


- TAIT ELECTRONICS LIMITED -
ID: CASTEL0010. 2.983 (d)(8)(9)(10) -

CASTEL0008/CASTEL0009

Applicant / Manufacturer:	Tait Electronics Ltd P.O.Box 1645 558 Wairakei Road Burnside Christchurch NEW ZEALAND
Vendor:	Tait Electronics (USA) Inc. 9434 Old Katy Road Suite 110 Houston Texas 77055 UNITED STATES of AMERICA
Model Number:	T856-16-0000 (CASTEL0008) T856-26-0000 (CASTEL0009)
Regular production quantity is planned.	
Technical Description:	
Type of Emission:	F3E
Frequency Range:	Transmitter: 400-440 Mhz (CASTEL0008) Transmitter: 440-480 Mhz (CASTEL0009)
Power Output:	5-25 Watts
Maximum Power:	25 Watts
DC supply voltage:	13.8V
DC supply current:	5.5A Transmit, 150mA Standby
Circuit Description and Theory of Operation	Refer T850 Series II Service Manual.
Description of Circuits Determining Frequency	Standard TCXO. Temperature Compensated Crystal Oscillator rated at $\pm 1.0\text{ppm}$, -30° deg C to $+70^{\circ}\text{ deg C}$.
Spurious and Harmonic Emission Suppression	Components: L910, L920, L930, L940, C9090, C910, C920, C930, C940, C950, C960, C970, C980, C990
Active Circuit Devices	Refer T850 Interim Service Manual Parts List.
Tune-up and Alignment Procedure	Refer T850 Interim Service Manual.

Radio Systems Division
Tait Electronics Ltd
558 Wairakei Road P.O. Box 1645
Christchurch New Zealand
Phone: (64) (3) 358-3399
Fax: (64) (3) 359-4632

Tait Electronics Ltd. is an ISO9001 registered supplier

2.7 T856 Drive Amplifier & PA

(Refer to Figure 2.1 and the exciter and PA circuit diagrams (sheets 3 & 4) in Section 6.2.)

The output power of the PA is maintained at a constant level via a power control loop applied to the two-stage, wide band exciter amplifier (Q350, Q355). The forward and reverse RF power levels are sensed via a dual directional coupler and detector diodes (D440, D420 in the PA cavity). The detected DC signals are buffered (IC330) and then summed with the 'power control' level and fed to the control integrator (IC350). The output control voltage is buffered by Q310 and Q315, and applied to the collector of the wide band exciter amplifier.

Note: Forward and reflected power signals are summed so that, under high VSWR, the power control will turn the output RF level down.

To reduce the spurious output level when the synthesiser is out-of-lock, the Tx-Reg and Lock Detect signals are gated to inhibit the PA control circuit and to switch off the RF signal at the input to the drive amplifier. This is achieved by a PIN switch attenuator (D340, D380, D360).

Cyclic keying control is provided by additional circuitry consisting of several time delay, ramp and gate stages:

- | | |
|--------------------|-------------------------------|
| • Q325, IC350 | Power Ramping. |
| • Q355, Q325 | Tx-Reg. and Lock Detect gate. |
| • Q335, Q340, Q345 | Delay and PIN switch drive. |

This is to allow the RF power circuits (both exciter and PA) to ramp up and down in a controlled manner so that minimal adjacent channel interference is generated during the transition.

The output of the wide band amplifier is approximately 1W (+30dBm) for an input of 100mW (+20dBm) from the VCO, when the power control is set to maximum.

A temperature sensor (R481) is provided so that the RF output power can be reduced to a preset level when a set temperature is exceeded. This is a protection circuit (IC330, Q305) to prevent overheating, as the unit is *not* rated for continuous operation (refer to Section 1.2.3 for duty cycle specifications).

#R517, #R518 and #R519 form an attenuator to provide good VCO/exciter isolation as well as the correct exciter drive level.

The attenuator (#R345, #R396 and #R397) aids in producing the correct exciter drive level to the PA over the three frequency bands.

The RF output from the exciter is fed to the driver stage (Q410) and then to the final (Q420). DC is fed to the final via a low pass filter with special low frequency decoupling. CV475 tunes the output matching across the entire band.

THIS UNIT USES THE T857 EXCITER FOR ITS DRIVE.

2.8 T857 Exciter Drive Amplifier

(Refer to Figure 2.2 and the exciter circuit diagram (sheet 3) in Section 6.3.)

A two-stage, wide band amplifier (Q350, Q355) provides an output level of approximately 1W (+30dBm) for an input of 100mW (+20dBm) from the VCO. IC300, Q302, and Q303 provide a 9V regulated supply for the exciter.

To reduce the spurious output level when the synthesiser is out-of-lock, the Tx-Reg and Lock Detect signals are gated to inhibit the exciter control circuit and to switch off the RF signal at the input to the drive amplifier. This is achieved by a PIN switch attenuator (D201, D202, D203).

Cyclic keying control is provided by additional circuitry consisting of several time delay, ramp and gate stages:

- Q301, Q302, Q303, IC300 Power Ramping.
- Q310, Q311 Tx-Reg. and Lock Detect gate.
- Q320, Q325, Q330, Q335 Delay and PIN switch drive.

This is to allow the RF power circuits (both exciter and PA) to ramp up and down in a controlled manner so that minimal adjacent channel interference is generated during the transition.

R517, R518 and R519 form a 3dB attenuator to provide good VCO/drive amplifier isolation as well as the correct exciter drive level

The attenuator (#R330, #R331 and #R332) assists in producing the correct drive level to the PA over the three frequency bands in the T856. There is no attenuator in the T857.

Note: The exciter provides a DC control signal to the PA via the RF coax. This is injected via L314.