

3.4 Short Tuning Procedure

Use this procedure only if you want to reprogram the T856/857 to a frequency outside the 8MHz switching range and do not intend to carry out any other major adjustments or repairs.

3.4.1 Introduction

Reprogram the operating frequency as described in the PGM800Win programming kit (refer to Section 3.2).

Remove the top cover (nearest the handle).

Set up the test equipment as described in Section 3.3.

Set the links in the audio processor section as required (refer to Section 3.5).

3.4.2 Synthesiser Alignment

- Connect a high impedance voltmeter to the junction of L1 & R1 in the VCO (this measures the synthesiser loop voltage).
- Key the transmitter by earthing the Tx key line.
- **Single Channel** Tune VCO trimmer C6 for a synthesiser loop voltage of 9V.
- **Multichannel** Tune VCO trimmer C6 for a synthesiser loop voltage of 10V on the middle channel.
 If there is no middle channel, tune C6 so that the channels are symmetrically placed around a loop voltage of 10V.
 All channels should lie within the upper and lower limits of 16V and 3V respectively.
 Do not attempt to program channels with a greater frequency separation than the specified switching range of 8MHz.

3.4.3 Output Power Adjustment (T856 Only)

Connect an RF power meter to the output socket and key the transmitter.

Turn RV320 (power adjust) fully clockwise.

Tune CV451 (output power trim) for maximum output power and check that this is >30W.

Adjust RV320 for the required output power (between 5 and 25W).

Readjust CV451 to reduce the supply current by up to 0.5A.

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3.4.4 Two Point Modulation Adjustment

Note 1: In this and following sections deviation settings are given first for wide bandwidth sets, followed by settings in brackets for narrow bandwidth sets [].

Note 2: Reference modulation and limiter adjustment are controlled by PGM800Win. Electronic potentiometers (256 step) are used to allow channel-by-channel adjustment of deviation and two point modulation.

Note 3: To optimise the modulation response across the switching band, repeat steps 1-4 below for each channel that will be used (usually needed only for data applications). In applications where the modulation response is less critical (e.g. voice use only), carry out steps 1-4 below on the middle channel and cut and paste the value to all other channels.

1. Inject an audio signal of 250Hz 1.5V rms (+5dBm) into the CTCSS input (D-range 1 (PL100) pin 8).
Key the transmitter by earthing the Tx key line.
2. Adjust the output from the audio generator to obtain $\pm 3\text{kHz}$ [$\pm 1.5\text{kHz}$] deviation at 250Hz.
3. Change the input frequency to 100Hz and adjust IC220 via PGM800Win "reference modulation" to obtain $\pm 3\text{kHz}$ [$\pm 1.5\text{kHz}$] deviation (you can use either the mouse or up and down arrow keys).
4. Change the input frequency back to 250Hz.
Repeat steps 2 and 3 above until the deviations achieved at the two input frequencies are within 0.2dB of each other. You will need to do this at least four times.
5. Sweep the audio between 50 and 300Hz for peaks.

Note: A peak between 50 and 300Hz will indicate a fault condition, i.e:

- incorrect set-up
- or - modulation circuitry fault.

The specification window is $\pm 1\text{dB}$ relative to 150Hz from 67 to 260Hz.

3.4.5 FM Deviation (Limiter) Adjustment

Note: If the T856/857 will be used over the whole 8MHz switching range, you must set the deviation for each channel. However, if the module will be used on frequencies that cover only a 1MHz (or less) switching range, you can set the deviation on the middle channel and use this value for all other channels with the "fill" option in PGM800Win.

Inject 1kHz at -10dBm into the line input (D-range 1 (PL100) pins 1 & 4; pins 2 & 3 shorted).

Adjust RV210 (line sensitivity) fully clockwise and key the transmitter by earthing the Tx key line. Adjust IC220 via PGM800Win "deviation" to set the peak deviation to $\pm 4.7\text{kHz}$ [$\pm 2.3\text{kHz}$] (you can use either the mouse or up and down arrow keys).

Sweep the audio frequency from 100Hz to 4kHz and ensure that the maximum deviation does not exceed 4.7kHz [2.3kHz] (3.8kHz). Readjust IC220 if necessary via PGM800Win "deviation".

3.4.6 Line-in Level Adjustment

Set the injected signal at the line input to the required line level (typically -10 to -20dBm).

Adjust RV210 (line sensitivity) to provide $\pm 3\text{kHz}$ [$\pm 1.5\text{kHz}$] ($\pm 2.4\text{kHz}$) deviation.

3.7 PA Alignment (T856 Only)

Check that the exciter is connected to the PA with the coaxial link.

Connect an RF power meter to the PA output (use appropriate attenuation as necessary).

Turn RV310 (power adjust) fully clockwise.

Note: Before the following measurement is taken ensure the heatsink is at ambient temperature (20-25°C).

Measure and record the voltage (VL) at L481; perform this measurement at room temperature so that the NTC (R481) is close to 25°C.

Key the transmitter by earthing the Tx key line.

Tune #CV475 until maximum power is obtained. Check that the power exceeds 30W.

Adjust RV310 (power control) to 25W.

Re-adjust #CV475 to reduce the supply current by up to 0.5A.

3.8 Thermal Shutdown (T856 Only)

Key the transmitter by earthing the Tx key line and set the output power to 25W as described in Section 3.7.

Short L481 to ground.

Set RV330 (shutdown power level) for an output power of 5W.

Set RV210 (shutdown temperature) to 0.16VL volts (measured at IC350 pin 3), where VL is the voltage measured at L481 in Section 3.7. This sets the thermal shutdown at 85°C at NTC R481.

3 T856/857 Initial Tuning & Adjustment

The following section describes both short and full tuning and adjustment procedures and provides information on:

- channel programming
- selecting required audio links
- synthesiser alignment
- PA alignment (T856 only)
- modulator adjustment
- limiter adjustment
- setting line level
- compressor adjustment
- timer adjustment.

Note: Unless otherwise specified, the term "PGM800Win" used in this and following sections refers to version 2.00 and later of the software.

Refer to Figure 4.3 which shows the location of the main tuning and adjustment controls. Refer also to Section 6 where the parts lists, grid reference index and diagrams will provide detailed information on identifying and locating components and test points on the main PCB. The parts list and diagrams for the VCO PCB are in Part E.

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3.1 Introduction

When you receive your T856 transmitter or T857 exciter it will be run up and working on a particular frequency (the "default channel")¹. If you want to switch to a frequency that is within the 8MHz switching range (i.e. ± 4 MHz from the factory programmed frequency), you should only need to reprogram the transmitter/exciter with the PGM800Win software (refer to the PGM800Win programming kit and Section 3.2 below).

However, if you want to switch to a frequency outside the 8MHz switching range, you will have to reprogram and re-tune the transmitter/exciter to ensure correct operation. In this case you should carry out the short tuning procedure described in Section 3.4.

If you have carried out repairs or other major adjustments, you must carry out the full tuning and adjustment procedure described in this section (except for Section 3.4).

3.2 Channel Programming

You can program up to 128 channel frequencies into the transmitter/exciter's EEPROM memory (IC820) by using the PGM800Win software package and an IBMTM PC. You can also use PGM800Win to select the transmitter/exciter's current operating frequency (or "default channel").

For a full description of the channel programming procedure, refer to the PGM800Win programming software user's manual.



Note: When an ancillary D-range kit is fitted, you can also select a channel with an external switch, such as the DIP switch on the rack frame backplane PCB. Refer to Part C in the T800 Series Ancillary Equipment Service Manual (M800-00-101 or later issue) or consult your nearest Tait Dealer or Subsidiary for further details.

1. Use the "Read Module" function in PGM800Win to find out what the default channel is.

? 3.3 Test Equipment Required

You will need the following test equipment:

- computer with PGM800Win installed
 - T800 programming kit
 - 13.8V power supply
 - digital multimeter
 - audio signal generator
 - RF power meter
 - audio voltmeter x 2
 - modulation meter
 - oscilloscope (digital preferred)
 - 20dB pad
- or RF test set (optional)
- T800-XX calibration test unit (optional)

Figure 3.1 and Figure 3.2 show typical test equipment set-ups.

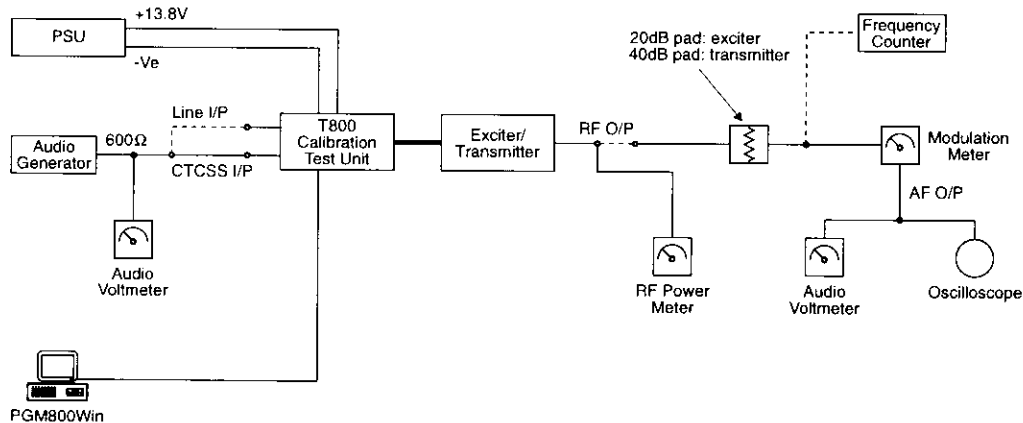


Figure 3.1 T856/857 Test Equipment Set-up With T800-XX

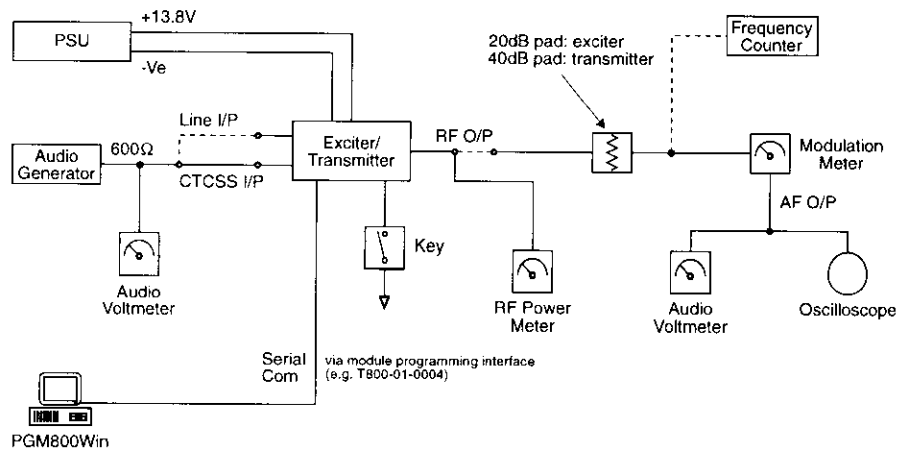


Figure 3.2 T856/857 Test Equipment Set-up Without T800-XX

3.5 Audio Processor Links

3.5.1 Link Details

Use the following table to set up the audio processor to the configuration you require. You should set the audio processor links before carrying out any of the tuning and adjustment procedures. The factory settings are shown in brackets [].

Plug	Link ^a		Function
PL205	1-2	A	not connected
	[3-4]	B	microphone pre-amp. output to compressor input
	5-6	C	microphone pre-amp. output to multiplexer input
PL210	[1-2]	L	multiplexer output to pre-emphasis input
	3-4	M	multiplexer output to limiter input
	5-6	N	multiplexer output to compressor input
PL215	1-2	G	not connected
	[3-4]	H	compressor output to multiplexer input
	5-6	I	compressor output to limiter input
	7-8	J	compressor output to pre-emphasis input
	9-10	K	not connected
PL220	1-2	D	pre-emphasis output to multiplexer input
	[3-4]	E	pre-emphasis output to limiter input
	5-6	F	not connected

a. The letters in this column and in the table in Section 3.5.2 below refer to the identification letters screen printed onto the PCB beside each pair of pins.

3.5.2 Typical Options

	PL205	PL210	PL215	PL220
microphone pre-amp. compressed and pre-emphasised; line input pre-emphasised (standard set-up)	[3-4] B	[1-2] L	[3-4] H	[3-4] E
microphone pre-amp. compressed and pre-emphasised; line input unprocessed	3-4 B	3-4 M	7-8 J	1-2 D
line and microphone compressed and pre-emphasised	5-6 C	5-6 N	7-8 J	3-4 E
microphone pre-amp. compressed; line and microphone flat response	3-4 B	3-4 M	3-4 H	5-6 F

? 3.6 Synthesiser Alignment

- Ensure that the T856/857 has been programmed with the required frequencies using PGM800Win software.
- **Single Channel** Select a channel using PGM800Win.
Multichannel Select the middle channel via PGM800Win.
- Connect a high impedance voltmeter to the junction of L1 and R1 in the VCO (this measures the synthesiser loop voltage).
- Key the transmitter by earthing the Tx key line.
Single Channel Tune VCO trimmer C6 for a synthesiser loop voltage of 9V.
Multichannel Tune VCO trimmer C6 for a synthesiser loop voltage of 9V on the middle channel.

If there is no middle channel, tune CV1 so that the channels are symmetrically placed around a loop voltage of 9V.

All channels should lie within the upper and lower limits of 15V and 5V respectively.

Do not attempt to program channels with a greater frequency separation than the specified switching range (8MHz).
- Check that the exciter output power is $1W \pm 300mW$ (T857 only).
- Measure the exciter output frequency and adjust the TCXO (IC700) trimmer if required.

**Caution:**

This trimmer is susceptible to physical damage. Do not exert a downward force of more than 500g (1lb) when adjusting.

3.9 Audio Processor

3.9.1 Two Point Modulation

The T856 and T857 utilise two point modulation to obtain a wide audio bandwidth independent of the synthesiser loop filter response. This is achieved by simultaneously frequency modulating the VCO and phase modulating the synthesiser reference frequency. The relative signal levels fed to the two modulators are quite critical and cause interaction when setting up.

Both modulating signals require readjustment when the exciter is shifted in frequency greater than the switching range (i.e. $\Delta F > \pm 4\text{MHz}$).

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Note 1: In this and following sections deviation settings are given first for wide bandwidth sets, followed by settings in square brackets for narrow bandwidth sets [] and round brackets () for mid bandwidth sets.

Note 2: Reference modulation and limiter adjustment are controlled by PGM800Win. Electronic potentiometers (256 step) are used to allow channel-by-channel adjustment of deviation and two point modulation.

Note 3: To optimise the modulation response across the switching band, repeat steps 1-4 below for each channel that will be used (usually needed only for data applications). In applications where the modulation response is less critical (e.g. voice use only), carry out steps 1-4 below on the middle channel and cut and paste the value to all other channels.

3.9.2 Modulator Adjustment

1. Inject an audio signal of 600Hz 1.5V rms (+5dBm) into the CTCSS input (D-range 1 (PL100) pin 8).

Key the transmitter by earthing the Tx key line.

2. Adjust the output from the audio generator to obtain $\pm 3\text{kHz}$ [$\pm 1.5\text{kHz}$] deviation at 600Hz.
3. Change the input frequency to 120Hz and adjust IC220 via PGM800Win "reference modulation" to obtain $\pm 3\text{kHz}$ [$\pm 1.5\text{kHz}$] deviation.
4. Change the input frequency back to 600Hz.

Repeat steps 2 and 3 above until the deviations achieved at the two input frequencies are within 0.2dB of each other. You will need to do this at least four times.

5. Sweep the audio between 50 and 300Hz for peaks.

Note: A peak between 50 and 300Hz will indicate a fault condition, i.e:

- incorrect set-up
- or - modulation circuitry fault.

The specification window is ± 1 dB relative to 150Hz from 65 to 260Hz.

3.9.3 Limiter Adjustment

Note: If the T856/857 will be used over the whole 8MHz switching range, you must set the deviation for each channel. However, if the module will be used on frequencies that cover only a 1MHz (or less) switching range, you can set the deviation on the middle channel and use this value for all other channels with the “fill” option in PGM800Win.

Set the links in the audio processor section as required (refer to Section 3.5).

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Inject 1kHz at -10dBm into the line input (D-range 1 (PL100) pins 1 & 4; and pins 2 & 3 shorted; refer to Section 1.2 of Part F).

Adjust RV210 (line sensitivity) fully clockwise and key the transmitter by earthing the Tx key line. Adjust IC220 via PGM800Win “deviation” to set the peak deviation to ± 4.7 kHz [± 2.3 kHz] (you can use either the mouse or up and down arrow keys).

Sweep the audio frequency from 100Hz to 4kHz and ensure that the maximum deviation does not exceed 4.7kHz [2.3kHz] (3.8kHz). Readjust IC220 if necessary via PGM800Win “deviation”.

3.9.4 Line Level Without Compressor

This section assumes that the compressor is not used. If the compressor is required, refer to Section 3.9.5.

Adjust the line sensitivity as follows:

- set the injected signal at the line input to the required line level (typically -10 to -20dBm);
- adjust RV210 (line sensitivity) to provide ± 3 kHz [± 1.5 kHz] (± 2.4 kHz) deviation.

3.9.5 Compressor

The compressor may be used on the line input only, the microphone input only, or on both the line and microphone inputs. If the compressor is used, refer to one of the following sections as appropriate.

3.9.5.1 Compressor On Line Input Only

Set RV210 (line sensitivity) fully clockwise and key the transmitter by earthing the Tx key line.

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T856 TRANSMITTER - LIST OF ACTIVE DEVICES

IPN: 220-01397-02

Designation	IPN	Comp. Code	Description
#L355	052-08125-15	15H25	COIL A/W 1.5T/2.5MM HOR 0.8MM
#L910	052-08145-15	15H45	COIL A/W 1.5T/4.5MM HOR 0.8MM
#L930	052-08150-15	15H50	COIL A/W 1.5T/5.0MM HOR 0.8MM
#L940	052-08145-15	15H45	COIL A/W 1.5T/4.5MM HOR 0.8MM
=IC700	539-00010-47	GFS-415	TCXO GFS-415 12.8MHZ +/-2PPM -25 TO +75C
IC210	002-10003-24	LM324D	IC LM324D QUAD OP AMP SO14
IC220	002-10126-70	DS1267S	IC DS1267S DUAL DIGITAL POT SOL16
IC230	002-10003-24	LM324D	IC LM324D QUAD OP AMP SO14
IC240	002-10040-53	4053BD	IC 4053BD 2CH MUX/DEMUX SO16
IC250	002-00020-50	4N25	IC 4N25A OPTO COUPLER DIP6
IC260	002-10003-24	LM324D	IC LM324D QUAD OP AMP SO14
IC330	002-10003-58	358D	IC 358D DUAL OP AMP SO8
IC350	002-10003-58	358D	IC 358D DUAL OP AMP SO8
IC370	002-12951-00	LP2951M	IC LP2951M REGULATOR 100MA SMD SO8
IC610	002-00014-58	78L05	IC 78L05 REG 5V 100MA TO-92
IC630	002-00014-62	LM317L	IC LM317L REGULATOR 100MA TO-92
IC640	002-10003-58	358D	IC 358D DUAL OP AMP SO8
IC650	002-10012-32	DS1232	IC DS1232LPS-2 LO-PWR RESET WATCHDOG SO8
IC710	002-74910-04	74HCU04T	IC 74HCU04T HEX INVERTER CMOS UNBUFFERED SO14
IC720	002-74910-04	74HCU04T	IC 74HCU04T HEX INVERTER CMOS UNBUFFERED SO14
IC730	002-10045-20	74HC4520T	IC 74HC4520T DUAL BINARY COUNTER 4BIT SO16
IC740	002-14519-10	145191F	IC MC145191F SYNTHESIZER SOG20
IC750	002-10330-78	33078D	IC 33078D-R2 DUAL OP AMP LOW NOISE SO8
IC820	002-12416-00	24C01A16	IC 24C01A16 16K LO-VOLT SERIAL EEPROM SO8

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T856 TRANSMITTER - LIST OF ACTIVE DEVICES

IPN: 220-01397-02

IC830	002-10003-24	LM324D	IC LM324D QUAD OP AMP	SO14	
L302	057-10120-03	BLM21A05	INDUCTOR SOLID CHIP EMI SUPPRESSION 200MA	0805	
L303	057-10120-03	BLM21A05	INDUCTOR SOLID CHIP EMI SUPPRESSION 200MA	0805	
L304	056-10330-02	330NHU2	INDUCTOR FXD 330NH	SIEMENS SIMID02 1210	
L305	065-00010-04	F8	BEAD FERRITE 4*2*5/NEOSID F8/9.5MM& 7.5MM		
L310	065-00010-04	F8	BEAD FERRITE 4*2*5/NEOSID F8/9.5MM& 7.5MM		
L315	052-08130-65	65H30	COIL A/W 6.5T/3.0MM HOR 0.8MM		
L320	056-10330-02	330NHU2	INDUCTOR FXD 330NH	SIEMENS SIMID02 1210	
L325	CU-ON-PCB	PRINTED	PRINTED INDUCTOR (MADE INTO THE PCB)		
L330	CU-ON-PCB	PRINTED	PRINTED INDUCTOR (MADE INTO THE PCB)		
L333	057-10120-03	BLM21A05	INDUCTOR SOLID CHIP EMI SUPPRESSION 200MA	0805	
L334	057-10120-03	BLM21A05	INDUCTOR SOLID CHIP EMI SUPPRESSION 200MA	0805	
L335	052-08130-25	25H30	COIL A/W 2.5T/3.0MM HOR 0.8MM		
L340	CU-ON-PCB	PRINTED	PRINTED INDUCTOR (MADE INTO THE PCB)		
L345	065-00010-01	3B	BEAD 3B 6 HOLE		
L350	CU-ON-PCB	PRINTED	PRINTED INDUCTOR (MADE INTO THE PCB)		
L405	052-08125-15	15H25	COIL A/W 1.5T/2.5MM HOR 0.8MM		
L410	052-08160-15	15H60	COIL A/W 1.5T/6.0MM HOR 0.8MM		
L415	065-00010-04	F8	BEAD FERRITE 4*2*5/NEOSID F8/9.5MM& 7.5MM		
L418	CU-ON-PCB	PRINTED	PRINTED INDUCTOR (MADE INTO THE PCB)		
L420	065-00010-04	F8	BEAD FERRITE 4*2*5/NEOSID F8/9.5MM& 7.5MM		
L425	056-00021-04	330NHW	FXD INDUCTOR TYPE 104 330NH		
L430	065-00010-04	F8	BEAD FERRITE 4*2*5/NEOSID F8/9.5MM& 7.5MM		
L435	052-08160-15	15H60	COIL A/W 1.5T/6.0MM HOR 0.8MM		
L440	CU-ON-PCB	PRINTED	PRINTED INDUCTOR (MADE INTO THE PCB)		
L445	052-08130-35	35H30	COIL A/W 3.5T/3.0MM HOR 0.8MM		

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IPN: 220-01397-02

L450	065-00010-04	F8	BEAD FERRITE 4*2*5/NEOSID F8/9.5MM& 7.5MM
L455	CU-ON-PCB	PRINTED	PRINTED INDUCTOR (MADE INTO THE PCB)
L460	065-00010-04	F8	BEAD FERRITE 4*2*5/NEOSID F8/9.5MM& 7.5MM
L465	051-00020-02	2002	TAIT COIL 2002 A/W 10MM (0.4") LINK (INDUCTOR)
L470	CU-ON-PCB	PRINTED	PRINTED INDUCTOR (MADE INTO THE PCB)
L475	051-00556-00	556	TAIT COIL #556 INDUCTOR (COPPER SLOT CAR TRACK)
L480	056-10330-02	330NHU2	INDUCTOR FXD 330NH SIEMENS SIMID02 1210
L481	056-10330-02	330NHU2	INDUCTOR FXD 330NH SIEMENS SIMID02 1210
L485	056-10330-02	330NHU2	INDUCTOR FXD 330NH SIEMENS SIMID02 1210
L520	057-10120-03	BLM21A05	INDUCTOR SOLID CHIP EMI SUPPRESSION 200MA 0805
L610	056-00021-04	330NHV	FXD INDUCTOR TYPE 104 330NH VERT
L620	065-00010-04	F8	BEAD FERRITE 4*2*5/NEOSID F8/9.5MM& 7.5MM
L750	052-08125-15	15H25	COIL A/W 1.5T/2.5MM HOR 0.8MM
L920	052-08150-15	15H50	COIL A/W 1.5T/5.0MM HOR 0.8MM
Q210	000-10008-48	BC848	TRANSISTOR BCW60/BC848 NPN AF SMALL SIG SOT-23
Q220	000-10008-17	BC817	TRANSISTOR BCX19/BC817 NPN AF LOW POWER SOT-23
Q230	000-10008-48	BC848	TRANSISTOR BCW60/BC848 NPN AF SMALL SIG SOT-23
Q240	000-10008-48	BC848	TRANSISTOR BCW60/BC848 NPN AF SMALL SIG SOT-23
Q250	000-10008-17	BC817	TRANSISTOR BCX19/BC817 NPN AF LOW POWER SOT-23
Q260	000-10008-57	BC857	TRANSISTOR BCW70/BC857 PNP AF SMALL SIG SOT-23
Q270	000-00011-91	BD139V	TRANSISTOR BD139 NPN AF PWR TO-126
Q310	000-10008-17	BC817	TRANSISTOR BCX19/BC817 NPN AF LOW POWER SOT-23
Q315	000-00012-15	BD234	TRANSISTOR BD234 PNP AF PWR TO-126
Q320	000-10008-48	BC848	TRANSISTOR BCW60/BC848 NPN AF SMALL SIG SOT-23
Q325	000-10008-48	BC848	TRANSISTOR BCW60/BC848 NPN AF SMALL SIG SOT-23
Q330	000-10008-07	BC807	TRANSISTOR BC807 PNP AF LOW POWER SOT-23

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T856 TRANSMITTER - LIST OF ACTIVE DEVICES

IPN: 220-01397-02

Q335	000-10008-07	BC807	TRANSISTOR BC807 PNP AF LOW POWER	SOT-23
Q340	000-10008-07	BC807	TRANSISTOR BC807 PNP AF LOW POWER	SOT-23
Q345	000-10008-07	BC807	TRANSISTOR BC807 PNP AF LOW POWER	SOT-23
Q350	000-00005-55	MRF555	TRANSISTOR MRF555 NPN VHF MACRO-X CASE 317D-02	
Q355	000-00032-56	MRF630	TRANSISTOR MRF630 NPN UHF POWER 3W	TO-39
Q410	000-00022-75	SD1433	TRANSISTOR SD1433 NPN UHF PWR 10W .280 4L CB-312	
Q420	000-00022-80	SD1488	TRANSISTOR SD1488 NPN UHF POWER 40W	6LFL
Q505	000-10008-48	BC848	TRANSISTOR BCW60/BC848 NPN AF SMALL SIG	SOT-23
Q510	000-10008-07	BC807	TRANSISTOR BC807 PNP AF LOW POWER	SOT-23
Q520	000-10008-07	BC807	TRANSISTOR BC807 PNP AF LOW POWER	SOT-23
Q530	000-10008-07	BC807	TRANSISTOR BC807 PNP AF LOW POWER	SOT-23
Q540	000-10008-07	BC807	TRANSISTOR BC807 PNP AF LOW POWER	SOT-23
Q550	000-10008-48	BC848	TRANSISTOR BCW60/BC848 NPN AF SMALL SIG	SOT-23
Q610	000-10008-07	BC807	TRANSISTOR BC807 PNP AF LOW POWER	SOT-23
Q620	000-00012-15	BD234	TRANSISTOR BD234 PNP AF PWR	TO-126
Q630	000-50011-30	BC557	TRANSISTOR BC557B AI PNP AF SMALL SIG	TO-92
Q660	000-10008-17	BC817	TRANSISTOR BCX19/BC817 NPN AF LOW POWER	SOT-23
Q670	000-10008-57	BC857	TRANSISTOR BCW70/BC857 PNP AF SMALL SIG	SOT-23
Q710	000-10008-48	BC848	TRANSISTOR BCW60/BC848 NPN AF SMALL SIG	SOT-23
Q720	000-10008-57	BC857	TRANSISTOR BCW70/BC857 PNP AF SMALL SIG	SOT-23
Q730	000-10008-48	BC848	TRANSISTOR BCW60/BC848 NPN AF SMALL SIG	SOT-23
Q740	000-10008-57	BC857	TRANSISTOR BCW70/BC857 PNP AF SMALL SIG	SOT-23
Q750	000-10008-07	BC807	TRANSISTOR BC807 PNP AF LOW POWER	SOT-23
Q760	000-10008-48	BC848	TRANSISTOR BCW60/BC848 NPN AF SMALL SIG	SOT-23
Q770	000-10008-57	BC857	TRANSISTOR BCW70/BC857 PNP AF SMALL SIG	SOT-23
Q775	000-10008-57	BC857	TRANSISTOR BCW70/BC857 PNP AF SMALL SIG	SOT-23

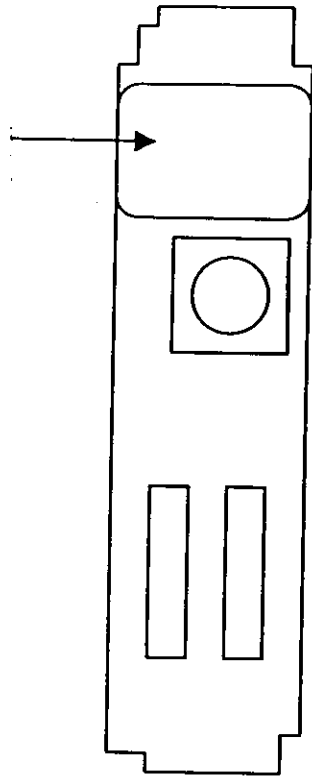
FCCID: CASTEL0009 and CASTEL0010

T856 TRANSMITTER - LIST OF ACTIVE DEVICES

IPN: 220-01397-02

Q780	000-10008-48	BC848	TRANSISTOR BCW60/BC848 NPN AF SMALL SIG	SOT-23
Q785	000-10008-57	BC857	TRANSISTOR BCW70/BC857 PNP AF SMALL SIG	SOT-23
Q790	000-10003-12	BFR31	TRANSISTOR BFR31 N-CHANNEL JFET UHF	SOT-23
Q795	000-10057-10	MMBR571	TRANSISTOR MMBR571 NPN UHF LOW POWER	SOT-23
Q810	000-10008-48	BC848	TRANSISTOR BCW60/BC848 NPN AF SMALL SIG	SOT-23
Q820	000-10008-17	BC817	TRANSISTOR BCX19/BC817 NPN AF LOW POWER	SOT-23
Q830	000-10008-57	BC857	TRANSISTOR BCW70/BC857 PNP AF SMALL SIG	SOT-23
Q840	000-10008-57	BC857	TRANSISTOR BCW70/BC857 PNP AF SMALL SIG	SOT-23
Q850	000-10008-48	BC848	TRANSISTOR BCW60/BC848 NPN AF SMALL SIG	SOT-23
Q860	000-10008-48	BC848	TRANSISTOR BCW60/BC848 NPN AF SMALL SIG	SOT-23

Receiver/Transmitter/Exciter



PA

