (IF Amplifier) normal?
N
Internal wiring in the Antenna unit or Power Supply in the Processor unit is faulty.
Y
Does the voltage on J2-3 (IF PCB) vary from 6 V to 9 V?
N
IF PCB is faulty.
Y
Is +5 V supply on J2-2 (IF PCB) normal?
N
IF PCB or LNFE module is faulty.
Y
LNFE module is faulty.


Tuning meter is faulty
Is the tuning voltage on J1-3 (IF PCB) about 2 V?
N
IF PCB is faulty.
Y
Check for the cable connection between IF PCB (J1) and Modulator PCB.
Automatic tuning does not function
Y
Perform the procedure for automatic tuning set up
Does the automatic tuning function become normal?
N
IF PCB is faulty.
Y
Finished
No picture
Is the error message “MAGNETRON CURRENT ABNORMAL” shown?
Y
The magnetron is faulty.
N
Does the MIC monitor voltage lies within 30 – 70 mV?
N
MIC module is faulty.
Y
Is the video signal connection normal in the Antenna Cable?
N
Repair a faulty connection.
Y
Main Logic PCB or LCD module is faulty.


Poor sensitivity
Is the error message "MAGNETRON CURRENT ABNORMAL" shown?
Y
The magnetron is faulty.
N
Is the MIC monitor voltage in the following range?
30 – 70 mV
N
MIC module is faulty.
Y
IF PCB is faulty.

8.4 On board servicing

8.4.1 Replacing the fuses

There are three fuses provided on the rear panel of the processor unit. Details are as follows

- Fuse type and ratings

Fuse name	Shape (Dimensions in mm)	Fuse Type	Ratings
Main fuse	Tubular type (ϕ6.3 x 32)	Normal Blow	15 A
Modulator fuse	Tubular type (ϕ5 x 20)	Normal Blow	0.3 A
Drive Motor fuse	Tubular type (ϕ5 x 20)	Normal Blow	5 A

- Location of the fuses

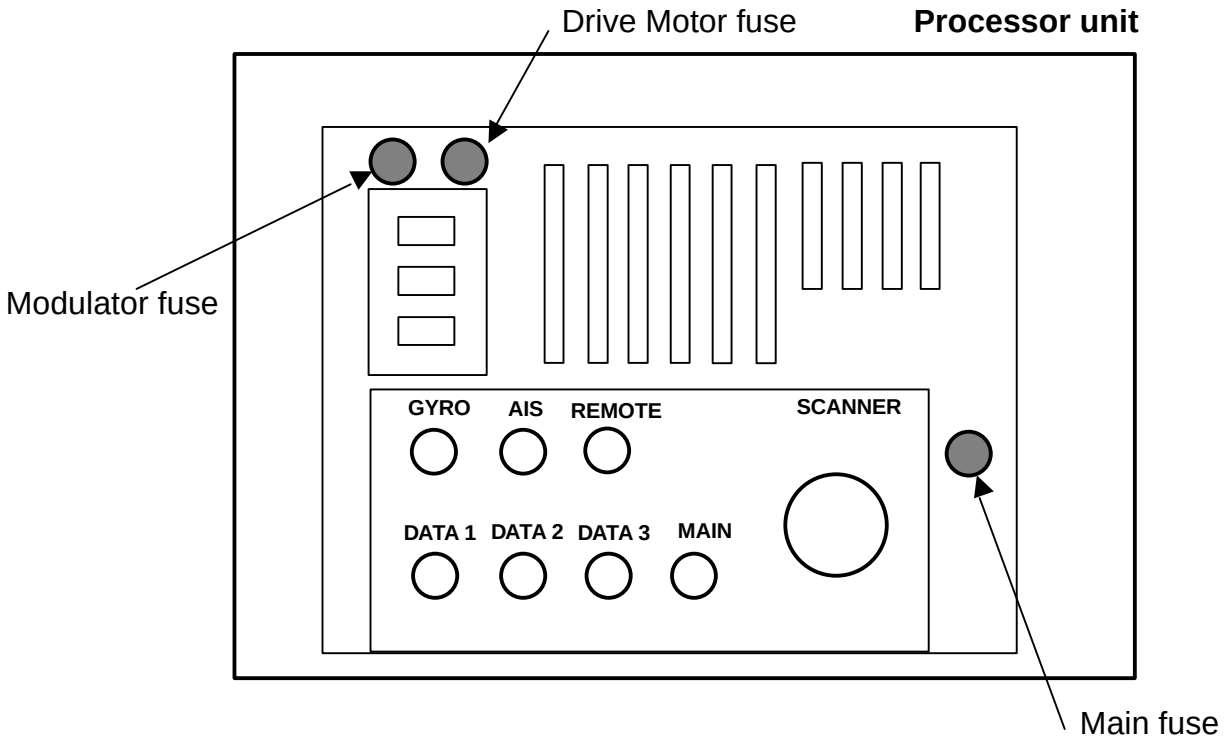


Figure 8.2 Fuses provided on the processor rear panel