

Eddystone Broadcast

E2075 Automatic Changeover Unit

Installation and Operation

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**Eddystone Broadcast Ltd.
26, Arden Rd.
Arden Forest Industrial Estate
Alcester, Warwickshire
B49 6EP, England
Tel. 44 (0)1789 762278
Fax. 44 (0)1789 766033
www.eddystone-broadcast.com**

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SECTION ONE : INTRODUCTION

! CAUTION !

These Changeover Units can operate at **high RF power levels** and use **mains supply voltages**. Installation, operation and maintenance of these units must therefore, only be carried out by suitably qualified personnel, familiar with and fully utilising the safety procedures such equipment demands.

NO attempt at installation should be made without full reference to and compliance with SECTION TWO : INSTALLATION – especially section 2.2.1 A.C. Supply Connector

NO attempt at internal maintenance should be made without full reference to and compliance with the appropriate sections (external fuse changing is detailed in INSTALLATION).

1.1 : GENERAL DESCRIPTION

The E2075 is a transmitter or drive changeover unit capable of automatic and manual operation with both local and remote control. It has its own internal changeover relays with a maximum power handling capability of 200W at 100MHz. Controls for external changeover switches are also provided to enable switching of higher powers and frequencies. On/off (mute) outputs and status monitoring inputs are provided for connection to the two transmitters/drives and to two receivers (in re-broadcast systems) to enable control to be effected. Internal option switches are provided to enable selection of digital or analogue status monitoring of the two inputs generally used for the transmitter/drives status. If analogue is selected, the level at which the monitored equipment is considered 'good' can be set from the front panel. The polarities of input status, output controls, and the length of associated delays, can also be preset by internal option switches.

Two variants are available. On the E2075-01 variant, an internal option switch also allows the outputs of the two transmitters (fed from the same drive) to be simultaneously connected to the antenna(s) or simultaneously to the load via an external switch/combiner unit or 'switch-less combiner' ('Tx1+Tx2 to antenna systems'). Fully automatic control is maintained in this situation with all of the remaining transmitter's power being directed to the antenna if one of the transmitters fails. On the E2075-02 variant, this internal option switch only additionally allows simultaneous connection to the antenna(s) not to the load. The two variants also have minor remote monitoring and remote control differences.

The unit is supplied in a standard 19 inch rack mount steel box of 1U height and approximately 250mm depth. The front panel uses momentary tactile switches and separate high intensity red and yellow light emitting diodes (leds). The rear panel uses standard D connectors for control inputs and outputs, TNC RF coaxial connectors and, for the mains supply, a standard three pole IEC connector. Although this mains connection carries a protective earth wire, a separate earth terminal is also provided for permanent connection to a 'rack ground'.

The unit is capable of operation from 85-264V AC single-phase mains supplies. Total power consumption does not exceed 25VA (actual consumption largely depending on the current consumed by any external devices powered by the unit). The AC supply connector has its own fuse, accessible from the rear panel. Re-settable fuses protect +12V and +24VDC supply outputs from the unit.

The unit uses micro-controller based software control, utilising up-datable 'flash' memory. Comprehensive hardware/software 'watchdogs' are incorporated which illuminate a front panel CPU ALARM led if a software fault occurs. This automatically switches off other front panel leds as their indications may be erroneous in this circumstance.

The unit consists of a single main printed circuit board with permanently fixed front panel sections, a separate RF relay changeover board and separate switched mode power supply, allowing easy replacement of these latter sections. These are described as follows (1.1.1 - 3 inc.).

Front and rear views (E2075-00GA), a block diagram (E2075-00BK) and a complete circuit diagram (E2075-00CT) are bound at the rear of this handbook.

1.1.1 Main (and Front Panel) Board

This board contains all the control circuitry utilising a single micro-controller. The board is powered by regulated +24V dc from the switched mode power supply (see section 1.1.3) and contains additional +12V and +5V regulators for circuitry on the board. The +12V and +24V supplies are also made available, via re-settable fuses, at rear panel connectors, principally for external relays/switches and remote monitoring/control equipment.

The keyboard, on the permanently attached front panel section, is directly connected to the micro-controller. The majority of the other inputs and outputs are via chains of parallel to serial and serial to parallel converters respectively. These inputs are from the internal option setting switches, SW9/10, from the remote input connector (1)SK07, and from the transmitter/drive/receiver/switch status inputs (1)SK05 and (1)PL06. The outputs are to the front panel led display, the remote monitoring socket (1)PL08, and to the transmitter/drive muting and external switch control relays (1)SK05 and (1)PL06. Conversion to streams of serial data at the micro-controller ports is required because of the high number of inputs and outputs.

The internal option setting switches, SW9/10, allow various operating functions and parameters to be preset for specific systems being controlled (see section 2.3.3).

All inputs and outputs at the rear panel connectors are protected by either relay isolation or by zener diodes, current limiting resistors and capacitor/resistor/impeder filtering. External switch/relay control is via two independent internal changeover relays, both of which have pole, normally open and normally closed contacts made available at output connector (1)SK05.

Single outputs directly from the micro-controller provide external indication of received signal presence (in re-broadcast systems) on the E2075-01 or of alarm warning status on the E2075-02, control the internal changeover relays via additional logic and an open-collector transistor, and also control the front panel 'MAN' led. Another two 'CPU Reset/Off' and 'W.Dog Pulse' outputs drive a watchdog mono-stable circuit, which provides a front panel led and rear panel remote indication if the program within the micro-controller fails to run. In this case, the mono-stable also sets the internal relay to connect Tx1 to the antenna. Other single inputs/outputs are directed to the on-board programming connector.

Two analogue voltage comparators are provided to convert analogue voltages from transmitter forward power monitors into logic good/fail states. The trip levels for the comparators are independently set by two multi-turn preset potentiometers mounted on the permanently connected front panel section of the board (accessible via holes in the front panel). Analogue or digital monitoring is internally selected by four internal changeover switches, SW11-14, on the Main Board (see section 2.3.2).

1.1.2 Relay Board

This board contains two coaxial changeover relays, interconnected to provide a dual input, dual output changeover function, with all inputs and outputs available via TNC connectors on the rear panel. The 12V coils of the relays are connected in series to be operated from the 24V supply from the Main Board, being switched to ground by an open collector transistor, also on the Main Board.

1.1.3 Switched Mode Power Supply

This is a separate, fully enclosed 25W, AC to DC converter module, supplying regulated +24V dc to the Main Board. Its AC input is connected via a separate standard filtered IEC mains input connector with an integral fuse. Its input range is 85-264V AC, 50/60Hz, with no adjustments required.

1.2 : VARIANTS AND OPTIONS

Two software variants (with no physical differences) and with no hardware options, exist as follows :

E2075-01	Internal switch also allows both Tx to be connected to antenna(s) or to load.
E2075-02	Internal switch also allows both Tx to be connected to antenna(s) but only one Tx at a time to be connected to the load.

1.3 TECHNICAL SPECIFICATIONS

RF Interface Ports	50Ω nominal with four TNC Connectors for Tx1, Tx2, Antenna (output) and dummy load.
Power Level with Frequency	200W maximum up to 100MHz, de-rating to 100W maximum at 500MHz, using internal relays. External relays/switches fitted to meet system requirements.
Controls (front panel)	Eight tactile momentary switches for Operational Mode, Tx1/2 On/Off and Tx1/2 to Antenna or Load.
Remote Control and Monitoring	Rear panel 25 Way D connector plug and socket for parallel control and monitoring of all major functions and status. The polarity of the outputs (except CPU good/alarm and, on E2075-02, alarm warning) can be set using an internal option switch. The remote output connector also has a +12Vdc supply output for ancillary equipment (at approx. 100mA maximum).
Transmitter and Receiver Control and Monitoring	Rear panel 9 Way D connector plug for parallel control and monitoring of two associated receivers and transmitters. Connections provided are :- A Mute line to each transmitter/drive. A Status line, typically signal present, from each receiver. A Status line, typically forward power present, from each transmitter. The polarities of these inputs and outputs, and the delays associated with them, can be set using internal option switches. The receiver status is digital input only. The transmitter status can be internally set for digital or analogue inputs. When set for analogue inputs, levels in the range +1V to +4V dc can be set, from the front panel, as the 'trip' point above or below which the transmitter forward power is read as being 'present'.
Optional External Switch Control and Monitoring	Rear panel 15 Way D connector socket for parallel control and monitoring of optional external switches or relays. Connections provided are :- Two independently operating, internal relays' pole, normally open and normally closed contacts (i.e. six total) outputs to control external switches/relays. Outputs at +12Vdc at 100mA maximum and +24Vdc at 200mA maximum, which may be used to supply external switches or relays. Two independent, switch position monitoring inputs. If the external switch status present option is internally enabled, the 'SW1/2 selected' status from the switch will generate front panel and remote alarms and mute both transmitter/drives if a switch setting is not valid. If the external switch does not have this status provision, this option <u>must</u> be internally disabled.
Environmental	Ambient Temperature (operating) : 0 to +45 deg.C Ambient Temperature (storage) : -20 to +70 deg.C Relative Humidity (operating) : Less than or equal to 90%, non condensing. Altitude (operating) : Up to 3000 metres a.s.l.
Mechanical	Width : 483mm (19 in.) Height : 43mm (1U) Depth : 280mm intrusion into rack (including connectors) Weight : Approx. 3.5kg
Power Supply	85Vto 264 AC (universal input, switched mode, power supply) Both 50- 60Hz single phase plus protective earth. Power Consumption variable, but less than 25VA, dependent on external loading.

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SECTION TWO : INSTALLATION

! CAUTION !

These Changeover Units can operate at **high RF power levels** and use **mains supply voltages**. Before commencing installation, it is recommended that the complete INSTALLATION section is read and understood. **The instructions should then be strictly followed, by suitably qualified personnel, otherwise sub-standard or even dangerous operation may result.**

2.1 : PHYSICAL DIMENSIONS AND FITTING

2.1.1 Installation Accessories

Various installation accessories may be supplied as required. A list of these (including spare fuse) is given below. Actual requirements depend on the configuration of the equipment supplied (e.g. with or without Transmitter/Drive(s) etc., separate to or already fitted into a 19 inch rack, whether or not leads are supplied ready made etc.). Note that extra, unlisted parts may be required for connections to any other equipment supplied (see manuals supplied with them).

Typical Quantity	Description	Function
4	TNC RF coaxial free plug(s).	For connection to leads from transmitter/drives and the antenna and dummy load.
Length as req'd	Low loss RF coaxial cable, rated in excess of transmitter/drive output power at maximum ambient temperature.	RF input, output and dummy load leads.
1	Coaxial 50Ω load with connector, rated in excess of transmitter/drive output power/frequency at maximum ambient temperature.	Transmitter/Drives' dummy load.
1	15 Way D plug c/w cover	For connection to leads from external antenna switches/relays.
1	9 Way D socket c/w cover.	For connection to associated transmitter/drives and receivers.
1	25 Way D plug c/w cover.	For connection to remote control equipment
1	25 Way D socket c/w cover.	For connection to remote monitoring equipment
Length as req'd	Multi-core screened cable (number of cores as required).	Control/monitor leads.
Length as req'd	Grounding wire/strap.	For safety earth lead.
1	IEC mains connector/lead	For connection to mains supply.
4	Screws c/w plastic cup washers and rack caged nuts.	For fixing unit into 19 inch rack.
1	1A (T) HBC 5x20mm Fuse	For protection of mains supply input
1 (For Tx1+Tx2 to antenna systems only)	Switch, switch/combiner assembly, or 'switchless combiner', rated in excess of transmitter output power at maximum ambient temperature. (dependent on variant).	For connection of either or both transmitters to the antenna or to the load (both to antenna but only singly to the load in the case of the E2075-02 variant). The internal switch cannot provide this function.

2.1.2 Rack Mounting

If the Changeover Unit is not supplied ready mounted in a 19 inch rack, this will be required to be done at time of installation. The 19 inch rack requires at least 1U space for the Changeover Unit which is fixed to the front of the racking using four screws, plastic cup washers and caged nuts. The total intrusion into the rack, including rear panel connectors, is approximately 280mm.

2.2 : EXTERNAL CONNECTIONS

NOTE: - Unless otherwise specified, the following applies to all rear panel control inputs and outputs.

Inputs (except 'Remote') and outputs are continuous (as opposed to momentary) with all common returns connected to the unit's chassis ground. Leads to connectors must be screened and be less than 3m in length.

Each input is internally 'pulled up' to +5V through 12 k Ω and must be fed from a voltage free source of less than 1k Ω impedance when in its 'on' or low impedance state.

Each input is protected against constant application of up to $\pm 24V$ dc directly applied.

Each output, except the external switch drives from SK05, is an 'open collector' NPN, silicon low saturation switching transistor suitable for driving loads from +5V to +24V dc with maximum currents of 10mA. The 'on' or low impedance state output impedance is 100 Ω . The Mute Tx1/2 pins 1 and 6 of PL06, can all deliver higher currents of up to 50mA, the 'on' or low impedance state output impedance of these outputs is 47 Ω .

Each transistor output is protected against constant application of up to $\pm 5V$ dc directly applied.

The 'Select (external) SW1/2 Outputs', pins 1 to 6 of SK05, are from relay contacts with switching ratings of typically 0.5A at 24V DC. No additional internal protection is provided on these inputs.

2.2.1 AC SUPPLY Connector

This is a standard IEC connector PL09 intended for connection to a single phase (plus protective earth) supply. The supply range is 85-264VAC (50-60Hz). The input is protected by a 20mm 1A(T) HBC fuse fitted in a carrier in PL09.

! CAUTION !

The mains supply lead to the Changeover Unit must use at least **3A rated three core (P+N+protective earth)** insulated cable. **An approximately 3A HBC fuse MUST be provided at the supply distribution board, or in the associated plug at the supply outlet, to protect this lead.** Also, since the supply input circuitry contains a filter, which passes current to the Changeover Unit chassis, **the chassis must be connected to a safety ground** via the earthing bolt provided adjacent to the mains supply input connector.

The IEC lead terminates at the supply outlet in three wires, generally colour coded as follows :-

Brown	Line
Blue	Neutral
Green/yellow	Prot. Earth

Care MUST be taken to connect these leads to the supply as detailed in the above table. If a lead with different coloured wires is used, further advice MUST be taken.

2.2.2 ANT Connector (not functional in Tx1+Tx2 to antenna systems)

! CAUTION !

When operating, high RF Voltages may be present on this connector. Always ensure when making connections here, or working on any load connected, that the transmitter/drive source(s) to the Changeover Unit are switched off or safely muted. The maximum power rating of this connector is 200W at 100MHz.

This is a coaxial 50Ω TNC RF output connector SK01 intended for connection to the final antenna system via any associated final combining or filtering units. This output is internally switched to the Tx1 or Tx2 Connector as indicated by the unit's front panel led 'Ant' (Antenna) displays.

2.2.3 Tx2 Connector (not functional in Tx1+Tx2 to antenna systems)

! CAUTION !

When operating, high RF Voltages may be present on this connector. Always ensure when making connections here, or working on any load connected, that the transmitter/drive source(s) to the Changeover Unit are switched off or safely muted.

This is a coaxial 50Ω TNC RF input connector SK02 intended for connection to the output of the second transmitter. This input is internally switched to the ANT Connector or LOAD Connector as indicated by the unit's front panel led 'Ant' and 'Load' displays. **The maximum power rating of this connector is 200W at 100MHz.**

2.2.4 LOAD Connector (not functional in Tx1+Tx2 to antenna systems)

! CAUTION !

When operating, high RF Voltages may be present on this connector. Always ensure when making connections here, or working on any load connected, that the transmitter/drive source(s) to the Changeover Unit are switched off or safely muted.

This is a coaxial 50Ω TNC RF output connector SK03 intended for connection to a 50Ω 'dummy' load capable of dissipating the output power of the non-selected transmitter. This output is internally switched to the Tx1 or Tx2 Connector as indicated by the unit's front panel led 'Load' displays. **The maximum power rating of this connector is 200W at 100MHz.**

2.2.5 Tx1 Connector (not functional in Tx1+Tx2 to antenna systems)

! CAUTION !

When operating, high RF Voltages may be present on this connector. Always ensure when making connections here, or working on any load connected, that the transmitter/drive source(s) to the Changeover Unit are switched off or safely muted.

This is a coaxial 50Ω TNC RF input connector SK04 intended for connection to the output of the first transmitter. This input is internally switched to the ANT Connector or LOAD Connector as indicated by the unit's front panel led 'Ant' and 'Load' displays. **The maximum power rating of this connector is 200W at 100MHz.**

2.2.6 EXTERNAL ANTENNA SWITCH Connector

(Except for Tx1 + Tx2 to antenna systems on E2075-01 variant, for which, see section 2.2.7)

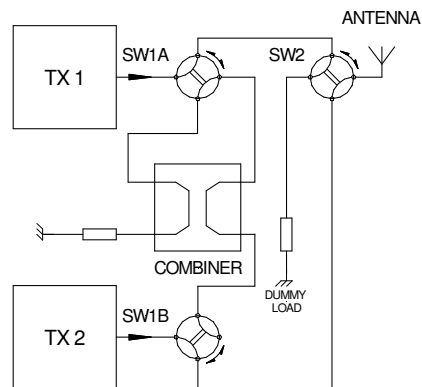
This is a 15 way D socket SK05 intended for connection to external antenna switches or relays when the internal switch has inadequate isolation or power/frequency range capacity or when a Tx1+Tx2 to antenna system is being controlled. The functions are shown in the table below.

EXT. ANT. SWITCH Connector SK05 (15 Way Female D Connector)		
Pin	Function	Notes
1	Select SW1 Output pole contact	These outputs are intended to control external changeover switches/relays, either by themselves or in conjunction with SW2 outputs.
2	Select SW1 Output normally closed (n/c) contact	
3	Select SW1 Output normally open (n/o) contact	
		Pole connects to n/o when Tx1 to antenna, and to n/c when Tx1 to load. System type set by the internal options switch SW9, switch 3 (see section 2.3.3).
4	Select SW2 Output pole contact	These outputs are intended to control external changeover switches/relays, either by themselves or in conjunction with SW1 outputs.
5	Select SW2 Output normally closed (n/c) contact	
6	Select SW2 Output normally open (n/o) contact	
		Pole connects to n/o when Tx2 to antenna, and to n/c when Tx2 to load. System type set by the internal options switch SW9, switch 3 (see section 2.3.3).
7	SW2 selected input	These inputs are enabled/disabled and their polarity set by the internal options switch SW10, switches 5 and 6 (see section 2.3.3). They are intended for connection to interlock contacts on the external switches or relays being controlled, providing automatic muting of both transmitters/drives whilst the switches are changing over.
8	SW1 selected input	
		If enabled, both must be pulled to ground or be left open circuit (depending on polarity set) via the switch interlock contacts, when the switch has settled in a valid position. When not so connected, the unit will automatically mute both transmitter/drives.
		If the external switches/relays have no interlock contacts available for this purpose, these inputs <u>must</u> be disabled by SW10, switch 6.
9	+12V, at 100mA max, output	Intended for supply to external switches/relays. Protected by internal re-settable fuse
10	Common (chassis ground)	Any of these can be used for ground returns from the external switches or relays.
11	Common (chassis ground)	
12	Common (chassis ground)	
13	Common (chassis ground)	
14	Common (chassis ground)	
15	+24V, at 200mA max, output	Intended for supply to external switches/relays. Protected by internal re-settable fuse

2.2.7 EXTERNAL ANTENNA SWITCH Connector (E2075-01 variant, Tx1 +Tx2 to antenna systems)

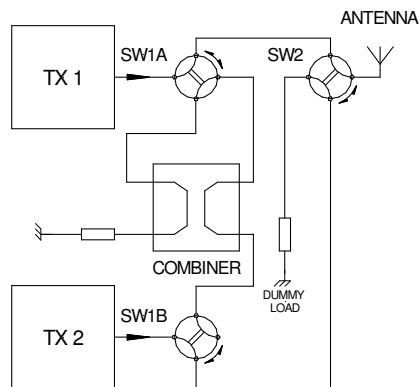
On the E2075-01 variant, when a Tx1+Tx2 to antenna system is being controlled, the functions of the 15 way D socket SK05, pins 1-6, are different to those shown in section 2.2.6. Details are given in the table below, for each of the four possible system configurations, Figs 1-4. **NOTE - the numbering of Tx1 and Tx2 is for systems configured as shown in BS/IEC 60864 (i.e. with Tx2 connected to the switch with the unused output).** In non-60864 systems, Tx1 is connected to that switch. The system being controlled must be reflected in the setting of internal option switch SW9, switch 2 – see section 2.3.3 – this affects the function of the SW2 outputs in Figs 1 and 2.

EXT. ANT. SWITCH Connector SK05 – pins 1-6 (see section 2.2.6 for pins 7-15)					
Pin	Function	Fig. 1 Tx1 to Load Tx2 to Ant.	Fig. 2 Tx1 to Ant. Tx2 to Load	Fig. 3 Tx1+Tx2 to Antenna	Fig 4 Tx1+Tx2 to Load
1	Select SW1 Output pole contact	Pole to n/o	Pole to n/o	Pole to n/c	Pole to n/c
2	Select SW1 Output normally closed (n/c) contact	Controls SW1A and SW1B in parallel	Controls SW1A and SW1B in parallel	Controls SW1A and SW1B in parallel	Controls SW1A and SW1B in parallel
3	Select SW1 Output normally open (n/o) contact				
4	Select SW2 Output pole contact	Pole to n/o (BS/IEC 60864) Pole to n/c (non-60864)	Pole to n/c (BS/IEC60864) Pole to n/o (non-60864)	Pole to n/c	Pole to n/o
5	Select SW2 Output normally closed (n/c) contact	Controls SW2	Controls SW2	Controls SW2	Controls SW2
6	Select SW2 Output normally open (n/o) contact				



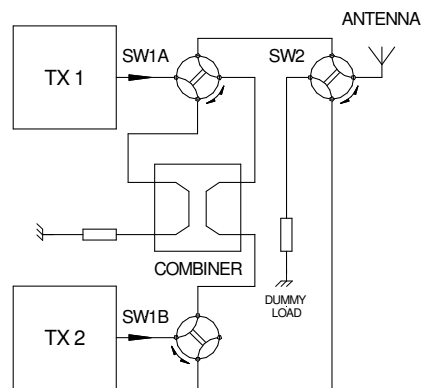
TX1 to Dummy Load
Tx2 to Antenna

Fig. 1



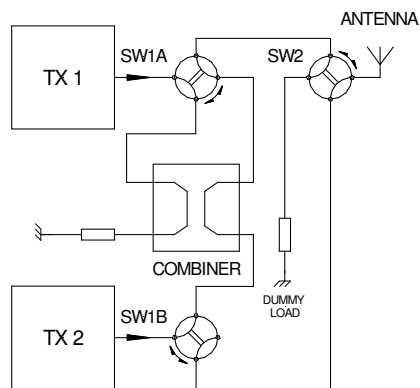
TX1 to Antenna
Tx2 to Dummy Load

Fig. 2



TX1 + Tx2 to Antenna

Fig. 3



TX1 + Tx2 to Dummy Load

Fig. 4

2.2.8 Tx1/2 Connector

This is a 9 way D plug PL06 intended for connection to the status outputs of the associated pair of transmitters and (in rebroadcast systems) receivers. The functions are shown in the table below.

Tx1/2 Connector PL06 (9 Way Male D Connector)		
Pin	Function	Notes
1	Mute Tx1 Output	This output has its polarity and associated muting period set by the internal options switch SW10, switch 2, and SW9, switches 4 and 5 (see section 2.3.3).
2	Tx1 Digital/Analogue Status Monitor Input	<p>These inputs have their polarity and associated delays set by the internal options switch SW10, switches 3 and 4, and SW9, switches 6, 7 and 8 (see section 2.3.3).</p> <p>The Tx1 input only, can be set internally for analogue or digital status by option switches SW11 and 12 (see section 2.3.2).</p> <p>Tx1 analogue inputs are considered as being 'good' when an analogue signal above or below (depending on polarity set) the set threshold level is present. This level is set via front panel control 'Tx1 Trip' in the range +1V to +4V dc.</p> <p>If not used, the Rx1 input must be left open-circuit or be short-circuited to ground (depending on its internally set polarity) to simulate a signal present.</p>
3	Rx1 (Digital) Status Monitor Input	
4	Common (chassis ground)	Either of these can be used for ground returns from transmitters/drives etc.
5	Common (chassis ground)	
6	Mute Tx2 Output	This output has its polarity and associated muting period set by the internal options switch SW10, switch 2, and SW9, switches 4 and 5 (see section 2.3.3).
7	Tx2 Digital/Analogue Status Monitor Input	<p>These inputs have their polarity and associated delays set by the internal options switch SW10, switches 3 and 4, and SW9, switches 6, 7 and 8 (see section 2.3.3).</p> <p>The Tx2 input only, can be set internally for analogue or digital status option switches SW13 and 14 (see section 2.3.2).</p> <p>Tx2 analogue inputs are considered as being 'good' when an analogue signal above or below (depending on polarity set) the set threshold level is present. This level is set via front panel control 'Tx2 Trip' in the range +1V to +4V dc.</p> <p>If not used, the Rx2 input must be left open-circuit or be short-circuited to ground (depending on its internally set polarity) to simulate a signal present.</p>
8	Rx2 (Digital) Status Monitor Input	
9	Common (chassis ground)	As for pins 4 and 5

2.2.9 REMOTE IN Connector

This is a 25 way D socket SK07 intended for connection to a Remote Control Unit able to supply commands. The functions are shown in the table below.

REMOTE IN Connector SK07 (25 Way Female D Connector)			
Pin	Function	Notes	
1	Select Tx2 to Load	The commands must be in the form of a momentary 'pull to ground' of duration >0.5secs (i.e. they are not continuous). Only one remote command should be made at any one time. If commands occur together, they may be ignored. A gap of at least 100mS between commands is recommended.	
2	Common (chassis ground)		
3	Select Tx2 to Antenna		
4	Common (chassis ground)		
5	Select Tx2 On/Off		
6	Common (chassis ground)		
7	Select Auto/Manual mode		
8	Common (chassis ground)		
9	<u>On the E2075-01 variant</u> Select Local/Remote mode	On/Off and mode selections are toggling controls and require reading of the equivalent status outputs on the REMOTE OUT connector (see section 2.2.10) to determine their effect.	
	<u>On the E2075-02 variant</u> Cancel Alarm Warning	Any of the common (chassis ground) connections can be used for ground returns from remote control equipment.	
10	Common (chassis ground)	<u>On the E2075-01 variant</u>	
11	Select Tx1 On/Off	The Mode of operation is selected by the 'Select Local/Remote' and 'Select Auto/Manual' commands. Whether the front panel LOC/REM switch <u>or</u> the rear panel 'Local/Remote' input, pin 9, is enabled is determined by the internal options switch SW10, switch 7 (see section 2.3.3). Both methods of selecting local/remote cannot be in use together. When 'Remote Mode is selected (remotely <u>or</u> locally) the other remote commands are enabled and mimic the operation of the unit's other front panel switches (see section 3.1) which are themselves disabled. When 'Local Mode' is then selected (remotely <u>or</u> locally) all the other remote commands are disabled and the equivalent front panel switches enabled. <u>On the E2075-02 variant</u> Whether the front panel controls (Local Mode) <u>or</u> these rear panel remote inputs (Remote Mode) are enabled is directly determined by the internal options switch SW10, switch 7 (see section 2.3.3). When 'Remote Mode is selected the remote commands mimic the operation of the unit's front panel switches (see section 3.1) which are themselves disabled. When 'Local Mode' is selected all remote commands are disabled and the equivalent front panel switches enabled.	
12	Common (chassis ground)		
13	Select Tx1 to Antenna		
14	Common (chassis ground)		
15	Select Tx1 to Load		
16	Common (chassis ground)		
17 –25 inc	Not Connected		

2.2.10 REMOTE OUT Connector

This is a 25 way D plug PL08 intended for connection to a Remote Control Unit able to read status. The status given, are shown in the table below.

REMOTE OUT Connector PL08 (25 Way Male D Connector)		
Pin	Function	Notes
1	Tx2 to Antenna/Load	These outputs have their polarity set by the internal options switch SW10, switch 1, except CPU Good/Alarm (see section 2.3.3) and correspond to the front panel led indications, but without any 'flashing' (see section 3.1) and without the instantaneous Tx/Rx/1/2 alarm indications in 'manual' mode. CPU Good/Alarm is always low/high respectively. These outputs are low impedance to ground or high impedance/ open circuit, depending on the polarity set, when the first noted function is true (e.g. 'Antenna', 'On', 'Good' etc) In the case of the changeover outputs, they follow a binary sequence low/low/low (no changeover) to high/low/low (4 changeovers) or high/high/high to low/high/high depending on output polarity set.
2	Tx2 On/Off	
3	Tx1/Rx1 Good/Alarm	
4	Tx1 Antenna/Load	
5	Tx1 On/Off	
6	Local/Remote Mode	
7	Auto/Manual Mode	
8	CPU Good/Alarm	
9	Changeover (lsb)	
10	Changeover (lsb+1)	
11	Changeover (msb)	
12	Antenna Good/Alarm	
13	Common (chassis ground)	Any of these can be used for ground returns from the external remote control and monitoring equipment.
14	Common (chassis ground)	
15	Common (chassis ground)	
16	Common (chassis ground)	
17	+12V at 100mA max, output	Intended for supply to external control/monitoring equipment. Protected by internal re-settable fuse
18 –23 Inclusive	Not Connected	
24	<u>On the E2075-01 variant</u> Rx1 or Rx2 Signal(s) Present/Absent	Provides an additional indication that at least one received signal is present in a dual receiver system and that the original source of the signal is 'on-air' See also notes for pins 1-12 above.
	<u>On the E2075-02 variant</u> External alarm warning output	Provides an indication that a change in a connected transmitter or receiver alarm status has changed from 'Good' to 'Alarm'. This warning can be cleared by use of the 'Cancel Alarm Warning' input (pin 9 of Sk07 – see section 2.2.9) when in 'Remote Mode' or by pressing the front panel Local/Remote switch when in 'Local Mode'. This warning will also automatically be cancelled when all transmitter and receiver status becomes 'Good'.
25	Tx2/Rx2 Good/Alarm	See notes for pins 1-12 above.

2.3 SETTING UP PROCEDURES

2.3.1 Fuses

If any problems occur after the Changeover Unit has been installed and switched on, fuses may need to be checked and possibly replaced. However, a blown or re-settable fuse failure would generally indicate the presence of a fault, which would need correcting.

The type, function and access to fuses is as follows :

Type	Function	Access
1A (T) HBC 5x20mm Fuse One only	For protection of mains supply input circuitry. If the fuse goes open circuit, all of the Unit's front panel displays will go out and control will cease. If the internal relays are in use, the input from Tx1 (SK04) will be connected to the Antenna output (SK01).	At the left rear of the Unit, the single small fuseholder part of the associated mains input socket. (1)FS1/(1)PL09 ! CAUTION ! this is a high energy circuit and thus care must be taken if replacing the fuse with power on.
1.1A Hold, 30V Resettable Fuse One only.	For protection of the Unit's +24V supply output on pin 15 of SK05 ('Ext. Ant. Switch'). If the fuse goes high impedance, any external items powered by this supply will not be operative.	Inside Unit, on rear left hand side of Main Board (FS1). Note this fuse will automatically reset if the Unit is temporarily disconnected from the mains supply, or the supply is temporarily switched off, or if the external connection is removed.
0.5A Hold, 60V Resettable Fuse One only.	For protection of the Unit's +12V supply output on pin 9 of SK05 ('Ext. Ant. Switch'). If the fuse goes high impedance, any external items powered by this supply will not be operative.	Inside Unit, on rear left hand side of Main Board (FS2). Note this fuse will automatically reset if the Unit is temporarily disconnected from the mains supply, or the supply is temporarily switched off, or if the external connection is removed.
0.5A Hold, 60V Resettable Fuse One only.	For protection of the Unit's +12V supply output on pin 17 of PL08 ('Remote Out'). If the fuse goes high impedance, any external items powered by this supply will not be operative.	Inside Unit, on rear right hand side of Main Board (FS3). Note this fuse will automatically reset if the Unit is temporarily disconnected from the mains supply, or the supply is temporarily switched off, or if the external connection is removed.

2.3.2 Tx1/2 Digital or Analogue Status Option

! CAUTION !

The following switch settings require the top dust cover to be removed. The mains supply and transmitter/drive source(s) to the Changeover Unit MUST switched off or safely muted and disconnected before removing the cover. Once set as required, the cover must be re-fitted before the unit is reconnected to the system, mains power applied and any required front panel 'Tx1/2 Trip' levels are set.

The digital/analogue option setting switches SW11-14 are at the left rear of the main printed circuit board (to access, remove top dust cover – 12 M3 screws). Note that, if required, one transmitter can have digital monitoring selected whilst the other has analogue.

For Tx1 Digital Status Monitoring (pin 2 of Tx1/2 Connector PL06), switches SW11 and SW12 should be in the right hand 'D' positions. For Tx1 Analogue Status Monitoring these switches should be in the left hand 'A' positions.

For Tx2 Digital Status Monitoring (pin 7 of Tx1/2 Connector PL06), switches SW13 and SW14 should be in the right hand 'D' positions. For Tx2 Analogue Status Monitoring these switches should be in the left hand 'A' positions.

For any input set to analogue, the relevant front panel preset potentiometer, 'Tx1 Trip' or 'Tx2 Trip', should then be set to just prevent the front panel 'Tx1 Alarm' or 'Tx2 Alarm' led from showing continuous red with the analogue voltage level (in the approximate range +1V to +4V dc) available from the associated transmitter operating at lowest normal power. Local and Manual operating modes must first be selected to facilitate these settings.

Note that if either Tx1/2 led is flashing red, this indicates no receiver signal present. This must be prevented by having such a signal present, or by shorting the appropriate Rx1 or Rx2 Status Monitor Input (pin 3 or pin 8 of Tx1/2 Connector PL06 respectively) to ground or leaving it open circuit, depending on the polarity set for these inputs by the internal options switch SW10, switch 4.

2.3.3 Internal Options Settings

! CAUTION !

These settings require the top dust cover to be removed. The main supply and transmitter/drive source(s) to the Changeover Unit MUST be switched off or safely muted and disconnected before removing the cover. Once set as required, the cover must be re-fitted before the unit is reconnected to the system and mains power applied.

The operating option setting switches SW9 and SW10 (both eight way DIL switches) are at the middle right of the main printed circuit board (to access, remove top dust cover – 12 M3 screws).

Option DIL Switch SW9				Option DIL Switch SW10			
No.	Function	Off	On	No.	Function	Off	On
1	Power-On Default State (Mode/Ant Tx On/Off)	As before power removed	Auto/Local Tx1 on and to Antenna Tx2 off *	1	Remote Out Alarms (Except CPU Good/Alarm)	Low = Good, On, Antenna, Auto, Local, Present	High = Good, On, Antenna, Auto, Local, Present
2	E2075-01 Switch Frame Option	BS/IEC 60864-1	Non BS/IEC 60864-1	2	Output Muting State	Low = Mute	High = Mute
	E2075-02 Auto/Manual Mode lock	Auto or Manual	Locked to manual operation only				
3	Combined Tx1/Tx2 Operation	Only Tx1 or Tx2 to Ant	Tx1, Tx2 or both Tx1 and Tx2 to Antenna or Load (only Tx1 or Tx2 to load on E2075-02)	3	Tx1/2 Status Input State	Low = Good (digital) or High Volts = Good (analogue)	High = Good (digital) or Low Volts = Good (analogue)
4	C/O Muting Period #1	4/5=off/off gives no muting 4/5=on/off gives 1 sec 4/5=off/on gives 5 secs		4	Rx1/2 Status Input State	Low = Good	High = Good
5	C/O Muting Period #2	4/5=on/on gives 10 secs (after C/O – all but first give 1 sec before C/O)		5	Ext. Switch Status input State	Low = Switch in desired position	High = Switch in desired position
6	Tx1/2 Fail Delay #1	6/7=off/off gives 5 secs 6/7=on/off gives 10 secs 6/7=off/on gives 20 secs 6/7=on/on gives 30 secs (to register fail – all give 5 secs to register good)		6	Ext Switch Status Present	Low = Not present (input ignored)	High = Present (input read as per switch 5) **
7	Tx1/2 Fail Delay #2			7	Remote/Local mode selection	Control via front panel switch(es) only	Control via rear panel input(s) only
8	Rx1/2 Fail Delay	1 second to register fail or good	10 seconds to register fail, 1 sec to register good	8	Test Mode	Normal operation	Switch test

*Note :- If combined Tx1/Tx2 operation selected by switch 3 being 'on', then both Tx1 and Tx2 will be switched on and to antenna in this circumstance.

**Note :- If the Ext Switch Status is read, the C/O muting period may be extended until the switch is in the desired position.

The switches should be checked or set during installation using the following guidelines.

DIL Switch SW9	
1	Determines if, after a mains supply interruption, settings return to those before the interruption or to a fixed default configuration. The first option is generally recommended.
2	<u>On the E2075-01 variant</u> Determines, <u>on Tx1 plus Tx2 to antenna systems only</u> , whether the switch frame being controlled, via SK05, is to the commonly used standard detailed in BS/IEC 60864-1 or to its inverse (see section 2.2.7) <u>On the E2075-02 variant</u> Determines if manual and automatic control can be selected (locally or remotely) or if the controller is locked to manual control to prevent unintended automatic changeovers.
3	Determines if a single Tx1 or Tx2 to antenna or a both Tx1 plus Tx2 to antenna(s) system is being controlled via SK05 (in the latter case, for the E2075-01 Variant, see switch 2 above)
4 5	Determine the fixed muting period, if any, before and after a changeover being made. Generally higher power levels/bigger switches should have longer periods. Low power levels may require none.
6 7	Determine the period a fault has to be continuously present at the Tx1/2 status inputs, at PL06, before it is actually registered as a fault. In a system with two cascaded changeover units, the period should set to be longer in the second unit in the chain than in the first.
8	Determines the period a fault has to be continuously present at the Rx1/2 status inputs, at PL06, before it is actually registered as a fault.

DIL Switch SW10	
1	Determines the output polarity of the Remote Out status/alarms on PL08 i.e. low/short-circuit or high/open-circuit for a particular status or alarm. All outputs apart from CPU good/alarm are affected. Low for good etc. is preferred as a positive indication of normal operation.
2	Determines the polarity of the Tx1/2 muting outputs on PL06 i.e. low/short-circuit or high/open-circuit to mute. These are set to suit the transmitter/drives being controlled and, for Eddystone equipment, are normally low/short-circuit to mute.
3	Determines the polarity of the Tx1/2 status inputs on PL06 i.e. low/short-circuit or high/open-circuit indicating good. These are set to suit the transmitter/drives being monitored, which for Eddystone equipment, are normally low/short-circuit indicating good. Note that when these inputs are set for analogue levels (see section 2.3.2) the low/short circuit option corresponds to a <u>high</u> analogue voltage indicating good and vice versa.
4	Determines the polarity of the Rx1/2 status inputs on PL06 i.e. low/short-circuit or high/open-circuit indicating good. These are set to suit the receivers being monitored, which for Eddystone equipment, are normally low/short-circuit indicating good.
5	Determines the polarity of the Sw1/2 status inputs on SK05 i.e. low/short-circuit or high/open-circuit indicating selected. These are set to suit the switches being monitored, which for Eddystone equipment, are normally low/short-circuit indicating good. Note that if these inputs are monitored (see next switch 6) and either of them do not indicate 'good', both transmitter/drives will automatically be muted. In systems this may effectively extend the changeover muting period, even if none is selected.
6	Determines if the Sw1/2 status inputs on SK05 are monitored (see previous switch 5). If the internal changeover relays are being used or if an external switch has no position indicating contacts, correctly wired to these inputs, this monitoring must be disabled by this switch.
7	<u>On the E2075-01 variant</u> Determines if remote or local operation is selected from the front panel switch or via the rear panel input on SK07. The form selected depends on the requirement of the system operator. <u>On the E2075-02 variant</u> Determines directly if operation is via the front panel switches or via the rear panel remote inputs. The form selected depends on the requirement of the system operator.
8	Test mode switch, which <u>must</u> be left in the OFF position.

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SECTION THREE : OPERATION

Once installed and set up as described in Section Two, manual operation and automatic control can be provided using the Changeover Unit. This unit also provides comprehensive remote control and monitoring facilities.

3.1 CONTROLS AND DISPLAYS

The front panel controls and displays available and their functions are as follows :-

3.1.1 Tx1/Tx2 Trip Preset Potentiometers

When the Tx1 and/or Tx2 status monitoring inputs on PL06 are set for analogue level monitoring (see section 2.3.2) these preset potentiometers are used to set the levels at which the input(s) will register as being 'good'. Setting of these is also detailed in section 2.3.2.

3.1.2 CPU Alarm Display Led

If the internal microprocessor is not operating correctly, the red CPU ALARM led is illuminated and all other front panel leds are switched off and all switches disabled.

3.1.3 Mode Switches and Leds

On the E2075-01 variant, when rear panel input, remote control of remote/local mode has been set by internal option switch SW10, switch 7 (see section 2.3.3), the front panel LOC/REM switch is inoperative. Otherwise it selects 'local' or 'remote' mode with the rear panel remote/local control input inoperative. In both cases the present state is indicated by the yellow leds on the right hand side of the switch.

On the E2075-02 variant, 'local' or 'remote' mode is directly set by internal option switch SW10, switch 7 (see section 2.3.3). The present state is indicated by the yellow leds on the right hand side of the switch. The LOC/REM switch itself, in local mode, acts as 'cancel external alarm warning'.

When 'local' mode is selected in either variant, 'automatic/manual' mode, antenna/load selection and transmitter on/off are only set by the front panel switches (with the equivalent rear panel remote commands inoperative).

When 'remote' mode is selected in either variant, 'automatic/manual' mode, antenna/load selection and transmitter on/off are only set by remote commands, via the REMOTE IN connector (with the equivalent front panel switches inoperative).

The AUTO/MAN switch, or equivalent remote command, selects 'automatic' or 'manual' mode. The present state is indicated by the yellow leds on the left hand side of the switch. On the E2075-02 variant only, this switch, and the remote command can be disabled and the mode locked to 'manual' by internal option switch SW9, switch 2 (see section 2.3.3).

In 'automatic' mode, antenna/load selection and transmitter on/off, are set automatically by the controller, with the equivalent front panel switches and remote commands being disabled.

In 'manual' mode, antenna/load selection and transmitter on/off are set directly by the front panel switches ('local' mode) or remotely ('remote' mode) with no automatic changeover provided.

3.1.4 Tx1 and Tx2 On/Off Switches and Leds

In 'manual' mode, the ON/OFF switches de-mute or mute the transmitters directly. On is indicated by the yellow leds above the switches. **Note that any muting of a transmitter during a changeover period or due to invalid settings of external switches (see section 3.1.5) is not shown by these leds, which remain on if the transmitter is intended to be switched on.**

In 'automatic' mode, the switches (and equivalent remote inputs) are inoperative. The yellow led above the switch now indicates whether a transmitter has been automatically switched on or off.

If the transmitter is 'on' but is registered as failed (via the Tx1 or Tx2 status monitor inputs) the associated red ALARM led is continuously illuminated. If the transmitter is 'off' it will automatically be registered as good.

If the Rx1 or Rx2 status monitor input is in use but there is no received signal registered, the associated red ALARM led will flash (note this takes precedence over a continuous Tx1 or Tx2 fault indication).

In 'automatic' mode, the red ALARM led indications are delayed by the Tx1/2 and Rx1/2 fail (and good) delays set by the internal options switch SW9, switches 6, 7, 8. In 'manual' mode however, these indications are instantaneous to assist the setting of trip levels and general system checking and monitoring.

The switches (when in 'remote' mode) and the led operations are mimicked by the rear panel REMOTE inputs and outputs, apart from any 'flashing' and without the instantaneous Tx/Rx/1/2 alarm indications in 'manual' mode. On the E2075-01 variant only, an additional remote output indicates if no received signals are present.

3.1.5 Tx1 and Tx2 Ant /Load Switches and Leds (including Ant Alarm)

Note, that the action of these switches is determined by the system being controlled, i.e. single or both transmitters to antenna as set by the internal options switch SW9, switch 3 (see section 2.3.3). In the first case, the Tx1 and Tx2 pairs of switches interact, so that only one transmitter can be connected to the antenna, with the other being connected to the load. In the second case the pairs of switches are more independent, allowing other combinations of connection to antenna or load including both to antenna and, in the case of the E2075-01 variant only, both to load.

In 'manual' mode, the ANT and LOAD switches connect the transmitters to the antenna or to the load directly, as indicated by the yellow leds above the switches.

In 'automatic' mode, the switches (and equivalent remote inputs) are inoperative. The yellow leds above the switches now indicate whether a transmitter has been automatically connected to antenna or load.

If external antenna/load switches/relays are being controlled, and external switch status monitoring is enabled by the internal options switch SW10, switch 6 (see section 2.3.3), the associated red 'ANT ALARM' will be continuously illuminated and both transmitter/drives muted, if the switches are not in a valid position.

The switches' operations (when in 'remote' mode) and the led operations are mimicked by the rear panel REMOTE inputs and outputs.

3.1.6 Changeover Leds

These yellow leds indicate the number of automatic changeovers made since the 'changeover counter' was last reset to zero. After the fourth automatic changeover (led number 4' on) no more automatic changeovers can occur without such a reset.

A reset to zero is made by selection of manual mode and also occurs during each mains power on reset sequence or when no received signal is detected by either Rx1 or Rx2 status inputs (when these inputs are in use).

All four Changeover leds flash, in auto mode only, for approximately 12 seconds after 'power on'. The same will happen when selecting 'auto' mode or when a received signal is first detected by either Rx1 or Rx2 status inputs (when these inputs are in use).

This flashing indicates that no automatic changeovers are allowed to occur during periods whilst the system settles to any actual changes that may have been initiated by the application of mains power, by operation of the controls, or as a response to a change in inputs.

After any subsequent automatic changeover, all the changeover leds (apart from the one indicating the actual changeover number) similarly flash for the same reason.

The led operations are mimicked, in binary form by the rear panel REMOTE output, apart from any 'flashing', changeover indications being continuous.

3.2 LOCAL OPERATION

On the E2075-01 variant, this is enabled by selecting 'local' (LOC) using the front panel switch or by using the equivalent rear panel remote input, depending on the setting of the internal option switch SW10, switch 7 (see section 2.3.3). All other front panel switches are then enabled and all other rear panel remote inputs disabled.

On the E2075-02 variant, this is directly determined by the setting the internal option switch SW10, switch 7 (see section 2.3.3). All front panel switches are then enabled and all rear panel remote inputs disabled.

3.3 REMOTE OPERATION

On the E2075-01 variant, this is enabled by selecting 'remote' (REM) using the front panel switch or by using the equivalent rear panel remote input, depending on the setting of the internal option switch SW10, switch 7 (see section 2.3.3). All other front panel switches are then disabled and all other rear panel remote inputs enabled

On the E2075-02 variant, this is directly determined by the setting the internal option switch SW10, switch 7 (see section 2.3.3). All front panel switches are then disabled and all rear panel remote inputs enabled.

In both variants, the remote commands now available, mimic and provide the same functions as the switches on the unit's front panel. The front panel led status (apart from any flashing effects and without the instantaneous Tx/Rx/1/2 alarm indications in 'manual' mode) is available via the rear panel REMOTE OUT Connector, PL08.

3.4 MANUAL OPERATION

This is enabled by selecting 'manual' (MAN) using the front panel switch or by using the equivalent rear panel remote input, depending on whether 'local' or 'remote' is presently selected. On the E2075-02 Variant only, this mode can also be locked to 'manual' by internal option switch SW9, switch 2 (see section 2.3.3).

Transmitter on/off and antenna/load selection is now performed using either the front panel controls or remotely (again depending on whether 'local' or 'remote' is presently selected). No automatic control is provided in this circumstance. No changeovers occur, with the changeover counter and display reset to zero.

If 'Tx1+Tx2 to antenna' operation is set by internal option switch SW9, switch 3 (see section 2.3.3), both as well as individual transmitters can be connected to the antenna. In the case of the E2075-01 both can also be connected to the load if required. Otherwise only one to antenna, with the other to load, can be selected.

Manual mode is generally used for testing purposes and for setting the initial status of the system before selecting 'auto' operation (though it may be permanently selected for systems which require no automatic changeovers). The red ALARM leds respond instantaneously in this mode without any fail or good delays (leds only, not the rear panel outputs at REMOTE OUT).

In 'manual' mode, both transmitters can be switched on. This enables the status of the transmitter not in use to be checked (it will be terminated in the load connected to the rear panel 'Load' connector).

If both transmitters are on before 'auto' is selected, both will remain on during subsequent automatic changeovers, giving active standby.

If one or both are switched off before 'auto' is selected, then only the one switched to the antenna will be switched on during subsequent automatic operation, giving passive standby. However, if 'Tx1+Tx2 to antenna' operation is set, both transmitters will be switched on during subsequent automatic operation, no matter what settings were made in 'manual' mode.

Note that when both are switched on for test purposes or for 'active' standby systems, interaction between transmitters may cause a small rise in incidental amplitude/phase modulation of both signals or cross-talk between them. This may be overcome by the use of external switches with higher isolation between their ports.

If external switch status monitoring is enabled by internal option switch SW10, switch 6 (see section 2.3.3) the front panel ANT ALARM red led will be illuminated if the actual external switch setting is not valid.

3.5 AUTOMATIC OPERATION

This is enabled by selecting 'automatic' ('AUTO') using the front panel switch or by using the equivalent remote control input, depending on whether 'local' or 'remote' is presently selected.

Transmitter on/off and antenna/load selection is now performed automatically with the equivalent front panel controls and remote control inputs disabled. Selecting 'automatic' mode causes all four front panel changeover leds to flash for 12 seconds, indicating that changeovers are not allowed to occur during this 'settling' period.

In automatic mode any failure of the selected receiver or transmitter/drive causes automatic changeover to the other side, with a maximum of four changeovers before 'local' or 'remote' control intervention or by resumption of received signals – see later paragraph.

On the E2075-01 variant, if 'Tx1+Tx2 to antenna' operation is set, both transmitters (normally using a common drive) can be connected to the antenna or load together as well as individually. In this situation, use of AUTO control will direct all of the remaining transmitter's power to the antenna if the other should fail. If the faulty transmitter becomes good again, the system will automatically revert to both transmitters being connected to the antenna.

Transmitter/drive faults are monitored by Tx1/2 status monitor inputs. These require faults to be present continuously for 5, 10, 20 or 30 seconds before they are registered as a fault and a changeover initiated (the period depending on the setting of internal option switch SW9, switches 6 and 7 – see section 2.3.3). Similarly they have to be 'good' continuously for 5 seconds before the fault state is cancelled.

Receiver faults are monitored by Rx1/2 status monitor inputs. These require faults to be present continuously for 1 or 10 seconds before they are registered as a fault and a changeover initiated (the period depending on the setting of internal option switch SW9, switch 8 – see section 2.3.3). Similarly they have to be 'good' continuously for 1 second before the fault state is cancelled.

If an Rx1/2 or a Tx1/2 input is not required it must be connected to ground or left open circuit (depending on the polarities set by the internal options switch) to simulate a 'good' status (and set as a digital input in the case of Tx1/2).

Note that in 'passive' standby systems, changeover from a failed side will occur without pre-checking that the other side itself does not have a faulty transmitter/drive, i.e. a transmitter/drive, which is presently switched off, is presumed to be good and will not indicate a fault locally or remotely. In 'active' standby systems, changeover will not occur to a transmitter/drive already switched on and registering as faulty.

The used transmitter/drive of the selected side will remain on or be switched on automatically. The unused transmitter/drive of the deselected side will remain switched on (active) or will be switched off (passive) depending on its' setting before 'auto' mode was selected (see section 3.4).

If the Rx1/2 status monitor inputs are in use and both indicate no received signal, both transmitter/drives will be switched off and the changeover counter reset to zero (further changeovers are inhibited). When reception resumes, only the transmitter/drive last connected to the antenna will be turned back on, giving automatic selection of passive standby using the transmitter/drive already connected to the antenna. Further changeovers are inhibited for 12 seconds (changeover leds flashing) whilst the system settles down. By these means, re-broadcast services which regularly go off-air by muting the original signal source, can be switched off and then restarted have without further manual intervention.

Up to four automatic changeovers can occur without manual local or remote intervention. The present changeover number is shown on the front panel display. All leds (apart from that registering the present changeover) flash for 12 seconds after a changeover occurring, this again indicating that no further changeovers are allowed to occur during this 'settling' period.

A reset to zero changeovers is made by selection of manual mode and also occurs during each mains power on reset sequence or when no received signal is detected by either Rx1 or Rx2 status inputs (when these inputs are in use).

If external switch status monitoring is enabled by internal option switch SW10, switch 6 (see section 2.3.3) the front panel ANT ALARM red led will be illuminated if the actual external switch setting is not valid.

3.6 MUTING DURING CHANGEOVER OPERATION

If set by internal option switch SW9, switches 4 and 5 (see section 2.3.3) both transmitters/drives are muted automatically for a periods of 1 second before and 1, 5 or 10 seconds after the changeover point. This ensures the internal and/or external relays from are not carrying power whilst switching over (recommended if they are operating at near their maximum load capacity). It should be noted that this muting period is not displayed as OFF by the front panel Tx1/2 leds nor is it indicated by the rear panel REMOTE output connector PL08.

If external switch status monitoring is enabled by internal option switch SW10, switch 6 (see section 2.3.3) the front panel ANT ALARM red led will be illuminated and the transmitter/drives muted whilst the switches are not in a valid position (i.e. whilst they are moving). This may increase the post-changeover muting period for very slow moving switches.

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