

# Eclipse Series

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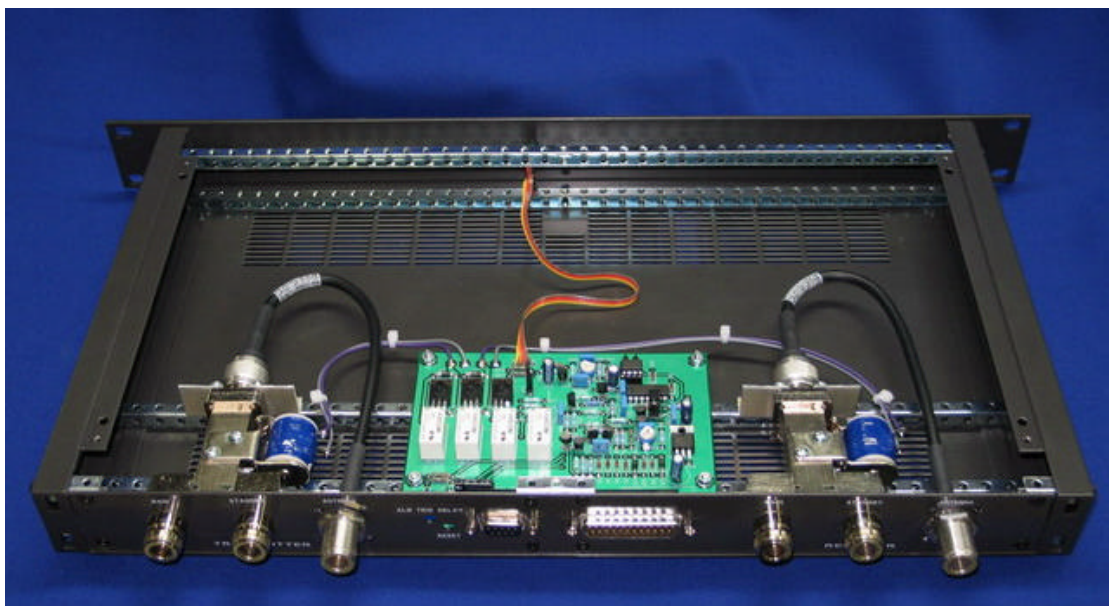
## Hot Standby Switch Operation, Maintenance and Installation



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## 1 Operating Instructions

The HSS has two modes of operation, MAIN and STANDBY.

MAIN mode is the normal operation of the MAIN repeater and STANDBY mode is when the HSS has switched to the standby repeater. There are two front mounted LEDS. If the main repeater is connected correctly to the HSS the GREEN PWR LED signifies that the main repeater has no alarms or fault conditions. If an alarm or fault condition arises in the main repeater the RED ALM LED will light up and the HSS switches to STANDBY mode.

The HSS does not need to be actively powered for STANDBY mode so in the event of complete power supply failure to the main repeater the HSS defaults to STANDBY automatically. For continued operation the standby repeater should have a battery backup system and/or separate power supply.

## 2 I/O Connections

**DB-25 Pin Connector**

Function/Signal	Pins	Relay Standby Position
+12V DC IN	1, 14	-
STBY_DIRAUD_OUT	2	Closed
STBY_DIRAUD_IN	15	Link
Pin 3	3	Open
STBY_BALAUD_OUT	16	Closed
STBY_BALAUD_IN	4	Link
Pin 17	17	Open
STBY_PTT	5	Closed
STBY_COS	18	Link
Pin 6	6	Open
MAIN_PTT	19	Closed
Pin 7	7	Link
MAIN_COS	20	Open
T/R-RELAY_MAIN	8	-
RFO_MAIN	21	-
ALARM_LOW_IN1	9	-
ALARM_LOW_IN2	22	-
ALARM_HI_IN1	10	-
ALARM_HI_IN2	23	-
EXT_BATT	11	-
RESET (FORCE_MAIN)	24	-
FORCE_STANDBY	12	-
GND	13, 25	-

**Option DB-9 Pin Connector**

<b>Function/Signal</b>	<b>Pins</b>	<b>Relay Standby Position</b>
User assigned	5	Closed
User assigned	9	Link
User assigned	4	Open
User assigned	8	Closed
User assigned	3	Link
User assigned	7	Open
User assigned	2	Closed
User assigned	6	Link
User assigned	1	Open

### 3 Circuit Description

The following descriptions should be read as an aid to understanding the schematic diagram at the rear of this manual.

#### 3.1 Coaxial Relays

The coaxial relays switch the RF signal path between two repeaters. A separate relay is used for antenna – receivers and another for antenna – transmitters. Both relays are powered ON in normal operation, in the MAIN mode. Transistors Q10 and Q11 drive each relay. In STANDBY mode the relays default to OFF position so are particularly suitable for monitoring an ac or dc power failure condition.

#### 3.2 Line Relays

The relays RL1, RL2, RL3 and RL4 provide the input/ output signal line switching facility. Transistor Q9 drives these relays in unison with Q10 and Q11 operation. All relays operate together. Either all are ON or all are OFF. The schematic shows the relays in STANDBY or OFF position.

Four signal lines are switched through RL1, RL2 and the DB-25 connector. Another three signal lines are available for user expansion switched through RL3 and the DB-9 connector.

#### 3.3 Alarm and Fault Triggers

##### ATI Alarm output

The HSS is designed to work with the Eclipse Alarm Trunking Interface (ATI) and can also be easily interfaced to third party equipment. The ATI combines the receiver and transmitter alarm signals and the output is brought to a common pin (ATI card DB-25 Pin 4). The ATI also monitors and will alarm if either the receiver or transmitter is disconnected from the rack frame connector. In alarm condition the standard ATI output is Alarm\_High.

**Receiver Alarms**

LED Flash Cadence	Fault Condition
5 flashes, pause	Synthesizer unlocked
4 flashes, pause	Tuning voltage outside limits
3 flashes, pause	Signal level below preset threshold (fixed link)
1 flash, pause	dc supply voltage low or high
LED ON continuously	External squelch is active

**Transmitter Alarms**

LED Flash Cadence	Fault Condition
5 flashes, pause	Synthesizer unlocked
4 flashes, pause	Tuning voltage out of range
3 flashes, pause	Low forward power
2 flashes, pause	High reverse (reflected) power
1 flash, pause	Low dc supply voltage
LED ON continuously	Transmitter timed out

**Input Signal Lines**

The alarm inputs are diode protected. Two Alarm\_Low inputs (pin 9 and pin 22 at D6 and D7) and two Alarm\_High inputs (pin 10 and pin 23 at D8 and D9) are provided so that third party equipment may also be monitored.

The external Eclipse power amplifier may be monitored through two lines at pin 8, T/R\_Relay\_Main and pin 21, RFO\_Main. Both lines must be connected for proper operation. Q1, Q7 & Q2 provide the logic for alarm condition.

To force the HSS into STANDBY mode the Force\_Stby line pin 12 and D11 should be connected to GND momentarily. This line is protected by diode D11.

**3.4 Alarm Outputs****Alarm Double Beep Audio Tone**

Any main repeater alarm or fault condition will cause the HSS to switch to STANDBY. If link JP2 (Alarm Beep Enable) is fitted, a double beep tone of approximately 8 seconds interval is mixed in with the audio on the standby repeater (pin 2, Stby\_DirAudio\_out). RV3 adjusts the beep tone level.

**Power Loss Alarm Double Beep Audio Tone**

Loss of ac power to the main repeater or dc power supply failure in the main repeater will cause the HSS to switch to STANDBY. If links JP1 (Low voltage detector) and JP2 (Alarm Beep Enable) are fitted, a double beep tone of approximately 2 seconds interval is mixed in with the audio on the standby repeater (pin 2, Stby\_DirAudio\_out). RV3 adjusts the beep tone level. RV2 sets the threshold of the low voltage detector circuit.

### **PTT for Standby Transmitter**

By default U1 provides the PTT signal to key up the standby transmitter for the alarm beep tones. This feature can be disabled by fitting link JP4. In this case the alarm beep tones will only be transmitted when the standby receiver or other device keys up the standby transmitter.

### **HSS reaction time switching to Standby Mode**

R25 (or RV1 if fitted) adjusts the trigger reaction time up to 10 seconds. This allows for short duration power outages without triggering the alarm condition.

## **3.5 Voltage Regulator**

The dc supply to U3 voltage regulator is derived from +12V input pins 1, 14 (from the MAIN repeater) and Ext\_Batt input pin 11 (from the STANDBY repeater). The Ext\_Batt input continues to supply dc to the HSS if the main repeater power supplies have failed. This allows the alarm beep tones function to continue.

## **3.6 Reset HSS**

The rear mounted RESET push button switch may be used to reset the HSS to the MAIN position. Alternately the RESET signal line on Pin 24 and D10 may be taken LOW momentarily for a remote RESET function. This line is protected by diode D10.

NOTE:

The main repeater must be in good operational condition before the RESET function can be enacted otherwise the HSS will detect any alarm or fault condition and shall NOT switch to MAIN mode.

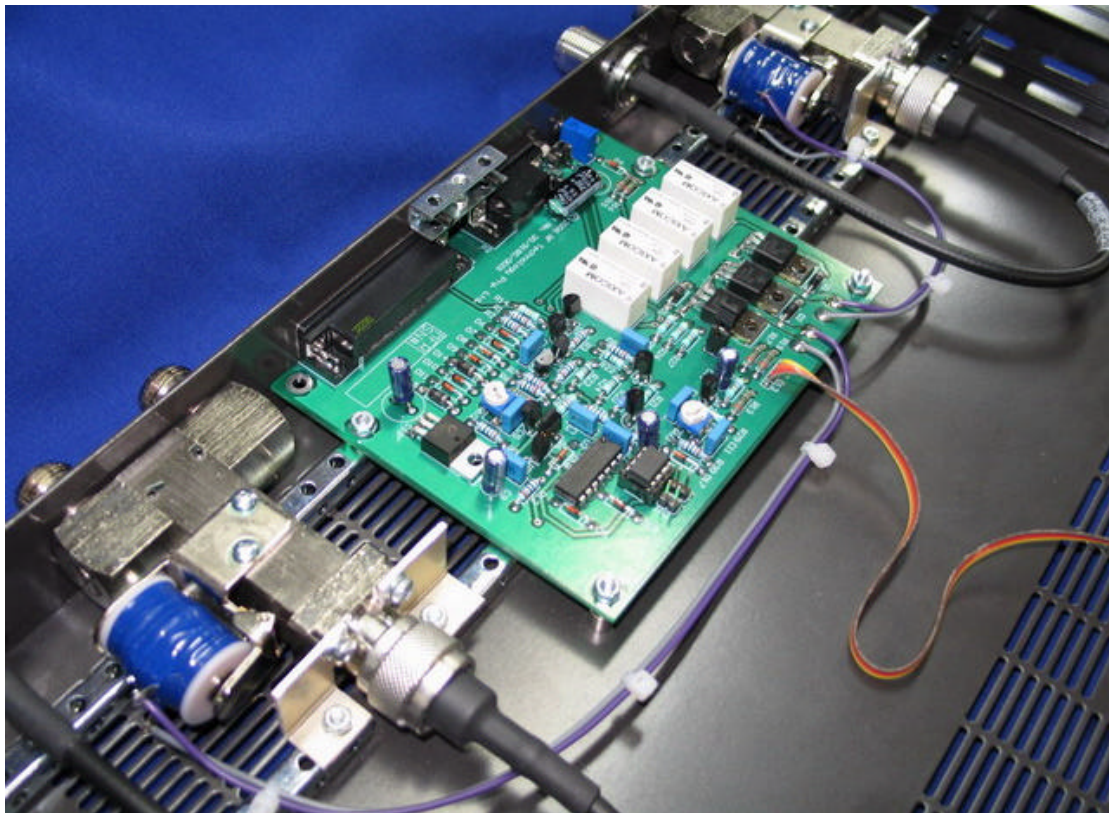
## **4 Alignment Procedure**

There is no alignment procedure. The HSS is factory set up to operate automatically for most situations. The user adjustments are covered in the previous section.

## **5 Installation**

- 1 Locate and mount the HSS securely in a suitable position between or near the MAIN and STANDBY repeaters.
- 2 Attach to the DB-25 connector the appropriate wiring for power supplies and signal inputs. Attach to the DB-9 connector more signal lines if required.
- 3 Connect the rf cables to the HSS N-type connectors between Antenna and Transmitters and also between Antenna and Receivers. Please note the MAIN and STANDBY connector positions carefully.
- 4 Check that the MAIN repeater is operating normally – no alarm or fault conditions.

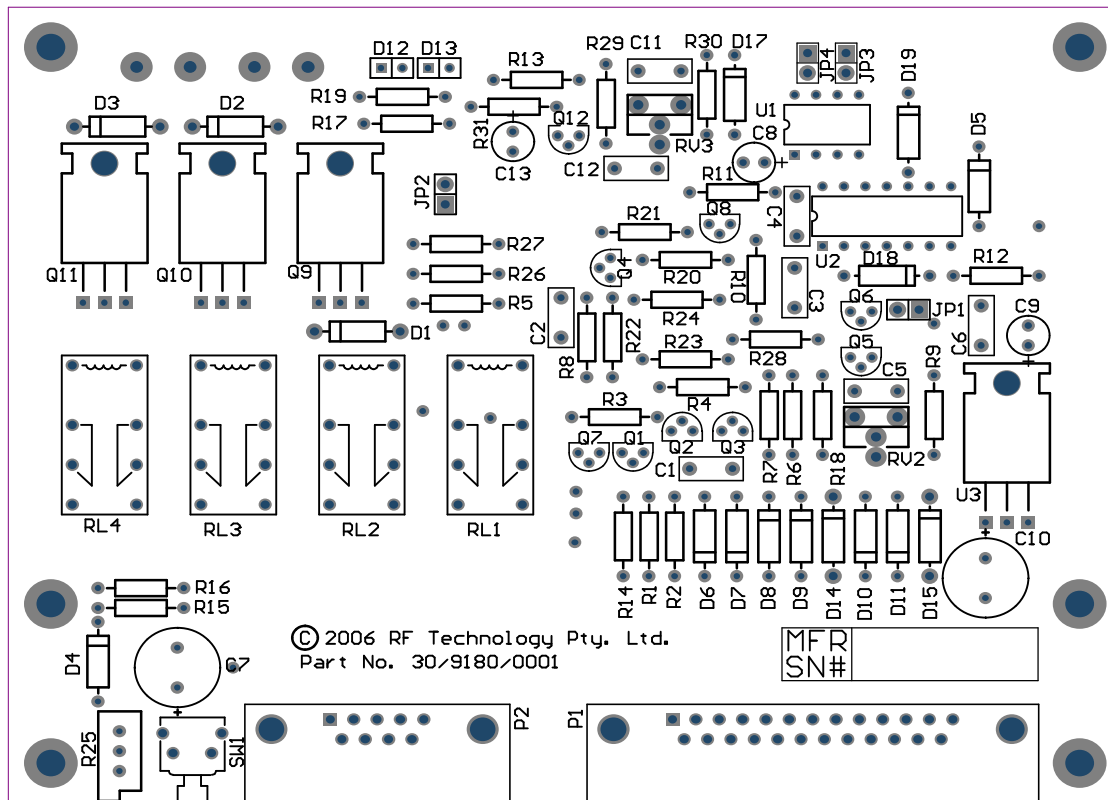
- 5 Check the HSS GREEN PWR LED is lit ON.
- 6 Press the RESET push button switch on the rear of the HSS to switch it to MAIN repeater. The RED ALM LED should be OFF and the main repeater is functioning properly. This is the normal operation mode.
- 7 Test the STANDBY mode by introducing an alarm in the main repeater. If an ATI is fitted simply pull out the receiver or transmitter sufficiently to disconnect it from the rack frame connector and an alarm will occur. The HSS should switch to STANDBY and the RED ALM LED should light ON.
- 8 If JP1 and JP2 are set correctly the HSS will introduce a double beep audio tone mixed with the standby transmitter audio. This is the STANDBY mode.
- 9 To RESET the HSS, restore the main repeater to normal operation (no alarms) before pressing the RESET push button switch.
- 10 This ends the installation but the remote RESET (FORCE\_MAIN) and remote FORCE\_STANDBY can be tested in a similar way.



<b>Designator</b>	<b>Description</b>	<b>Part Number</b>
C1	100N 10% 50V X7R RD.2	46/2001/100N
C2	100N 10% 50V X7R RD.2	46/2001/100N
C3	100N 10% 50V X7R RD.2	46/2001/100N
C4	100N 10% 50V X7R RD.2	46/2001/100N
C5	100N 10% 50V X7R RD.2	46/2001/100N
C6	100N 10% 50V X7R RD.2	46/2001/100N
C7	470U 25V RB Electrolytic	41/2001/470U
C8	10U 35V RB Electrolytic	41/2001/010U
C9	10U 35V RB Electrolytic	41/2001/010U
C10	47U 25V RB Electrolytic	41/2001/047U
C11	100N 10% 50V X7R RD.2	46/2001/100N
C12	100N 10% 50V X7R RD.2	46/2001/100N
C13	10U 35V RB Electrolytic	41/2001/010U
D1	SIL GP 1N4002	21/1010/4002
D2	SIL GP 1N4002	21/1010/4002
D3	SIL GP 1N4002	21/1010/4002
D4	SIL GP 1N4148	21/1010/4148
D5	SIL GP 1N4148	21/1010/4148
D6	SIL GP 1N4148	21/1010/4148
D7	SIL GP 1N4148	21/1010/4148
D8	SIL GP 1N4148	21/1010/4148
D9	SIL GP 1N4148	21/1010/4148
D10	SIL GP 1N4148	21/1010/4148
D11	SIL GP 1N4148	21/1010/4148
D12	R/A, RED	21/1010/LEDR
D13	R/A, Green	21/1011/LEDG
D14	SIL GP 1N4002	21/1010/4002
D15	SIL GP 1N4002	21/1010/4002
D17	SIL GP 1N4148	21/1010/4148
D18	SIL GP 1N4148	21/1010/4148
D19	SIL GP 1N4148	21/1010/4148
JP1	2 Way Pin Header	35/2501/0002
JP2	2 Way Pin Header	35/2501/0002
JP3	2 Way Pin Header	35/2501/0002
JP4	2 Way Pin Header	35/2501/0002
P1	R/A PCB Mount DB25 Male	35/5010/025M
P2	R/A PCB Mount DB9 Female	35/5010/009F
Q1	2N3904 NPN TO92	27/2020/3904
Q2	2N3904 NPN TO92	27/2020/3904
Q3	2N3904 NPN TO92	27/2020/3904
Q4	2N3904 NPN TO92	27/2020/3904
Q5	2N3904 NPN TO92	27/2020/3904
Q6	2N3904 NPN TO92	27/2020/3904
Q7	2N3906 NPN TO92	27/2010/3906
Q8	2N3906 NPN TO92	27/2010/3906
Q9	TIP31 NPN TO220	27/2010/TP31
Q10	TIP31 NPN TO220	27/2010/TP31
Q11	TIP31 NPN TO220	27/2010/TP31



<b>Designator</b>	<b>Description</b>	<b>Part Number</b>
Q12	2N3904 NPN TO92	27/2020/3904
R1	10K 5% 0.25W Axial	51/1040/010K
R2	10K 5% 0.25W Axial	51/1040/010K
R3	10K 5% 0.25W Axial	51/1040/010K
R4	10K 5% 0.25W Axial	51/1040/010K
R5	4K7 5% 0.25W Axial	51/1040/04K7
R6	10K 5% 0.25W Axial	51/1040/010K
R7	10K 5% 0.25W Axial	51/1040/010K
R8	10K 5% 0.25W Axial	51/1040/010K
R9	10K 5% 0.25W Axial	51/1040/010K
R10	10K 5% 0.25W Axial	51/1040/010K
R11	10K 5% 0.25W Axial	51/1040/010K
R12	10K 5% 0.25W Axial	51/1040/010K
R13	1K 5% 0.25W Axial	51/1040/001K
R14	47K 5% 0.25W Axial	51/1040/047K
R15	1K 5% 0.25W Axial	51/1040/001K
R16	1K 5% 0.25W Axial	51/1040/001K
R17	1K 5% 0.25W Axial	51/1040/001K
R18	1K 5% 0.25W Axial	51/1040/001K
R19	1K 5% 0.25W Axial	51/1040/001K
R20	100K 5% 0.25W Axial	51/1040/100K
R21	100R 5% 0.25W Axial	51/1040/0100
R22	100R 5% 0.25W Axial	51/1040/0100
R23	100R 5% 0.25W Axial	51/1040/0100
R24	100R 5% 0.25W Axial	51/1040/0100
R25	100K R/A MULTI-TURN	53/THH1/100K
R26	10K 5% 0.25W Axial	51/1040/04K7
R27	10K 5% 0.25W Axial	51/1040/04K7
R28	10K 5% 0.25W Axial	51/1040/04K7
R29	10K 5% 0.25W Axial	51/1040/04K7
R30	10K 5% 0.25W Axial	51/1040/010K
R31	10K 5% 0.25W Axial	51/1040/04K7
R32	10K 5% 0.25W Axial	51/1040/010K
R33	10K 5% 0.25W Axial	51/1040/04K7
RL1	12V DPCO Miniature	96/2000/012V
RL2	12V DPCO Miniature	96/2000/012V
RL3	12V DPCO Miniature	96/2000/012V
RL4	12V DPCO Miniature	96/2000/012V
RV2	10K SINGLE TURN Vertical	53/1020/010K
RV3	10K SINGLE TURN Vertical	53/1020/010K
U1	HC908QT MCU	26/68HC/908Q
U2	74C00 QUAD NAND DIP14	26/2031/4C00
U3	LM7805 Voltage Regulator	25/2040/7805
RL5	Coaxial Relay, 12V	96/COAX/0001
RL6	Coaxial Relay, 12V	96/COAX/0001



HSS Pcb Layout

**ATI Preparation**

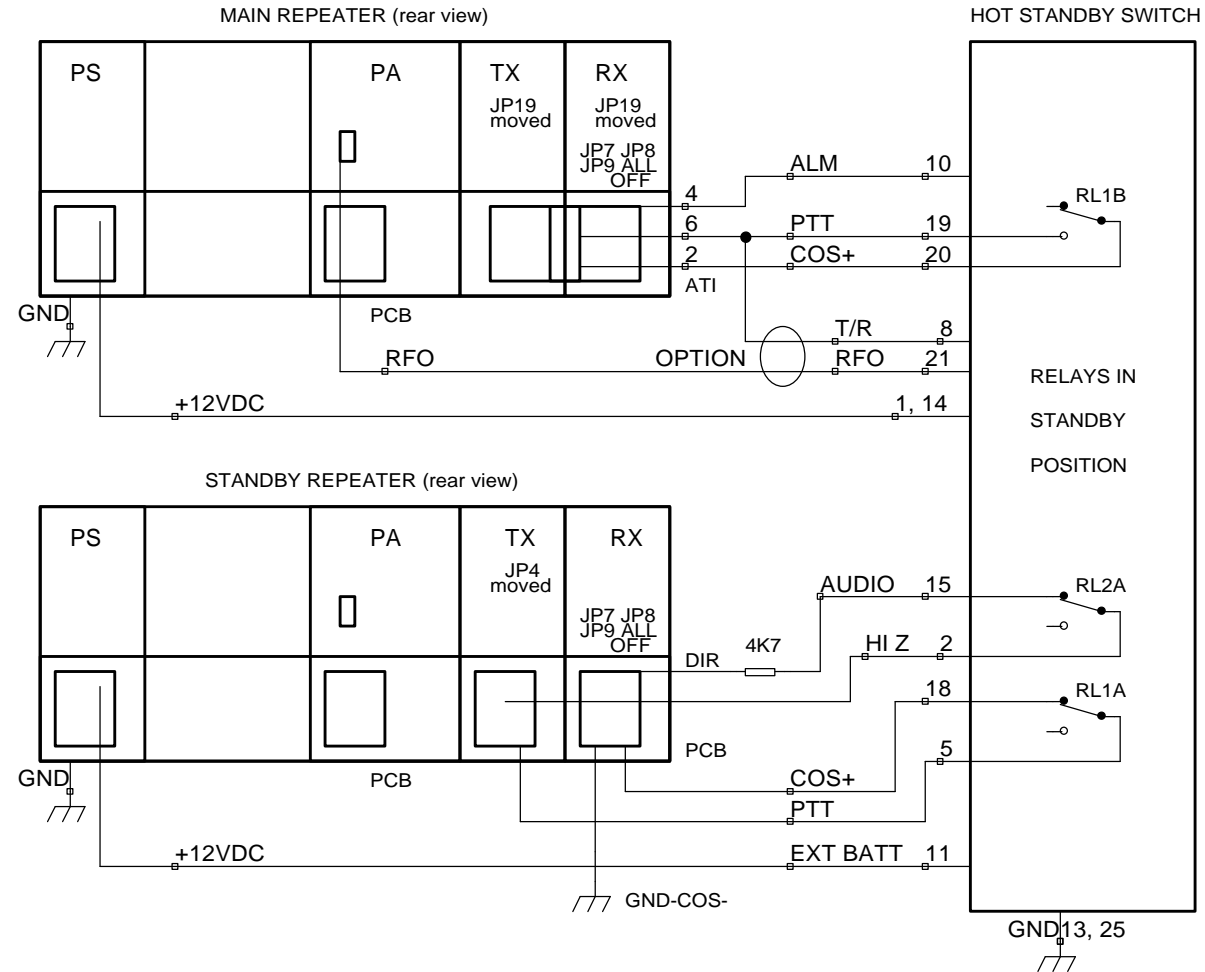
JP4, JP5 Line Audio standard  
 Cut link PS2 C-L  
 Solder link GND to COS-

**RX Preparation**

Remove JP7, JP8, JP9  
 Move JP19 to other position

**TX Preparation**

Move JP19 to other position

**RX Preparation**

Remove JP7, JP8, JP9

**TX Preparation**

Move JP4 to other position

THE HOT STANDBY SWITCH (HSS) MONITORS THE MAIN REPEATER

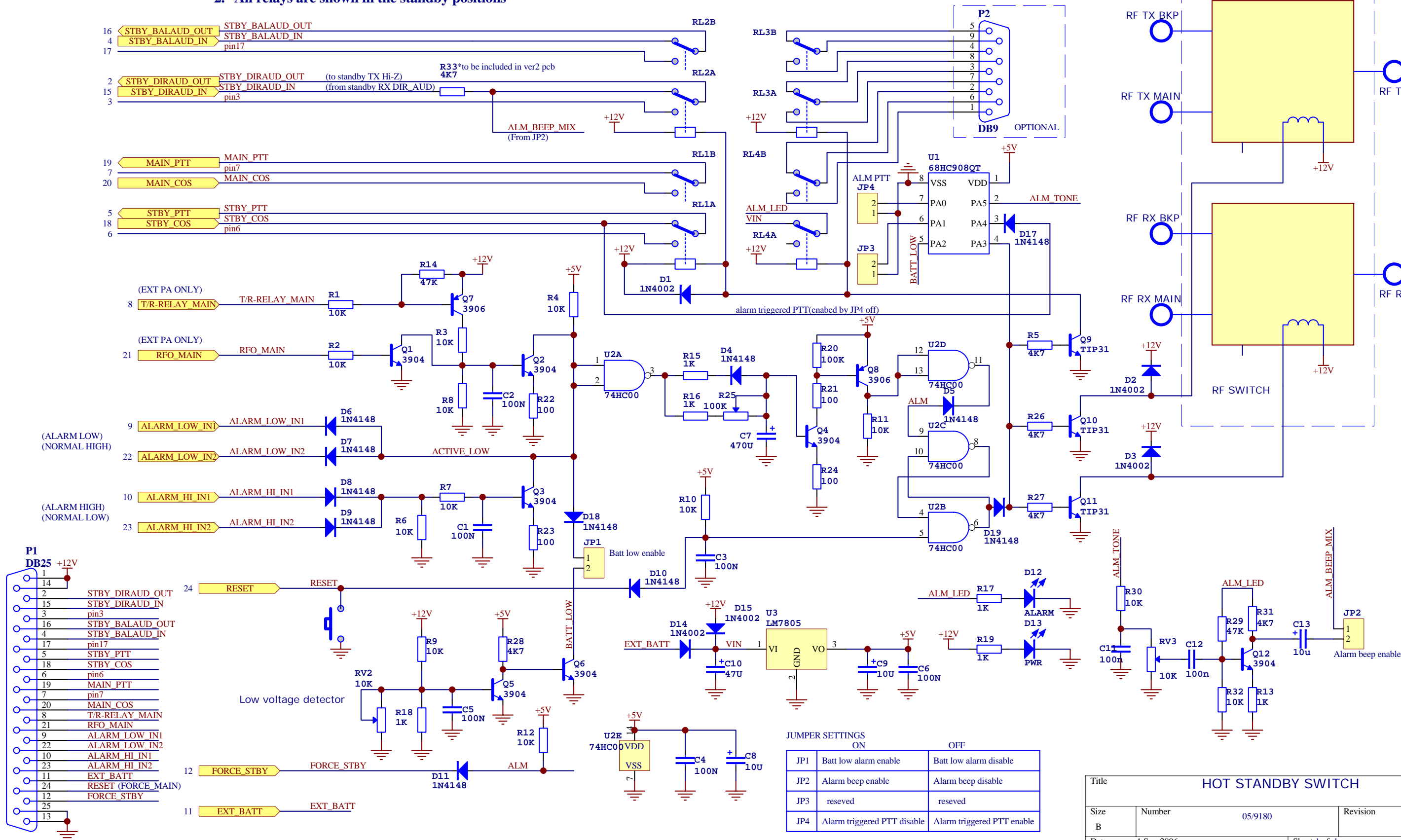
ANY ALARMS IN THE MAIN RECEIVER OR TRANSMITTER, LOSS OF AC OR DC SUPPLY VOLTAGE OR LOW OUTPUT POWER WILL CAUSE THE HSS TO SWITCH TO THE STANDBY REPEATER.

THE HSS WILL ONLY SWITCH BACK TO THE MAIN REPEATER IF THE ALARMS OR FAULT CONDITIONS HAVE BEEN REMOVED AND THE RESET LINE IS TOGGLED

Title HSS- Typical connections		
Author G Lee RFT		
File D:\1My Documents\Cad\HSS connect.dsn		Document
Revision 1.0	Date 5 September 2006	Sheets 1 of 1

\*Note: 1. The signals used for RL1B,RL2B,RL3A,RL3B,RL4B are identical, labels in this schematic diagram are for description only.

2. All relays are shown in the standby positions



JUMPER SETTINGS

	ON	OFF
JP1	Batt low alarm enable	Batt low alarm disable
JP2	Alarm beep enable	Alarm beep disable
JP3	reseved	reseved
JP4	Alarm triggered PTT disable	Alarm triggered PTT enable

Title				HOT STANDBY SWITCH			
Size	Number	05/9180		Revision		1	
Date:	4-Sep-2006			Sheet 1 of 1			
File:	D:\Protel Files\Work Files\Hotstandby.ddb			Drawn By:		G. LOU	