



Power Amplifiers Types 4402/4404

Technical service manual

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1 GENERAL INFORMATION

The HF4000 Type 4402 (200W) and 4404 (400W) Power Amplifiers give an interchangeable choice of output power capabilities to match the 8528S-H, 4101 Control Unit and the 4200 series of antenna tuners. The Power Amplifiers provide DC supply to both the Control Unit and the Antenna Tuner as well as interfacing between the two. They are capable of supplying full forward power into loads up to 1.6:1 VSWR and maintain a constant reflected power with higher VSWR.

Both units have a PA PCB assembly and a filter PCB assembly. The PA PCB assembly has a gain control amplifier to give ALC and medium/low power control, a class A driver stage followed by drivers and power stages, both operating in class AB. Both bias and PTT control are generated, as well as one 13.6V regulator. The filter PCB assembly has band switched low pass filters for removal of PA harmonics, the ALC generating circuits, and the Control Unit to Antenna Tuner interface circuitry. Three voltage regulators supply the control unit, the antenna tuner and internal 13.6V needs. The 4404 unit consists in effect of two 4402's running in parallel, the outputs of which are combined through a single filter set.

2 SPECIFICATION

2.1 GENERAL

Specification figures will normally be exceeded by production equipment. Where relevant, acceptance limits are given in parentheses. All measurements are made at 27.2V DC input, 50 Ω source and load.

| | |
|-------------------------|--|
| Type: | All Solid State. |
| Frequency Range: | 2 - 23MHz |
| Spurious and Harmonics: | 55dB (48) below PEP |
| ALC Range: | A 30dB increase in input signal above compression threshold produces less than 1dB increase in output. |

2.2 TYPE 4402

| | |
|---------------------------|---|
| Power consumption: | J3E average; 6A J3E two-tone; 12A |
| Power Output: | SSB; J3E 200W PEP ± 1 dB at 2-8MHz AM; H3E 50W ± 1 dB (2182kHz only) |
| Medium Power: | J3E 80W PEP ± 2 dB |
| Low Power: | J3E 10W PEP ± 3 dB |
| Intermodulation products: | 40dB (34) below PEP |
| Duty cycle: | SSB Speech-continuous AM 50% |

2.3 TYPE 4404

| | |
|---------------------------|--|
| Power consumption: | J3E average; 11A J3E two-tone; 23A |
| Power Output: | SSB; J3E 400W PEP ± 1 dB AM; H3E 100W ± 1 dB (2182kHz only) |
| Medium Power: | J3E 80W PEP ± 2 dB |
| Low Power: | J3E 80W PEP ± 3 dB |
| Intermodulation products: | 40dB (36) below PEP |
| Duty cycle: | SSB Speech-continuous AM 50% |

3 TYPE 4402 200 W 24 V

3.1 VOLTAGE REGULATOR AND PTT CONTROL

The voltage regulator is a series pass type which supplies all the class A stages of the PA PCB via the PTT control, and the logic and relays (except the power relays) of the Filter PCB. As the output voltage is not critical, no adjustment is needed. It consists of the series pass emitter follower transistor, 3V18 whose output is sampled by 3R52 and 3R53 and compared to 3V20 using 3V19. 3V19 then shunts current supplied by 3R54 to ground thereby controlling the output voltage.

The PTT control allows the transmitter to operate when PTT is activated by supplying power to the class A stages and the bias supplies. It is driven by a 0 V on the PTT line which saturates the pass transistor 3V16, via 3R51 and 3V17. 3R49 prevents excessive dissipation in 3V17.

3.2 GAIN CONTROL

Drive signal appearing on the input terminals is terminated into 50 Ω by 3R1 and 3R3 via isolating transformer 3T1. The signal is then fed into the emitters of 3V2 and 3V3 which are in a grounded base differential amplifier configuration, the gain of which can be controlled by varying the DC voltage on the base of either transistor. Open loop gain of the entire PA PCB assembly is set by varying 3R5, and medium and low powers are set by using transistor switches 3V4 and 3V5, both of which are on for low power.

ALC control is also effected in this stage, with 3V1 being used as a buffer between the generated ALC voltage from the Filter PCB and the supply to the base of 3V2. The decay time of the ALC is controlled by 3C3.

3.3 CLASS A DRIVER

The gain controlled signal from 3V3 is then fed to 3V6, which is a buffer amplifier with a voltage gain set by 3R11 and 3R24. This transistor also provides a bias supply for 3V7 via 3L1 which is thermally compensated by 3D2-4. 3V7 with 3T2 provide a controlled gain, low distortion balanced drive for the following stage using transformer coupled feedback in the emitter. 3R27, 28 and 3C25, 28 ensure good linearity with some higher frequency boost, as well as controlling the output impedance. 3V8 is thermally bonded to the heatsink and is used as the bias supply for the next stage.

3.4 DRIVER STAGE

3V9 and 3V10 are the class AB driver stage, the bias being obtained from the previous stage. Output impedance and linearity are controlled by the feed-forward transformer 3T3 and input impedance is controlled by 3R29-32. The DC supply to the driver transistors is taken from the unregulated supply via transformer 3T4, and is not controlled by PTT. Bias adjustment of this stage is effected with 3R57.

3.5 OUTPUT STAGE AND BIAS SUPPLY

3V11 and 3V12 are the class AB output stage, the bias being derived from a dedicated bias supply. The DC supply to the output transistors is taken from the unregulated supply via the output transformer 3T6 and a fuse, and is not controlled by PTT. Negative feedback is provided by 3T5, 3R34-39, 3C35-36 and 3L2-3 and some common-mode feedback via 3C40, 3R42 and 3L5. The signal is then stepped up with the output transformer and fed to the filter PCB.

The bias regulator consists of a Darlington series pass transistor 3V13, its base current being supplied via 3R43 from the zener diode reference of 3V15 and 3R48. The output voltage from 3V13 is compared with the base-emitter voltage of 3V14, which in turn shunts current from 3R43 to ground so controlling the output voltage. Bias voltage adjustment is provided by 3R45 which modifies the voltage on the base of 3V14. Thermal compensation for the output pair is provided by 3V14 being thermally bonded to the heatsink, and the zener regulator, 3V15, prevents power supply fluctuations from affecting the bias voltage.

3.6 PA FILTER AND CONTROL

The signal from the output transformer is capacitively coupled via 2C63 and 2C65 to the PA Filter set, which is a series of relay switched low pass filters selected by using the band information from the Control Unit. The band information is a 4 bit binary word, 3 bits being responsible for filter switching, the remaining bit being used only by the Antenna Tuner. The sequence is shown in Table D.3.1.

| D | C | B | A | Frequency Band |
|---|---|---|-----|---------------------|
| 0 | 0 | 0 | 0/1 | 6.8 MHz - 10.2 MHz |
| 0 | 0 | 1 | 0/1 | 2 MHz - 3 MHz |
| 0 | 1 | 0 | 0/1 | 4.5 MHz - 6.8 MHz |
| 0 | 1 | 1 | 0/1 | 2 MHz - 3 MHz |
| 1 | 0 | 0 | 0/1 | 3 MHz - 4.5 MHz |
| 1 | 0 | 1 | 0/1 | 15.3 MHz - 23 MHz |
| 1 | 1 | 0 | 0/1 | 15.3 MHz - 23 MHz |
| 1 | 1 | 1 | 0/1 | 10.2 MHz - 15.3 MHz |

TABLE D.3.1

The duplication of bands 2 MHz - 3 MHz and 15.3 MHz - 23 MHz are due to the requirements of the Antenna Tuner.

The binary word is decoded by a 4028 and interfaced to the filter relays with a 1416 driver. The relays route the RF signal through the appropriate filter section, each of which is based on a 50 Ω : 50 Ω , Cauer-Chebyshev low pass filter, and are cascaded with reducing frequency band, so all filter sections are in the RF path in the 2 MHz - 3 MHz band.

The filters are in circuit in both transmit and receive modes, and so are not controlled by PTT, however the signal is diverted at the input to the filter for the PA or Control Unit respectively. This is done with a relay which is controlled by the PTT operated switch 2V4.

3.7 ALC GENERATOR

The ALC Generator consists of 2 stages, the detector circuit and the processor circuit. The detector circuit is immediately after the filters and samples RF voltage with the capacitive divider 2C10 and 2C8, 9, 11, 13 and RF current using the in line sampling transformer 2T1. The sampled current is then converted to a voltage by the terminating resistors 2R11 and 2R12, which generates two equal voltages 180° out of phase, both proportional to line current. The centre of the current sensor circuit is then added to the output from the capacitive divider and is set so when the output is terminated into 50 Ω , the voltage developed across each current terminating resistor exactly equals that of the capacitive divider output. Therefore at the anode of 2D2, (the forward power detector) there appears twice each voltage, and at the anode of 2D5, (the reflected power detector) there appears no voltage. Any deviation from 50 Ω in the load will generate a reflected power voltage and this OR-ed with a sample of the forward power detector. The forward power sample is controlled by the trimpot 2R8, and so the output power limit is set using this control. The reflected power limit is set to 12 W (1.6:1 VSWR) and this is not adjustable.

Also sampled is the peak output transistor collector voltage which is derived from a resistive divider on the PA PCB (3R46 and 3R47) and is OR-ed with the output from the output power detectors using 2D1 and 2D6. The resultant voltage is then compared to a reference generated by 2R2, 2V2, 3R2, 2R3, 2D3, 2D4 and 2R10 using 2V3 in the processor circuit which in turn drives the ALC control circuit of the PA PCB.

The reference generator consists basically of a resistive divider formed by 2R2, 3R2, 2R3, and 2R10 which tracks the unregulated supply so the output power is controlled by the supply voltage. The diodes 2D3 and 2D4 provide thermal compensation for 2V3 and 2D6. The thermistor 3R2 on the PA PCB is a PTC which is thermally bonded to the heatsink and transitions from about 100 Ω to in excess of 4 k Ω within 20°C centred around 90°C so effecting a thermal shutdown. The zener diode 2V2, ensures the voltage across the resistive divider formed by 3R2, 2R3 and 2R10 never exceeds 6.8 volts regardless of the resistance of 3R2, making thermal shutdown more complete.

3.8 TRANSMIT INDICATOR DRIVER

The drive for the transmit indicator is derived from the forward power detector output which is divided down by 2R4 and 2R5 and fed to the base of 2V1. The collector current of 2V1 is proportional to forward power out due to 2R1 so indicator brightness in the control unit is proportional to forward power output.

3.9 CONTROL UNIT AND ANTENNA TUNER INTERFACES

The interconnections from the Control Unit to the Antenna Tuner are via the Filter PCB which provides RF by passing using 2R19-23, and 2C66-72. This minimises problems created by the high RF fields of the Antenna Tuner.

3.10 REPLACEMENT OF PA COMPONENTS

If it is necessary to lift the PA PCB for servicing, remove the transistor flange mounting screws first and replace last to minimise stress on the packages. Before refitting the PCB thoroughly clean off any old thermal compound from the heatsink and transistor flanges and replace with new compound (e.g. Jermyn Thermaflow A30). Particular care is needed with the thermistor (3R2) to ensure it enters the hole in the heatsink without damage. The transistor types MRF422 and MRF426 are fitted as matched pairs and must be replaced as matched pairs i.e. the coloured dots on a pair of transistors must match. The procedure for replacement of these transistors is as follows:

- (a) MRF422 only, remove the feedback components 3R34-39, 3C35, 36 and 3T5.
- (b) Remove the flange fixing screws.
- (c) Using a de-soldering tool or 'solder-wick' remove the bulk of the solder from each lead. Gently pull the leads away from the PCB while heating joint. Remove the transistor.

Clear away any excess solder from the emitter, base and collector pads. Thoroughly clean the transistor mating surface on the heatsink with a cloth or tissue.

- (d) Form the leads of the replacement transistors using the discarded transistor as a guide.
- (e) Coat the transistor flange with a thin film of thermal compound (e.g. Jermyn Thermaflow A30).
- (f) Fit the transistor (check orientation) and tighten the flange fixing screws evenly.
- (g) Carefully solder the transistor leads, this should be carried out quickly using a very hot tipped soldering iron.
- (h) MRF422 only, replace feedback components and adjust bias current - refer para. 3.11.1.

3.11 PRE-SET ADJUSTMENTS

All adjustments to the PA are made with 27.2 V, 20A supply and terminated with a 50 Ω dummy load.

3.11.1 PA Bias

Ensure the unit is OFF at the Control Unit and remove the 2-strand FUSE link from the Filter PCB. Insert a DC Ammeter set to the 1A range in place of the FUSE link, turn the Control Unit to HIGH power and select SSB Mode. Remove any audio from the microphone input and press and hold the microphone PTT. Adjust the trimpot marked BIAS until the ammeter reads 65 mA \pm 5 mA. Turn off the Control Unit, remove the multimeter and replace the FUSE link.

3.11.2 Driver Bias

Turn Control Unit to HIGH power and select SSB Mode. With no audio drive present, press and hold the microphone PTT and adjust the 'DR. BIAS' resistor (3R57) until the DC voltage on the emitters of the Driver Transistors is 35 mV \pm 5 mV relative to ground.

3.11.3 Gain Adjustment

Select a channel frequency in the 8 MHz band and switch to LOW power. Press and hold the microphone PTT and increase two tone audio drive until the Control Unit microphone amplifier is well into compression. Adjust the trimpot marked GAIN until the output is approximately 10 W PEP.

3.11.4 ALC Adjustment

With the Control Unit, select a channel frequency in the 8 MHz band. With PTT activated and the microphone amplifier well into compression, select HIGH power and adjust the trimpot marked SET PWR on the Filter PCB for 200 W PEP.

3.11.5 Performance Checks

Using one frequency in each band and using full audio drive check that power output is within the range 160 to 240 W PEP and that IMD is better than -28 dB below each tone.

3.12 TYPICAL PA VOLTAGES

The Table D.3.2 is a guide to the peak to peak voltages one would expect to see at some points in a PA, and are given for full power out when driven with a 4101 Control Unit with two tone drive. The test voltage is 27.2 V, the antenna tuner is not connected and the output is terminated into a 50 Ω dummy load.

| Frequency MHz | I (A) | MRF260 | | MRF426 | MRF422 |
|------------------|-------|-----------------|----------------------|----------------------|----------------------|
| | | Base Voltage | Collector Voltage | Collector Voltage | Collector Voltage |
| 2 | 10.8 | 1.8 | 5 | 15 | 55 |
| 4 | 11.0 | 1.8 | 6.2 | 20 | 55 |
| 6 | 11.8 | 1.8 | 6.5 | 19 | 55 |
| 8 | 12.1 | 1.8 | 6.5 | 20 | 55 |
| 12 | 10.8 | 1.9 | 7 | 20 | 65 |
| 16 | 12.5 | 1.9 | 8 | 22 | 60 |
| 22 | 12.5 | 2.2 | 12 | 26 | 45 |

TABLE D.3.2

4 TYPE 4404 400 W 24 V

4.1 VOLTAGE REGULATOR AND PTT CONTROL

The voltage regulator is a series pass type which supplies all the class A stages of the PA PCB via the PTT control, and the logic and relays (except the power relays) of the Filter PCB. As the output voltage is not critical, no adjustment is needed. It consists of the series pass emitter follower transistor, 3V3 whose output is sampled by 3R6 and 3R7 and compared to 3V2 using 3V1. 3V1 then shunts current supplied by 3R3 to ground thereby controlling the output voltage. 3R25 and 3V12 provide short circuit protection for 3V3.

The PTT control allows the transmitter to operate when PTT is activated by supplying power to the class A stages and the bias supplies. It is driven by a 0 V on the PTT line which saturates the pass transistor 3V4, via 3R8 and 3V5. 3R10 and 3R77 prevent excessive dissipation in 3V5.

4.2 GAIN CONTROL

Drive signal appearing on the input terminals is terminated into 50 Ω by 3R22 and 3R24 via isolating transformer 3T1. The signal is then fed into the emitters of 3V13 and 3V14 which are in a grounded base differential amplifier configuration, the gain of which can be controlled by varying the DC voltage on the base of either transistor. Open loop gain of the entire PA PCB assembly is set by varying 3R26, and medium and low powers are set by using transistor switches 3V15 and 3V16, both of which are on for low power.

ALC control is also effected in this stage, with 3V11 being used as a buffer between the generated ALC voltage from the Filter PCB and the supply to the base of 3V13. The decay time of the ALC is controlled by 3C12.

4.3 CLASS A DRIVER

The gain controlled signal from 3V14 is then fed to 3V17, which is a buffer amplifier with a voltage gain set by 3R44 and 3R33. This transistor also provides a bias supply for 3V18, 19 via 3T2 which is thermally compensated by 3D4-6. 3V18, 19 with 3T3 provide a controlled gain, low distortion balanced drive for the following stage using transformer coupled feedback in the emitters. 3R46-49 and 3C30, 31, 34, 35 ensure good linearity with some higher frequency boost, as well as controlling the output impedance. 3V20 is thermally bonded to the heatsink and is used as the bias supply for the next stages.

At this point the signal is shared by two identical driver/output stages consisting of 3V21, 22, 25, 26 and 3V23, 24, 27, 28. The following description details only one of these stages.

4.4 DRIVER STAGE

3V21 and 3V22 are a class AB driver stage, the bias being obtained from the previous stage. Output impedance and linearity are controlled by the feed-forward transformer 3T4 and input impedance is controlled by 3R51-54. The DC supply to the driver transistors is taken from the unregulated supply via transformer 3T6, and is not controlled by PTT. Bias adjustment of this stage is effected with 3R50.

4.5 OUTPUT STAGE AND BIAS SUPPLY

3V25 and 3V26 are a class AB output stage, the bias being derived from a dedicated bias supply. The DC supply to the output transistors is taken from the unregulated supply via the output transformer 3T10 and a fuse, and is not controlled by PTT. Negative feedback is provided by 3T8, 3R59-64, 3C43, 45 and 3L3, 4 and some common-mode feedback via 3C49, 3R71 and 3L7. The signal is then stepped up with the output transformer and fed to the filter PCB.

The bias regulator consists of a Darlington series pass transistor 3V7, its base current being supplied via 3R12 from the zener diode reference of 3V6 and 3R11. The output voltage from 3V7 is compared with the base-emitter voltage of 3V8, which in turn shunts current from 3R12 to ground so controlling the output voltage. Bias voltage adjustment is provided by 3R14 which modifies the voltage on the base of 3V8. Thermal compensation for the output pair is provided by 3V8 being thermally bonded to the heatsink, and the zener regulator, 3V6, prevents power supply fluctuations from affecting the bias voltage.

4.6 PA FILTER AND CONTROL

The signal from both output transformers is capacitively coupled via 2C63 and 2C65 to chassis and 2C78 and 2C79 to the hybrid combining transformer 3T13 which provides isolation between the output stages with 1R1, 2. The auto transformer 3T12 then matches the signal from 3T13 to the PA Filter set, which is a series of relay switched low pass filters selected by using the band information from the Control Unit. The band information is a 4 bit binary word, 3 bits being responsible for filter switching, the remaining bit being used only by the Antenna Tuner. The sequence is shown in Table D.4.1.

| D | C | B | A | Frequency Band |
|---|---|---|-----|---------------------|
| 0 | 0 | 0 | 0/1 | 6.8 MHz - 10.2 MHz |
| 0 | 0 | 1 | 0/1 | 2 MHz - 3 MHz |
| 0 | 1 | 0 | 0/1 | 4.5 MHz - 6.8 MHz |
| 0 | 1 | 1 | 0/1 | 2 MHz - 3 MHz |
| 1 | 0 | 0 | 0/1 | 3 MHz - 4.5 MHz |
| 1 | 0 | 1 | 0/1 | 15.3 MHz - 23 MHz |
| 1 | 1 | 0 | 0/1 | 15.3 MHz - 23 MHz |
| 1 | 1 | 1 | 0/1 | 10.2 MHz - 15.3 MHz |

TABLE D.4.1

The duplication of bands 2 MHz - 3 MHz and 15.3 MHz - 23 MHz are due to the requirements of the Antenna Tuner.

The binary word is decoded by a 4028 and interfaced to the filter relays with a 1416 driver. The relays route the RF signal through the appropriate filter section, each of which is based on a 50 Ω : 50 Ω , Cauer-Chebyshev low pass filter, and are cascaded with reducing frequency band, so all filter sections are in the RF path in the 2 MHz - 3 MHz band.

The filters are in circuit in both transmit and receive modes, and so are not controlled by PTT, however the signal is diverted at the input to the filter for the PA or Control Unit respectively. This is done with a relay which is controlled by the PTT operated switch 2V4.

4.7 ALC GENERATOR

The ALC Generator consists of 2 stages, the detector circuit and the processor circuit. The detector circuit is immediately after the filters and samples RF voltage with the capacitive divider 2C10 and 2C8, 9 and RF current using the in line sampling transformer 2T1. The sampled current is then converted to a voltage by the terminating resistors 2R11, 25 and 2R12, 26, which generates two equal voltages 180° out of phase, both proportional to line current. The centre of the current sensor circuit is then added to the output from the capacitive divider and is set so when the output is terminated into 50 Ω, the voltage developed across each current terminating resistor exactly equals that of the capacitive divider output. Therefore at the anode of 2D2, (the forward power detector) there appears twice each voltage, and at the anode of 2D5, (the reflected power detector) there appears no voltage. Any deviation from 50 Ω in the load will generate a reflected power voltage and this OR-ed with a sample of the forward power detector. The forward power sample is controlled by the trimpot 2R8, and so the output power limit is set using this control. The reflected power limit is set to 24 W (1.6:1 VSWR) and this is not adjustable.

Also sampled are the peak output transistor collector voltage and the voltage across the hybrid transformer 3T13 which are derived from resistive dividers and OR-ed on the PA PCB (3R1, 2, 4, 5 and 3D1, 2) and is OR-ed with the output from the output power detectors using 2D1 and 2D6. The resultant voltage is then compared to a reference generated by 2R2, 2V2, 3R23, 2R3, 2D3, 2D4 and 2R10 using 2V3 in the processor circuit which in turn drives the ALC control circuit of the PA PCB.

The reference generator consists basically of a resistive divider formed by 2R2, 3R23, 2R3, and 2R10 which tracks the unregulated supply so the output power is controlled by the supply voltage. The diodes 2D3 and 2D4 provide thermal compensation for 2V3 and 2D6. The thermistor 3R23 on the PA PCB is a PTC which is thermally bonded to the heatsink and transitions from about 100 Ω to in excess of 4 kΩ within 20°C centred around 90°C so effecting a thermal shutdown. The zener diode 2V2, ensures the voltage across the resistive divider formed by 3R23, 2R3 and 2R10 never exceeds 6.8 volts regardless of the resistance of 3R23, making thermal shutdown more complete.

4.8 TRANSMIT INDICATOR DRIVER

The drive for the transmit indicator is derived from the forward power detector output which is divided down by 2R4 and 2R5 and fed to the base of 2V1. The collector current of 2V1 is proportional to forward power out due to 2R1 so indicator brightness in the control unit is proportional to forward power output.

4.9 CONTROL UNIT AND ANTENNA TUNER INTERFACES

The interconnections from the Control Unit to the Antenna Tuner are via the Filter PCB which provides RF by passing using 2R19-23, and 2C66-72. This minimises problems created by the high RF fields of the Antenna Tuner.

4.10 REPLACEMENT OF PA COMPONENTS

If it is necessary to lift the PA PCB for servicing, remove the transistor flange mounting screws first and replace last to minimise stress on the packages. Before refitting the PCB thoroughly clean off any old thermal compound from the heatsink and transistor flanges and replace with new compound (e.g. Jermyn Thermaflow A30). Particular care is needed with the thermistor (3R2) to ensure it enters the hole in the heatsink without damage. The transistor types MRF422 and MRF426 are fitted as matched pairs and must be replaced as matched pairs i.e. the coloured dots on a pair of transistors must match. The procedure for replacement of these transistors is as follows:

- (a) MRF422 only, remove the feedback components 3R59-64, 3C43, 45 and 3T8.
- (b) Remove the flange fixing screws.
- (c) Using a de-soldering tool or 'solder-wick' remove the bulk of the solder from each lead. Gently pull the leads away from the PCB while heating joint. Remove the transistor.

Clear away any excess solder from the emitter, base and collector pads. Thoroughly clean the transistor mating surface on the heatsink with a cloth or tissue.

- (d) Form the leads of the replacement transistors using the discarded transistor as a guide.
- (e) Coat the transistor flange with a thin film of thermal compound (e.g. Jermyn Thermaflow A30).
- (f) Fit the transistor (check orientation) and tighten the flange fixing screws evenly.
- (g) Carefully solder the transistor leads, this should be carried out quickly using a very hot tipped soldering iron.
- (h) MRF422 only, replace feedback components and adjust bias current - refer para. 3.11.1.

4.11 PRE-SET ADJUSTMENTS

All adjustments to the PA are made with 27.2 V, 40A supply and terminated with a 50 Ω dummy load.

4.11.1 PA Bias

Ensure the unit is OFF at the Control Unit and remove the 2-strand FUSE links from the Filter PCB. Insert a DC Ammeter set to the 1A range in place of one FUSE link, turn the Control Unit to HIGH power and select SSB Mode. Remove any audio from the microphone input and press and hold the microphone PTT. Adjust the appropriate BIAS trimpot until the ammeter reads 65 mA \pm 5 mA. Repeat for other FUSE link and BIAS trimpot. Turn off the Control Unit, remove the multimeter and replace the FUSE links.

4.11.2 Driver Bias

Turn Control Unit to HIGH power and select SSB Mode. With no audio drive present, press and hold the microphone PTT and adjust the 'DR. BIAS' resistor (3R50) until the DC voltage on the emitters of the Driver Transistors is 35 mV \pm 5 mV relative to ground.

4.11.3 Gain Adjustment

Select a channel frequency in the 8 MHz band and switch to LOW power. Press and hold the microphone PTT and increase two tone audio drive until the Control Unit microphone amplifier is well into compression. Adjust the trimpot marked GAIN until the output is approximately 10 W PEP.

4.11.4 ALC Adjustment

With the Control Unit, select a channel frequency in the 8 MHz band. With PTT activated and the microphone amplifier well into compression, select HIGH power and adjust the trimpot marked SET PWR on the Filter PCB for 400 W PEP.

4.11.5 Performance Checks

Using one frequency in each band and using full audio drive check that power output is within the range 320 to 480 W PEP and that IMD is better than -30 dB below each tone.

4.12 TYPICAL PA VOLTAGES

The Table D.4.2 is a guide to the peak to peak voltages one would expect to see at some points in a PA, and are given for full power out when driven with a 4101 Control Unit with two tone drive. The test voltage is 27.2 V, the antenna tuner is not connected and the output is terminated into a 50 Ω dummy load.

| Frequency (MHz) | I (A) | MRF220 | | MRF426 | MRF422 |
|--------------------|-------|-----------------|----------------------|----------------------|----------------------|
| | | Base Voltage | Collector Voltage | Collector Voltage | Collector Voltage |
| 2 | 23.5 | 2.2 | 4 | 22 | 50 |
| 4 | 24 | 2.2 | 5 | 25 | 50 |
| 6 | 24 | 2.2 | 5 | 28 | 60 |
| 8 | 25 | 2.4 | 6 | 25 | 55 |
| 12 | 26.5 | 2.4 | 9 | 28 | 60 |
| 16 | 25 | 2.3 | 10 | 20 | 60 |
| 22 | 26 | 2.2 | 16 | 24 | 50 |

TABLE D.4.2

5 PARTS LISTS

5.1 GENERAL

The parts lists contain the following information:

- (a) Circuit reference number
- (b) Description giving value and type of component
- (c) Manufacturer and manufacturer's part number
- (d) Codan part number.

The following abbreviations are used for resistor and capacitor types:

Resistors (all values in ohms unless otherwise stated)

- CF - carbon film
- MF - metal film
- WW - wire wound

Capacitors

- CC - ceramic multilayer chip
- CE - ceramic
- EL - aluminium electrolytic
- PE - polyester
- PS - polystyrene
- TA - solid tantalum

Ordering Information

When ordering replacement components, it is necessary to quote all the following information to minimise the risk of obtaining the wrong component and to expedite despatch:

- (a) Equipment type
- (b) Component
- (c) Component location
- (d) Full component description
- (e) Manufacturer and type
- (f) Codan part number

Component Substitution

Due to the continuous process of updating equipment, and variations in component availability, minor component changes from those listed will occur; equipment performance is in no way adversely affected.

For servicing purposes, equivalent components may be used (eg resistors, capacitors etc). Replacement components should have a similar tolerance to the types listed.

Parts List

5.2 PARTS LIST INDEX

| | | | |
|-------|-------------------------|-----|--------------|
| 5.2.1 | PA, 200W,24V | PCB | 08-02541-002 |
| 5.2.2 | PA, 400W 24V | PCB | 08-02640 |
| 5.2.3 | Filter, 200W 24V | | 08-02542-002 |
| 5.2.4 | Filter, 400W 24V | PCB | 08-02542-004 |
| 5.2.5 | PA, 4402 (200 watt) 24V | | 08-02545-002 |
| 5.2.6 | PA, 4404 (400 watt) 24V | | 08-02641 |

PA, 200W,24V

PCB

| Ref | Description | | | | Manufacturer | Manufacturer's P/N | Codan P/N | Remarks |
|-----|---------------------------------|-----|-----------|--------|--------------|--------------------|----------------|--------------|
| C2 | 47n | | 63V | CE Cap | Samwha | TL | 46-44700-210 | |
| C3 | 22u | 20% | 16V | TA Cap | AVX | TAP226M016CCS | 47-12201-610 | |
| C7 | 100n | | 50V Z5U | CE Cap | Centralab | CZ20C104M244 | 46-51000-260 | |
| C9 | 100n | | 50V Z5U | CE Cap | Centralab | CZ20C104M244 | 46-51000-260 | |
| C11 | 100n | | 50V Z5U | CE Cap | Centralab | CZ20C104M244 | 46-51000-260 | |
| C13 | 4,7u | 20% | 35V | TA Cap | AVX | TAP475M035CCS | 47-04703-510 | |
| C14 | 3,3n | 10% | 100V | CE Cap | Philips | 2222 630 03332 | 46-33300-200 | |
| C15 | 10u | 20% | 25V | TA Cap | AVX | TAP106M025CCS | 47-11002-510 | |
| C16 | 3,3n | 10% | 100V | CE Cap | Philips | 2222 630 03332 | 46-33300-200 | |
| C17 | 47n | | 63V | CE Cap | Samwha | TL | 46-44700-210 | |
| C18 | 47n | | 63V | CE Cap | Samwha | TL | 46-44700-210 | |
| C19 | 100n | | 50V Z5U | CE Cap | Centralab | CZ20C104M244 | 46-51000-260 | |
| C20 | 47n | | 63V | CE Cap | Samwha | TL | 46-44700-210 | |
| C21 | 47n | | 63V | CE Cap | Samwha | TL | 46-44700-210 | |
| C22 | 47n | | 63V | CE Cap | Samwha | TL | 46-44700-210 | |
| C23 | 100n | | 50V Z5U | CE Cap | Centralab | CZ20C104M244 | 46-51000-260 | |
| C24 | 100n | | 50V Z5U | CE Cap | Centralab | CZ20C104M244 | 46-51000-260 | |
| C25 | 270p | 2% | 100V N750 | CE Cap | Philips | 2222 680 58271 | 46-22700-013 | |
| C26 | 470n | 20% | 50V X7R | CE Cap | Vitramon | VP43BY474MA | 46-54700-261 | |
| C27 | 100n | 20% | 50V BX | CC Cap | Vitramon | VJ1808X104MFA | 46-51000-280 | |
| C28 | 220p | 2% | 100V N750 | CE Cap | Philips | 2222 680 58221 | 46-22200-013 | |
| C29 | 470n | 20% | 50V BX | CC Cap | Vitramon | VJ2321X474MFA | 46-54700-280 | |
| C30 | 150p | 2% | 100V N150 | CE Cap | Philips | 2222 680 34151 | 46-21500-012 | |
| C31 | 100n | 20% | 50V BX | CC Cap | Vitramon | VJ1808X104MFA | 46-51000-280 | |
| C32 | 470n | 20% | 50V BX | CC Cap | Vitramon | VJ2321X474MFA | 46-54700-280 | |
| C33 | 100n | 20% | 50V BX | CC Cap | Vitramon | VJ1808X104MFA | 46-51000-280 | |
| C34 | 10u | 20% | 25V | TA Cap | AVX | TAP106M025CCS | 47-11002-510 | |
| C35 | 2,2n | 5% | 160V | PS Cap | Philips | 2222 425 22202 | 46-32200-310 | |
| C36 | 2,2n | 5% | 160V | PS Cap | Philips | 2222 425 22202 | 46-32200-310 | |
| C38 | 470n | 20% | 50V BX | CC Cap | Vitramon | VJ2321X474MFA | 46-54700-280 | |
| C39 | 100n | | 50V Z5U | CE Cap | Centralab | CZ20C104M244 | 46-51000-260 | |
| C40 | 100n | 20% | 50V BX | CC Cap | Vitramon | VJ1808X104MFA | 46-51000-280 | |
| C41 | 47n | | 63V | CE Cap | Samwha | TL | 46-44700-210 | |
| C42 | 47n | | 63V | CE Cap | Samwha | TL | 46-44700-210 | |
| C44 | 47n | | 63V | CE Cap | Samwha | TL | 46-44700-210 | |
| C45 | 10u | 20% | 25V | TA Cap | AVX | TAP106M025CCS | 47-11002-510 | |
| C46 | 100n | | 50V Z5U | CE Cap | Centralab | CZ20C104M244 | 46-51000-260 | |
| C47 | 82p | 5% | 500V N750 | CE Cap | Murata | DD07 UJ 820J 500 | 46-18200-021 | |
| D1 | Diode, Si fast low cap med cond | | | | | | 23-10002 | |
| D2 | Diode, Si fast low cap med cond | | | | | | 23-10002 | |
| D3 | Diode, Si fast low cap med cond | | | | | | 23-10002 | |
| D4 | Diode, Si fast low cap med cond | | | | | | 23-10002 | |
| L1 | Inductor, 100uH | | | | Sigma | 10-10-0537-10 | 43-82100-051 | |
| L2 | Core Toroid | 6mm | Blue | 1 | Micrometals | T25-1 | 39-06061-001 | |
| L3 | Core Toroid | 6mm | Blue | 1 | Micrometals | T25-1 | 39-06061-001 | |
| L4 | Bead | 4mm | | 4B1 | Philips | 4322-020-34420 | 39-01041-022 | |
| L5 | Bead | 4mm | | 4B1 | Philips | 4322-020-34420 | 39-01041-022 | |
| P1 | Header (P) 10way 2row | | | | JAE | PS-10PE-D4T1-PN1 | 60-00100-260 | |
| R1 | 75 | Ohm | 5% | 0,33W | CF Res | Philips | 2322 211 13759 | 40-17500-020 |
| R2 | 50 | Ohm | 80°C | PTC | Thermistor | Philips | 2322-660-91008 | 41-11500-660 |
| R3 | 150 | Ohm | 5% | 0,33W | CF Res | Philips | 2322 211 13151 | 40-21500-020 |
| R4 | 2,2k | Ohm | 5% | 0,33W | CF Res | Philips | 2322 211 13222 | 40-32200-020 |

PA, 200W,24V

PCB (cont'd)

| Ref | Description | Manufacturer | Manufacturer's P/N | Codan P/N | Remarks |
|-----|---------------------|----------------|--------------------|--------------|---------|
| R5 | Pot,10k Lin MG Trim | Noble | VTP | 42-41076-000 | |
| R6 | 3,3k Ohm 5% 0,33W | CF Res Philips | 2322 211 13332 | 40-33300-020 | |
| R7 | 220 Ohm 5% 0,33W | CF Res Philips | 2322 211 13221 | 40-22200-020 | |
| R8 | 120 Ohm 5% 0,33W | CF Res Philips | 2322 211 13121 | 40-21200-020 | |
| R9 | 270 Ohm 5% 0,33W | CF Res Philips | 2322 211 13271 | 40-22700-020 | |
| R10 | 220 Ohm 5% 0,33W | CF Res Philips | 2322 211 13221 | 40-22200-020 | |
| R11 | 390 Ohm 5% 0,33W | CF Res Philips | 2322 211 13391 | 40-23900-020 | |
| R12 | 5,6k Ohm 5% 0,33W | CF Res Philips | 2322 211 13562 | 40-35600-020 | |
| R13 | 10k Ohm 5% 0,33W | CF Res Philips | 2322 211 13103 | 40-41000-020 | |
| R14 | 2,2k Ohm 5% 0,33W | CF Res Philips | 2322 211 13222 | 40-32200-020 | |
| R15 | 6,8k Ohm 5% 0,33W | CF Res Philips | 2322 211 13682 | 40-36800-020 | |
| R16 | 22k Ohm 5% 0,33W | CF Res Philips | 2322 211 13223 | 40-42200-020 | |
| R17 | 10k Ohm 5% 0,33W | CF Res Philips | 2322 211 13103 | 40-41000-020 | |
| R18 | 2,2k Ohm 5% 0,33W | CF Res Philips | 2322 211 13222 | 40-32200-020 | |
| R19 | 220 Ohm 5% 0,33W | CF Res Philips | 2322 211 13221 | 40-22200-020 | |
| R20 | 12k Ohm 5% 0,33W | CF Res Philips | 2322 211 13123 | 40-41200-020 | |
| R21 | 2,2k Ohm 5% 0,33W | CF Res Philips | 2322 211 13222 | 40-32200-020 | |
| R22 | 3,3k Ohm 5% 0,33W | CF Res Philips | 2322 211 13332 | 40-33300-020 | |
| R23 | 560 Ohm 5% 0,33W | CF Res Philips | 2322 211 13561 | 40-25600-020 | |
| R24 | 390 Ohm 5% 0,33W | CF Res Philips | 2322 211 13391 | 40-23900-020 | |
| R25 | 220 Ohm 5% 0,33W | CF Res Philips | 2322 211 13221 | 40-22200-020 | |
| R26 | 220 Ohm 5% 0,33W | CF Res Philips | 2322 211 13221 | 40-22200-020 | |
| R27 | 18 Ohm 5% 0,33W | CF Res Philips | 2322 211 13189 | 40-11800-020 | |
| R28 | 18 Ohm 5% 0,33W | CF Res Philips | 2322 211 13189 | 40-11800-020 | |
| R29 | 1 Ohm 5% 0,33W | CF Res Philips | 2322 211 13108 | 40-01000-020 | |
| R30 | 1 Ohm 5% 0,33W | CF Res Philips | 2322 211 13108 | 40-01000-020 | |
| R31 | 1 Ohm 5% 0,33W | CF Res Philips | 2322 211 13108 | 40-01000-020 | |
| R32 | 1 Ohm 5% 0,33W | CF Res Philips | 2322 211 13108 | 40-01000-020 | |
| R33 | 100 Ohm 5% 0,33W | CF Res Philips | 2322 211 13101 | 40-21000-020 | |
| R34 | 4,7 Ohm 5% 0,5W | MF Res Philips | 2322 186 13478 | 40-04700-030 | |
| R35 | 4,7 Ohm 5% 0,5W | MF Res Philips | 2322 186 13478 | 40-04700-030 | |
| R36 | 22 Ohm 5% 0,33W | CF Res Philips | 2322 211 13229 | 40-12200-020 | |
| R37 | 22 Ohm 5% 0,33W | CF Res Philips | 2322 211 13229 | 40-12200-020 | |
| R38 | 4,7 Ohm 5% 0,5W | MF Res Philips | 2322 186 13478 | 40-04700-030 | |
| R39 | 4,7 Ohm 5% 0,5W | MF Res Philips | 2322 186 13478 | 40-04700-030 | |
| R40 | 120 Ohm 5% 0,33W | CF Res Philips | 2322 211 13121 | 40-21200-020 | |
| R42 | 1,8 Ohm 5% 0,33W | CF Res Philips | 2322 211 13188 | 40-01800-020 | |
| R43 | 820 Ohm 5% 0,33W | CF Res Philips | 2322 211 13821 | 40-28200-020 | |
| R44 | 100 Ohm 5% 0,33W | CF Res Philips | 2322 211 13101 | 40-21000-020 | |
| R45 | Pot,10k Lin MG Trim | Noble | VTP | 42-41076-000 | |
| R46 | 10k Ohm 5% 0,33W | CF Res Philips | 2322 211 13103 | 40-41000-020 | |
| R47 | 820 Ohm 5% 0,33W | CF Res Philips | 2322 211 13821 | 40-28200-020 | |
| R48 | 560 Ohm 5% 0,33W | CF Res Philips | 2322 211 13561 | 40-25600-020 | |
| R49 | 390 Ohm 5% 0,5W | MF Res Philips | 2322 186 13391 | 40-23900-030 | |
| R50 | 3,3k Ohm 5% 0,33W | CF Res Philips | 2322 211 13332 | 40-33300-020 | |
| R51 | 12k Ohm 5% 0,33W | CF Res Philips | 2322 211 13123 | 40-41200-020 | |
| R52 | 4,7k Ohm 5% 0,33W | CF Res Philips | 2322 211 13472 | 40-34700-020 | |
| R53 | 4,7k Ohm 5% 0,33W | CF Res Philips | 2322 211 13472 | 40-34700-020 | |
| R54 | 8,2k Ohm 5% 0,33W | CF Res Philips | 2322 211 13822 | 40-38200-020 | |
| R55 | 220 Ohm 5% 0,33W | CF Res Philips | 2322 211 13221 | 40-22200-020 | |
| R56 | 2,2k Ohm 5% 0,33W | CF Res Philips | 2322 211 13222 | 40-32200-020 | |
| R57 | SOT 5% 0,33W | CF Res | | | |
| R59 | 2,7 Ohm 5% 0,33W | CF Res Philips | 2322 211 13278 | 40-02700-020 | |

| | | | |
|----|-------------------------|----------|----------|
| T1 | Inductor, Common Mode | bn/or | 44-80104 |
| T2 | Transformer, Pre-Driver | rd/rd/bl | 44-80171 |
| T3 | Transformer, Feed Fwrd | rd/rd/ye | 44-80172 |
| T4 | Transformer, Driver | rd/rd/rd | 44-80173 |
| T5 | Transformer, Feedback | rd/rd/gn | 44-80174 |

| Ref | Description | Manufacturer | Manufacturer's P/N | Codan P/N | Remarks |
|-----|-------------------------------|-----------------|--------------------|--------------|---------|
| T6 | Transformer, Output | bk/bk/rd | | 44-80169 | |
| V1 | Transistor, PNP Si | Philips | BC558 | BC558 | |
| V2 | Transistor, PNP Si | Philips | BF450 | BF450 | |
| V3 | Transistor, PNP Si | Philips | BF450 | BF450 | |
| V4 | Transistor, PNP Si | Philips | BC558 | BC558 | |
| V5 | Transistor, PNP Si | Philips | BC558 | BC558 | |
| V6 | Transistor, NPN Si | Philips | PH2369 | PH2369 | |
| V7 | Transistor, NPN Si | Motorola | MRF260 | MRF260 | |
| V8 | Transistor, NPN Si | Philips | BD135 | BD135 | |
| V9 | Transistor, NPN Si | Motorola | MRF426 | MRF426 | |
| V10 | Transistor, NPN Si | Motorola | MRF426 | MRF426 | |
| V11 | Transistor, NPN Si | Motorola | MRF422 | MRF422 | |
| V12 | Transistor, NPN Si | Motorola | MRF422 | MRF422 | |
| V13 | Transistor, Darlington NPN Si | Philips | BD675 | BD675 | |
| V14 | Transistor, NPN Si | Philips | BD135 | BD135 | |
| V15 | Diode, Zener 5,6V 5% 0,4W | Philips | BZX79-C5V6 | BZX79C5V6 | |
| V16 | Transistor, PNP Si | Texas Inst | TIP32A | TIP32A | |
| V17 | Transistor, PNP Si | Philips | BC328 | BC328 | |
| V18 | Transistor, Darlington NPN Si | Philips | BD675 | BD675 | |
| V19 | Transistor, NPN Si | Philips | BC548 | BC548 | |
| V20 | Diode, Zener 6,2V 5% 0,4W | Philips | BZX79-C6V2 | BZX79C6V2 | |
| 1 | Heatsink, 270mm Long | | | 05-02826 | |
| 4 | Clamp, Transformer | | | 05-02823 | |
| 6 | Strip, Rubber | | | 06-00640 | |
| 9 | PCB, PA 200W 24V | | | 07-00774 | |
| 21 | Bush, Transistor | TO-220 Motorola | B51547F019 | 30-03801-001 | |
| 22 | Washer, Mica | TO-220 Motorola | B08853A001 | 30-45001-001 | |

PA, 400W 24V PCB

| Ref | Description | | | | Manufacturer | Manufacturer's P/N | Codan P/N | Remarks | |
|-----|---------------------------------|-----|-----------|--------|--------------|--------------------|--------------|---------|--|
| C1 | 3,3n | 10% | 100V | CE Cap | Philips | 2222 630 03332 | 46-33300-200 | | |
| C2 | 47n | | 63V | CE Cap | Samwha | TL | 46-44700-210 | | |
| C3 | 100n | | 50V Z5U | CE Cap | Centralab | CZ20C104M244 | 46-51000-260 | | |
| C4 | 100n | | 50V Z5U | CE Cap | Centralab | CZ20C104M244 | 46-51000-260 | | |
| C5 | 10u | 20% | 25V | TA Cap | AVX | TAP106M025CCS | 47-11002-510 | | |
| C6 | 10u | 20% | 25V | TA Cap | AVX | TAP106M025CCS | 47-11002-510 | | |
| C7 | 100n | 20% | 50V BX | CC Cap | Vitramon | VJ1808X104MFA | 46-51000-280 | | |
| C8 | 470n | 20% | 50V BX | CC Cap | Vitramon | VJ2321X474MFA | 46-54700-280 | | |
| C9 | 470n | 20% | 50V BX | CC Cap | Vitramon | VJ2321X474MFA | 46-54700-280 | | |
| C11 | 47n | | 63V | CE Cap | Samwha | TL | 46-44700-210 | | |
| C12 | 22u | 20% | 16V | TA Cap | AVX | TAP226M016CCS | 47-12201-610 | | |
| C16 | 100n | | 50V Z5U | CE Cap | Centralab | CZ20C104M244 | 46-51000-260 | | |
| C17 | 100n | | 50V Z5U | CE Cap | Centralab | CZ20C104M244 | 46-51000-260 | | |
| C19 | 100n | | 50V Z5U | CE Cap | Centralab | CZ20C104M244 | 46-51000-260 | | |
| C21 | 4,7u | 20% | 35V | TA Cap | AVX | TAP475M035CCS | 47-04703-510 | | |
| C22 | 3,3n | 10% | 100V | CE Cap | Philips | 2222 630 03332 | 46-33300-200 | | |
| C23 | 3,3n | 10% | 100V | CE Cap | Philips | 2222 630 03332 | 46-33300-200 | | |
| C24 | 22u | 20% | 16V | TA Cap | AVX | TAP226M016CCS | 47-12201-610 | | |
| C25 | 47n | | 63V | CE Cap | Samwha | TL | 46-44700-210 | | |
| C26 | 100n | | 50V Z5U | CE Cap | Centralab | CZ20C104M244 | 46-51000-260 | | |
| C27 | 47n | | 63V | CE Cap | Samwha | TL | 46-44700-210 | | |
| C28 | 100n | | 50V Z5U | CE Cap | Centralab | CZ20C104M244 | 46-51000-260 | | |
| C29 | 47n | | 63V | CE Cap | Samwha | TL | 46-44700-210 | | |
| C30 | 330p | 2% | 100V N750 | CE Cap | Philips | 2222 680 58331 | 46-23300-013 | | |
| C31 | 330p | 2% | 100V N750 | CE Cap | Philips | 2222 680 58331 | 46-23300-013 | | |
| C32 | 100n | | 50V Z5U | CE Cap | Centralab | CZ20C104M244 | 46-51000-260 | | |
| C33 | 100n | | 50V Z5U | CE Cap | Centralab | CZ20C104M244 | 46-51000-260 | | |
| C34 | 330p | 2% | 100V N750 | CE Cap | Philips | 2222 680 58331 | 46-23300-013 | | |
| C35 | 330p | 2% | 100V N750 | CE Cap | Philips | 2222 680 58331 | 46-23300-013 | | |
| C36 | 470n | 20% | 50V X7R | CE Cap | Vitramon | VP43BY474MA | 46-54700-261 | | |
| C37 | 100n | 20% | 50V BX | CC Cap | Vitramon | VJ1808X104MFA | 46-51000-280 | | |
| C38 | 100n | 20% | 50V BX | CC Cap | Vitramon | VJ1808X104MFA | 46-51000-280 | | |
| C39 | 150p | 2% | 100V N150 | CE Cap | Philips | 2222 680 34151 | 46-21500-012 | | |
| C40 | 100n | 20% | 50V BX | CC Cap | Vitramon | VJ1808X104MFA | 46-51000-280 | | |
| C41 | 150p | 2% | 100V N150 | CE Cap | Philips | 2222 680 34151 | 46-21500-012 | | |
| C42 | 100n | 20% | 50V BX | CC Cap | Vitramon | VJ1808X104MFA | 46-51000-280 | | |
| C43 | 2,2n | 5% | 160V | PS Cap | Philips | 2222 425 22202 | 46-32200-310 | | |
| C44 | 470n | 20% | 50V BX | CC Cap | Vitramon | VJ2321X474MFA | 46-54700-280 | | |
| C45 | 2,2n | 5% | 160V | PS Cap | Philips | 2222 425 22202 | 46-32200-310 | | |
| C46 | 2,2n | 5% | 160V | PS Cap | Philips | 2222 425 22202 | 46-32200-310 | | |
| C47 | 470n | 20% | 50V BX | CC Cap | Vitramon | VJ2321X474MFA | 46-54700-280 | | |
| C48 | 2,2n | 5% | 160V | PS Cap | Philips | 2222 425 22202 | 46-32200-310 | | |
| C49 | 100n | 20% | 50V BX | CC Cap | Vitramon | VJ1808X104MFA | 46-51000-280 | | |
| C50 | 100n | 20% | 50V BX | CC Cap | Vitramon | VJ1808X104MFA | 46-51000-280 | | |
| C51 | 100n | | 50V Z5U | CE Cap | Centralab | CZ20C104M244 | 46-51000-260 | | |
| C52 | 10u | 20% | 25V | TA Cap | AVX | TAP106M025CCS | 47-11002-510 | | |
| C53 | 100n | | 50V Z5U | CE Cap | Centralab | CZ20C104M244 | 46-51000-260 | | |
| C54 | 10u | 20% | 25V | TA Cap | AVX | TAP106M025CCS | 47-11002-510 | | |
| C55 | 100n | 20% | 50V BX | CC Cap | Vitramon | VJ1808X104MFA | 46-51000-280 | | |
| C56 | 56p | 5% | 500V N750 | CE Cap | Murata | DD06 UJ 560J 500 | 46-15600-021 | | |
| C57 | 56p | 5% | 500V N750 | CE Cap | Murata | DD06 UJ 560J 500 | 46-15600-021 | | |
| D1 | Diode, Si fast low cap med cond | | | | | | 23-10002 | | |
| D2 | Diode, Si fast low cap med cond | | | | | | 23-10002 | | |
| D3 | Diode, Si fast low cap med cond | | | | | | 23-10002 | | |
| D4 | Diode, Si fast low cap med cond | | | | | | 23-10002 | | |
| D5 | Diode, Si fast low cap med cond | | | | | | 23-10002 | | |
| D6 | Diode, Si fast low cap med cond | | | | | | 23-10002 | | |

PA, 400W 24V PCB (cont'd)

Assembly No 08-02640

Issue 12

Page 2 of 4

| Ref | Description | Manufacturer | Manufacturer's P/N | Codan P/N | Remarks |
|-----|----------------------------|------------------|--------------------|--------------|---------|
| L1 | Bead 4mm | 4B1 Philips | 4322-020-34420 | 39-01041-022 | |
| L2 | Bead 4mm | 4B1 Philips | 4322-020-34420 | 39-01041-022 | |
| L3 | Core Toroid 6mm Blue 1 | Micrometals | T25-1 | 39-06061-001 | |
| L4 | Core Toroid 6mm Blue 1 | Micrometals | T25-1 | 39-06061-001 | |
| L5 | Core Toroid 6mm Blue 1 | Micrometals | T25-1 | 39-06061-001 | |
| L6 | Core Toroid 6mm Blue 1 | Micrometals | T25-1 | 39-06061-001 | |
| L7 | Bead 4mm | 4B1 Philips | 4322-020-34420 | 39-01041-022 | |
| L8 | Bead 4mm | 4B1 Philips | 4322-020-34420 | 39-01041-022 | |
| P1 | Header (P) 10way 2row | JAE | PS-10PE-D4T1-PN1 | 60-00100-260 | |
| R1 | 820 Ohm 5% 0,33W | CF Res Philips | 2322 211 13821 | 40-28200-020 | |
| R2 | 820 Ohm 5% 0,33W | CF Res Philips | 2322 211 13821 | 40-28200-020 | |
| R3 | 4,7k Ohm 5% 0,33W | CF Res Philips | 2322 211 13472 | 40-34700-020 | |
| R4 | 10k Ohm 5% 0,33W | CF Res Philips | 2322 211 13103 | 40-41000-020 | |
| R5 | 820 Ohm 5% 0,33W | CF Res Philips | 2322 211 13821 | 40-28200-020 | |
| R6 | 4,7k Ohm 5% 0,33W | CF Res Philips | 2322 211 13472 | 40-34700-020 | |
| R7 | 4,7k Ohm 5% 0,33W | CF Res Philips | 2322 211 13472 | 40-34700-020 | |
| R8 | 12k Ohm 5% 0,33W | CF Res Philips | 2322 211 13123 | 40-41200-020 | |
| R9 | 3,3k Ohm 5% 0,33W | CF Res Philips | 2322 211 13332 | 40-33300-020 | |
| R10 | 470 Ohm 5% 0,5W | MF Res Philips | 2322 186 13471 | 40-24700-030 | |
| R11 | 560 Ohm 5% 0,33W | CF Res Philips | 2322 211 13561 | 40-25600-020 | |
| R12 | 820 Ohm 5% 0,33W | CF Res Philips | 2322 211 13821 | 40-28200-020 | |
| R13 | 100 Ohm 5% 0,33W | CF Res Philips | 2322 211 13101 | 40-21000-020 | |
| R14 | Pot,10k Lin MG Trim | Noble | VTP | 42-41076-000 | |
| R15 | 820 Ohm 5% 0,33W | CF Res Philips | 2322 211 13821 | 40-28200-020 | |
| R16 | 100 Ohm 5% 0,33W | CF Res Philips | 2322 211 13101 | 40-21000-020 | |
| R17 | Pot,10k Lin MG Trim | Noble | VTP | 42-41076-000 | |
| R18 | 120 Ohm 5% 0,33W | CF Res Philips | 2322 211 13121 | 40-21200-020 | |
| R19 | 120 Ohm 5% 0,33W | CF Res Philips | 2322 211 13121 | 40-21200-020 | |
| R20 | 100 Ohm 5% 0,33W | CF Res Philips | 2322 211 13101 | 40-21000-020 | |
| R21 | 100 Ohm 5% 0,33W | CF Res Philips | 2322 211 13101 | 40-21000-020 | |
| R22 | 75 Ohm 5% 0,33W | CF Res Philips | 2322 211 13759 | 40-17500-020 | |
| R23 | 50 Ohm 80°C PTC Thermistor | Philips | 2322-660-91008 | 41-11500-660 | |
| R24 | 150 Ohm 5% 0,33W | CF Res Philips | 2322 211 13151 | 40-21500-020 | |
| R25 | 0,22 Ohm 5% 0,6W | MF Res Beyschlag | MBB0207-00-BX | 40-00220-590 | |
| R26 | Pot,10k Lin MG Trim | Noble | VTP | 42-41076-000 | |
| R27 | 2,2k Ohm 5% 0,33W | CF Res Philips | 2322 211 13222 | 40-32200-020 | |
| R28 | 3,3k Ohm 5% 0,33W | CF Res Philips | 2322 211 13332 | 40-33300-020 | |
| R29 | 220 Ohm 5% 0,33W | CF Res Philips | 2322 211 13221 | 40-22200-020 | |
| R30 | 120 Ohm 5% 0,33W | CF Res Philips | 2322 211 13121 | 40-21200-020 | |
| R31 | 270 Ohm 5% 0,33W | CF Res Philips | 2322 211 13271 | 40-22700-020 | |
| R32 | 220 Ohm 5% 0,33W | CF Res Philips | 2322 211 13221 | 40-22200-020 | |
| R33 | 390 Ohm 5% 0,33W | CF Res Philips | 2322 211 13391 | 40-23900-020 | |
| R34 | 5,6k Ohm 5% 0,33W | CF Res Philips | 2322 211 13562 | 40-35600-020 | |
| R35 | 10k Ohm 5% 0,33W | CF Res Philips | 2322 211 13103 | 40-41000-020 | |
| R36 | 2,2k Ohm 5% 0,33W | CF Res Philips | 2322 211 13222 | 40-32200-020 | |
| R37 | 6,8k Ohm 5% 0,33W | CF Res Philips | 2322 211 13682 | 40-36800-020 | |
| R38 | 8,2k Ohm 5% 0,33W | CF Res Philips | 2322 211 13822 | 40-38200-020 | |
| R39 | 10k Ohm 5% 0,33W | CF Res Philips | 2322 211 13103 | 40-41000-020 | |
| R40 | 2,2k Ohm 5% 0,33W | CF Res Philips | 2322 211 13222 | 40-32200-020 | |
| R41 | 22k Ohm 5% 0,33W | CF Res Philips | 2322 211 13223 | 40-42200-020 | |
| R42 | 3,3k Ohm 5% 0,33W | CF Res Philips | 2322 211 13332 | 40-33300-020 | |
| R43 | 560 Ohm 5% 0,33W | CF Res Philips | 2322 211 13561 | 40-25600-020 | |
| R44 | 1,5k Ohm 5% 0,33W | CF Res Philips | 2322 211 13152 | 40-31500-020 | |
| R45 | 220 Ohm 5% 0,33W | CF Res Philips | 2322 211 13221 | 40-22200-020 | |
| R46 | 18 Ohm 5% 0,33W | CF Res Philips | 2322 211 13189 | 40-11800-020 | |
| R47 | 18 Ohm 5% 0,33W | CF Res Philips | 2322 211 13189 | 40-11800-020 | |

PA, 400W 24V PCB (cont'd)

| Ref | Description | Manufacturer | Manufacturer's P/N | Codan P/N | Remarks |
|-----|-------------------------------|----------------|--------------------|--------------|---------|
| R48 | 18 Ohm 5% 0,33W | CF Res Philips | 2322 211 13189 | 40-11800-020 | |
| R49 | 18 Ohm 5% 0,33W | CF Res Philips | 2322 211 13189 | 40-11800-020 | |
| R50 | SOT 5% 0,33W | CF Res | | | |
| R51 | 1 Ohm 5% 0,33W | CF Res Philips | 2322 211 13108 | 40-01000-020 | |
| R52 | 1 Ohm 5% 0,33W | CF Res Philips | 2322 211 13108 | 40-01000-020 | |
| R53 | 1 Ohm 5% 0,33W | CF Res Philips | 2322 211 13108 | 40-01000-020 | |
| R54 | 1 Ohm 5% 0,33W | CF Res Philips | 2322 211 13108 | 40-01000-020 | |
| R55 | 1 Ohm 5% 0,33W | CF Res Philips | 2322 211 13108 | 40-01000-020 | |
| R56 | 1 Ohm 5% 0,33W | CF Res Philips | 2322 211 13108 | 40-01000-020 | |
| R57 | 1 Ohm 5% 0,33W | CF Res Philips | 2322 211 13108 | 40-01000-020 | |
| R58 | 1 Ohm 5% 0,33W | CF Res Philips | 2322 211 13108 | 40-01000-020 | |
| R59 | 4,7 Ohm 5% 0,5W | MF Res Philips | 2322 186 13478 | 40-04700-030 | |
| R60 | 4,7 Ohm 5% 0,5W | MF Res Philips | 2322 186 13478 | 40-04700-030 | |
| R61 | 22 Ohm 5% 0,33W | CF Res Philips | 2322 211 13229 | 40-12200-020 | |
| R62 | 22 Ohm 5% 0,33W | CF Res Philips | 2322 211 13229 | 40-12200-020 | |
| R63 | 4,7 Ohm 5% 0,5W | MF Res Philips | 2322 186 13478 | 40-04700-030 | |
| R64 | 4,7 Ohm 5% 0,5W | MF Res Philips | 2322 186 13478 | 40-04700-030 | |
| R65 | 4,7 Ohm 5% 0,5W | MF Res Philips | 2322 186 13478 | 40-04700-030 | |
| R66 | 4,7 Ohm 5% 0,5W | MF Res Philips | 2322 186 13478 | 40-04700-030 | |
| R67 | 22 Ohm 5% 0,33W | CF Res Philips | 2322 211 13229 | 40-12200-020 | |
| R68 | 22 Ohm 5% 0,33W | CF Res Philips | 2322 211 13229 | 40-12200-020 | |
| R69 | 4,7 Ohm 5% 0,5W | MF Res Philips | 2322 186 13478 | 40-04700-030 | |
| R70 | 4,7 Ohm 5% 0,5W | MF Res Philips | 2322 186 13478 | 40-04700-030 | |
| R71 | 1,8 Ohm 5% 0,33W | CF Res Philips | 2322 211 13188 | 40-01800-020 | |
| R72 | 1,8 Ohm 5% 0,33W | CF Res Philips | 2322 211 13188 | 40-01800-020 | |
| R73 | 2,2k Ohm 5% 0,33W | CF Res Philips | 2322 211 13222 | 40-32200-020 | |
| R74 | 220 Ohm 5% 0,33W | CF Res Philips | 2322 211 13221 | 40-22200-020 | |
| R75 | 2,2k Ohm 5% 0,33W | CF Res Philips | 2322 211 13222 | 40-32200-020 | |
| R76 | 220 Ohm 5% 0,33W | CF Res Philips | 2322 211 13221 | 40-22200-020 | |
| R77 | 470 Ohm 5% 0,5W | MF Res Philips | 2322 186 13471 | 40-24700-030 | |
| R78 | 120 Ohm 5% 0,33W | CF Res Philips | 2322 211 13121 | 40-21200-020 | |
| T1 | Inductor, Common Mode | bn/or | | 44-80104 | |
| T2 | Transformer, Interstage | gn/gn/gn | | 44-80179 | |
| T3 | Transformer, Predriver | gn/gn/rd | | 44-80178 | |
| T4 | Transformer, Feed Frwd | rd/rd/ye | | 44-80172 | |
| T5 | Transformer, Feed Frwd | rd/rd/ye | | 44-80172 | |
| T6 | Transformer, Driver | rd/rd/rd | | 44-80173 | |
| T7 | Transformer, Driver | rd/rd/rd | | 44-80173 | |
| T8 | Transformer, Feedback | rd/rd/gn | | 44-80174 | |
| T9 | Transformer, Feedback | rd/rd/gn | | 44-80174 | |
| T10 | Transformer, Output | bk/bk/rd | | 44-80169 | |
| T11 | Transformer, Output | bk/bk/rd | | 44-80169 | |
| T12 | Transformer, Hybrid | gn/gn/bn | | 44-80180 | |
| T13 | Transformer, Auto | gn/gn/wh | | 44-80181 | |
| V1 | Transistor, NPN Si | Philips | BC548 | BC548 | |
| V2 | Diode, Zener 6,2V 5% 0,4W | Philips | BZX79-C6V2 | BZX79C6V2 | |
| V3 | Transistor, Darlington NPN Si | Philips | BD675 | BD675 | |
| V4 | Transistor, PNP Si | Texas Inst | TIP32A | TIP32A | |
| V5 | Transistor, PNP Si | Philips | BC328 | BC328 | |
| V6 | Diode, Zener 5,6V 5% 0,4W | Philips | BZX79-C5V6 | BZX79C5V6 | |
| V7 | Transistor, Darlington NPN Si | Philips | BD675 | BD675 | |
| V8 | Transistor, NPN Si | Philips | BD135 | BD135 | |
| V9 | Transistor, Darlington NPN Si | Philips | BD675 | BD675 | |
| V10 | Transistor, NPN Si | Philips | BD135 | BD135 | |
| V11 | Transistor, PNP Si | Philips | BC558 | BC558 | |
| V12 | Transistor, NPN Si | Philips | BC548 | BC548 | |

PA, 400W 24V PCB (cont'd)

Assembly No 08-02640

Issue 12

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| Ref | Description | Manufacturer | Manufacturer's P/N | Codan P/N | Remarks |
|-----|----------------------------------|--------------|--------------------|--------------|---------|
| V13 | Transistor, PNP Si | Philips | BF450 | BF450 | |
| V14 | Transistor, PNP Si | Philips | BF450 | BF450 | |
| V15 | Transistor, PNP Si | Philips | BC558 | BC558 | |
| V16 | Transistor, PNP Si | Philips | BC558 | BC558 | |
| V17 | Transistor, NPN Si | Philips | PH2369 | PH2369 | |
| V18 | Transistor, NPN Si | Motorola | MRF220 | MRF220 | |
| V19 | Transistor, NPN Si | Motorola | MRF220 | MRF220 | |
| V20 | Transistor, NPN Si | Philips | BD135 | BD135 | |
| V21 | Transistor, NPN Si | Motorola | MRF426 | MRF426 | |
| V22 | Transistor, NPN Si | Motorola | MRF426 | MRF426 | |
| V23 | Transistor, NPN Si | Motorola | MRF426 | MRF426 | |
| V24 | Transistor, NPN Si | Motorola | MRF426 | MRF426 | |
| V25 | Transistor, NPN Si | Motorola | MRF422 | MRF422 | |
| V26 | Transistor, NPN Si | Motorola | MRF422 | MRF422 | |
| V27 | Transistor, NPN Si | Motorola | MRF422 | MRF422 | |
| V28 | Transistor, NPN Si | Motorola | MRF422 | MRF422 | |
| 1 | PCB, PA | | | 07-00881 | |
| 2 | Heatsink PA Assy | | | 08-04508 | |
| 3 | Clamp, Transformer | | | 05-02823 | |
| 4 | Spacer, M2.5x2.6mm Long | | | 05-03012-026 | |
| 5 | Strip, Rubber | | | 06-00640 | |
| 6 | Sleeve, Sil Rubber 2x0.5 Any Col | Symonds | 02005 | 71-80206-199 | |
| 7 | Strip, Rubber | | | 06-00672 | |
| 12 | Rivet, Pop Cu S/Dome 3,2dx3,2mm | Tucker | CD44 | 33-25232-032 | |
| 13 | Eyelet, Nickel Plated | Tucker | SE 2530 | 33-14253-040 | |
| 14 | QC Tab 6,3mm 90d | Utilux | H1181 | 61-00800-003 | |
| 15 | Lug, Solder 5BA | Tucker | S260 Code 127 5BA | 61-30200-006 | |

Filter, 200W 24V

| Ref | Description | Manufacturer | Manufacturer's P/N | Codan P/N | Remarks |
|-----|-------------|--------------------------|--------------------|--------------|---------|
| C2 | 3,3n 10% | 100V CE Cap Philips | 2222 630 03332 | 46-33300-200 | |
| C3 | 3,3n 10% | 100V CE Cap Philips | 2222 630 03332 | 46-33300-200 | |
| C4 | 100n | 50V 25U CE Cap Centralab | CZ20C104M244 | 46-51000-260 | |
| C5 | 100n | 50V 25U CE Cap Centralab | CZ20C104M244 | 46-51000-260 | |
| C6 | 3,3n 10% | 100V CE Cap Philips | 2222 630 03332 | 46-33300-200 | |
| C7 | 3,3n 10% | 100V CE Cap Philips | 2222 630 03332 | 46-33300-200 | |
| C8 | 330p 2% | 100V N750 CE Cap Philips | 2222 680 58331 | 46-23300-013 | |
| C9 | 330p 2% | 100V N750 CE Cap Philips | 2222 680 58331 | 46-23300-013 | |
| C10 | 120p 5% | 500V N750 CE Cap Murata | DD08 UJ 121J 500 | 46-21200-021 | |
| C11 | 330p 2% | 100V N750 CE Cap Philips | 2222 680 58331 | 46-23300-013 | |
| C12 | 47p 5% | 500V N750 CE Cap Murata | DD06 UJ 470J 500 | 46-14700-021 | |
| C13 | 330p 2% | 100V N750 CE Cap Philips | 2222 680 58331 | 46-23300-013 | |
| C14 | 56p 5% | 500V N750 CE Cap Murata | DD06 UJ 560J 500 | 46-15600-021 | |
| C16 | 56p 5% | 500V N750 CE Cap Murata | DD06 UJ 560J 500 | 46-15600-021 | |
| C17 | 56p 5% | 500V N750 CE Cap Murata | DD06 UJ 560J 500 | 46-15600-021 | |
| C18 | 82p 5% | 500V N750 CE Cap Murata | DD07 UJ 820J 500 | 46-18200-021 | |
| C19 | 82p 5% | 500V N750 CE Cap Murata | DD07 UJ 820J 500 | 46-18200-021 | |
| C20 | 47n | 63V CE Cap Samwha | TL | 46-44700-210 | |
| C21 | 100p 5% | 500V N750 CE Cap Murata | DD08 UJ 101J 500 | 46-21000-021 | |
| C22 | 56p 5% | 500V N750 CE Cap Murata | DD06 UJ 560J 500 | 46-15600-021 | |
| C23 | 27p 5% | 500V N750 CE Cap Murata | DD05 UJ 270J 500 | 46-12700-021 | |
| C24 | 100p 5% | 500V N750 CE Cap Murata | DD08 UJ 101J 500 | 46-21000-021 | |
| C25 | 82p 5% | 500V N750 CE Cap Murata | DD07 UJ 820J 500 | 46-18200-021 | |
| C26 | 100p 5% | 500V N750 CE Cap Murata | DD08 UJ 101J 500 | 46-21000-021 | |
| C27 | 120p 5% | 500V N750 CE Cap Murata | DD08 UJ 121J 500 | 46-21200-021 | |
| C28 | 3,3n 10% | 100V CE Cap Philips | 2222 630 03332 | 46-33300-200 | |
| C29 | 150p 5% | 500V N750 CE Cap Murata | DD09 UJ 151J 500 | 46-21500-021 | |
| C30 | 39p 5% | 500V N750 CE Cap Murata | DD05 UJ 390J 500 | 46-13900-021 | |
| C31 | 100p 5% | 500V N750 CE Cap Murata | DD08 UJ 101J 500 | 46-21000-021 | |
| C32 | 3,3n 10% | 100V CE Cap Philips | 2222 630 03332 | 46-33300-200 | |
| C33 | 150p 5% | 500V N750 CE Cap Murata | DD09 UJ 151J 500 | 46-21500-021 | |
| C34 | 150p 5% | 500V N750 CE Cap Murata | DD09 UJ 151J 500 | 46-21500-021 | |
| C35 | 100p 5% | 500V N750 CE Cap Murata | DD08 UJ 101J 500 | 46-21000-021 | |
| C36 | 3,3n 10% | 100V CE Cap Philips | 2222 630 03332 | 46-33300-200 | |
| C37 | 100p 5% | 500V N750 CE Cap Murata | DD08 UJ 101J 500 | 46-21000-021 | |
| C38 | 47p 5% | 500V N750 CE Cap Murata | DD06 UJ 470J 500 | 46-14700-021 | |
| C39 | 100p 5% | 500V N750 CE Cap Murata | DD08 UJ 101J 500 | 46-21000-021 | |
| C40 | 120p 5% | 500V N750 CE Cap Murata | DD08 UJ 121J 500 | 46-21200-021 | |
| C41 | 150p 5% | 500V N750 CE Cap Murata | DD09 UJ 151J 500 | 46-21500-021 | |
| C42 | 220p 5% | 500V N750 CE Cap Murata | DD10 UJ 221J 500 | 46-22200-021 | |
| C43 | 68p 5% | 500V N750 CE Cap Murata | DD07 UJ 680J 500 | 46-16800-021 | |
| C44 | 150p 5% | 500V N750 CE Cap Murata | DD09 UJ 151J 500 | 46-21500-021 | |
| C45 | 220p 5% | 500V N750 CE Cap Murata | DD10 UJ 221J 500 | 46-22200-021 | |
| C46 | 100p 5% | 500V N750 CE Cap Murata | DD08 UJ 101J 500 | 46-21000-021 | |
| C47 | 150p 5% | 500V N750 CE Cap Murata | DD09 UJ 151J 500 | 46-21500-021 | |
| C48 | 100n | 50V 25U CE Cap Centralab | CZ20C104M244 | 46-51000-260 | |
| C49 | 120p 5% | 500V N750 CE Cap Murata | DD08 UJ 121J 500 | 46-21200-021 | |
| C50 | 100n | 50V 25U CE Cap Centralab | CZ20C104M244 | 46-51000-260 | |
| C51 | 390p 5% | 500V N750 CE Cap Murata | DD12 UJ 391J 500 | 46-23900-021 | |
| C52 | 270p 5% | 500V N750 CE Cap Murata | DD11 UJ 271J 500 | 46-22700-021 | |
| C53 | 390p 5% | 500V N750 CE Cap Murata | DD12 UJ 391J 500 | 46-23900-021 | |
| C54 | 390p 5% | 500V N750 CE Cap Murata | DD12 UJ 391J 500 | 46-23900-021 | |
| C55 | 47n | 63V CE Cap Samwha | TL | 46-44700-210 | |
| C56 | 100n | 50V 25U CE Cap Centralab | CZ20C104M244 | 46-51000-260 | |
| C57 | 390p 5% | 500V N750 CE Cap Murata | DD12 UJ 391J 500 | 46-23900-021 | |
| C58 | 180p 5% | 500V N750 CE Cap Murata | DD10 UJ 181J 500 | 46-21800-021 | |
| C59 | 220p 5% | 500V N750 CE Cap Murata | DD10 UJ 221J 500 | 46-22200-021 | |
| C60 | 270p 5% | 500V N750 CE Cap Murata | DD11 UJ 271J 500 | 46-22700-021 | |
| C61 | 390p 5% | 500V N750 CE Cap Murata | DD12 UJ 391J 500 | 46-23900-021 | |
| C62 | 390p 5% | 500V N750 CE Cap Murata | DD12 UJ 391J 500 | 46-23900-021 | |

Filter, 200W 24V (cont'd)

| Ref | Description | Manufacturer | Manufacturer's P/N | Codan P/N | Remarks |
|-----|---------------------------------|--------------|--------------------|--------------|---------|
| C63 | 470n 20% 50V BX CC Cap | Vitramon | VJ2321X474MFA | 46-54700-280 | |
| C64 | 27p 5% 500V N750 CE Cap | Murata | DD05 UJ 270J 500 | 46-12700-021 | |
| C65 | 470n 20% 50V BX CC Cap | Vitramon | VJ2321X474MFA | 46-54700-280 | |
| C66 | 3,3n 10% 100V CE Cap | Philips | 2222 630 03332 | 46-33300-200 | |
| C67 | 3,3n 10% 100V CE Cap | Philips | 2222 630 03332 | 46-33300-200 | |
| C68 | 3,3n 10% 100V CE Cap | Philips | 2222 630 03332 | 46-33300-200 | |
| C69 | 3,3n 10% 100V CE Cap | Philips | 2222 630 03332 | 46-33300-200 | |
| C70 | 3,3n 10% 100V CE Cap | Philips | 2222 630 03332 | 46-33300-200 | |
| C71 | 3,3n 10% 100V CE Cap | Philips | 2222 630 03332 | 46-33300-200 | |
| C72 | 3,3n 10% 100V CE Cap | Philips | 2222 630 03332 | 46-33300-200 | |
| C73 | 100n 50V Z5U CE Cap | Centralab | CZ20C104M244 | 46-51000-260 | |
| C74 | 100n 50V Z5U CE Cap | Centralab | CZ20C104M244 | 46-51000-260 | |
| C75 | 68p 2% 100V N150 CE Cap | Philips | 2222 680 34689 | 46-16800-012 | |
| C76 | 100n 50V Z5U CE Cap | Centralab | CZ20C104M244 | 46-51000-260 | |
| C77 | 100n 50V Z5U CE Cap | Centralab | CZ20C104M244 | 46-51000-260 | |
| C80 | 100n 50V Z5U CE Cap | Centralab | CZ20C104M244 | 46-51000-260 | |
| C81 | 100n 50V Z5U CE Cap | Centralab | CZ20C104M244 | 46-51000-260 | |
| C84 | 22p 2% 100V NPO CE Cap | Philips | 2222 680 10229 | 46-12200-011 | |
| D1 | Diode, Si fast low cap med cond | | | 23-10002 | |
| D2 | Diode, Si fast low cap med cond | | | 23-10002 | |
| D3 | Diode, Si fast low cap med cond | | | 23-10002 | |
| D4 | Diode, Si fast low cap med cond | | | 23-10002 | |
| D5 | Diode, Si fast low cap med cond | | | 23-10002 | |
| D6 | Diode, Si fast low cap med cond | | | 23-10002 | |
| D7 | Diode, Si fast low cap med cond | | | 23-10002 | |
| D8 | Diode, Si fast low cap med cond | | | 23-10002 | |
| D9 | Diode, Si 400V 1A | | | 1N4004 | |
| D10 | Diode, Si 400V 1A | | | 1N4004 | |
| D11 | Diode, Si fast low cap med cond | | | 23-10002 | |
| D12 | Diode, Band Switch Si | Philips | BA423 | BA423 | |
| D13 | Diode, Band Switch Si | Philips | BA423 | BA423 | |
| IC1 | Array, Transistor | IC Motorola | MC1416P | XT-01416-000 | |
| IC2 | Decoder, 1 of 10 | IC National | CD4028BCN | YG-40028-000 | |
| K1 | Relay, Vert 1C 12V 8A 306 Ohm | Omron | G2L-113P-V 12V | 64-31120-232 | |
| K2 | Relay, Vert 1C 12V 8A 306 Ohm | Omron | G2L-113P-V 12V | 64-31120-232 | |
| K3 | Relay, Vert 1C 12V 8A 306 Ohm | Omron | G2L-113P-V 12V | 64-31120-232 | |
| K4 | Relay, Vert 1C 12V 8A 306 Ohm | Omron | G2L-113P-V 12V | 64-31120-232 | |
| K5 | Relay, Vert 1C 12V 8A 306 Ohm | Omron | G2L-113P-V 12V | 64-31120-232 | |
| K6 | Relay, Vert 1C 12V 8A 306 Ohm | Omron | G2L-113P-V 12V | 64-31120-232 | |
| K7 | Relay, Vert 1C 12V 8A 306 Ohm | Omron | G2L-113P-V 12V | 64-31120-232 | |
| K8 | Relay, 1C 12V 16A 275 Ohm | Omron | G2R-1117P-V-RP-US | 64-31125-227 | |
| K9 | Relay, 1C 12V 16A 275 Ohm | Omron | G2R-1117P-V-RP-US | 64-31125-227 | |
| L2 | Inductor, 100uH | Sigma | 10-10-0537-10 | 43-82100-051 | |
| L3 | Inductor, 0.32uH | bl/bl/or | | 44-70293 | |
| L4 | Inductor, 0.24uH | bl/bl/wh | | 44-70292 | |
| L5 | Inductor, 0.42uH | bl/bl/sl | | 44-70294 | |
| L6 | Inductor, 0.66uH | bl/bl/vi | | 44-70295 | |
| L7 | Inductor, 1.00uH | ye/ye/bl | | 44-70296 | |
| L8 | Inductor, 1.33uH | ye/ye/ye | | 44-70297 | |
| L9 | Inductor, 2.19uH | ye/ye/bk | | 44-70298 | |

Filter, 200W 24V (cont'd)

| Ref | Description | Manufacturer | Manufacturer's P/N | Codan P/N | Remarks |
|-----|--------------------------------|--------------|----------------------|--------------|---------|
| P1 | Header (P) 10way 2row | JAE | PS-10PE-D4T1-PN1 | 60-00100-260 | |
| P2 | Plug, 25way D 90 deg PCB Fixed | ITT-Cannon | DB-25P-1B0N (9,4 sp) | 60-00250-092 | |
| P3 | Plug, 15way D 90 deg PCB Fixed | ITT-Cannon | DA-15P-1B0N (9,4 Sp) | 60-00150-093 | |
| R1 | 150 Ohm 5% 0,33W CF Res | Philips | 2322 211 13151 | 40-21500-020 | |
| R2 | 3,3k Ohm 5% 0,33W CF Res | Philips | 2322 211 13332 | 40-33300-020 | |
| R3 | 270 Ohm 5% 0,33W CF Res | Philips | 2322 211 13271 | 40-22700-020 | |
| R4 | 8,2k Ohm 5% 0,33W CF Res | Philips | 2322 211 13822 | 40-38200-020 | |
| R5 | 1,2k Ohm 5% 0,33W CF Res | Philips | 2322 211 13122 | 40-31200-020 | |
| R7 | 6,8k Ohm 5% 0,33W CF Res | Philips | 2322 211 13682 | 40-36800-020 | |
| R8 | Pot,1k Lin MG Trim | Noble | VTP | 42-31076-000 | |
| R9 | 1,5k Ohm 5% 0,33W CF Res | Philips | 2322 211 13152 | 40-31500-020 | |
| R10 | 470 Ohm 5% 0,33W CF Res | Philips | 2322 211 13471 | 40-24700-020 | |
| R11 | 82 Ohm 5% 0,5W MF Res | Philips | 2322 186 13829 | 40-18200-030 | |
| R12 | 82 Ohm 5% 0,5W MF Res | Philips | 2322 186 13829 | 40-18200-030 | |
| R13 | 100k Ohm 5% 0,33W CF Res | Philips | 2322 211 13104 | 40-51000-020 | |
| R14 | 10k Ohm 5% 0,33W CF Res | Philips | 2322 211 13103 | 40-41000-020 | |
| R15 | 10k Ohm 5% 0,33W CF Res | Philips | 2322 211 13103 | 40-41000-020 | |
| R16 | 10k Ohm 5% 0,33W CF Res | Philips | 2322 211 13103 | 40-41000-020 | |
| R17 | 2,2k Ohm 5% 0,33W CF Res | Philips | 2322 211 13222 | 40-32200-020 | |
| R18 | 4,7k Ohm 5% 0,33W CF Res | Philips | 2322 211 13472 | 40-34700-020 | |
| R19 | 270 Ohm 5% 0,33W CF Res | Philips | 2322 211 13271 | 40-22700-020 | |
| R20 | 2,2k Ohm 5% 0,33W CF Res | Philips | 2322 211 13222 | 40-32200-020 | |
| R21 | 2,2k Ohm 5% 0,33W CF Res | Philips | 2322 211 13222 | 40-32200-020 | |
| R22 | 2,2k Ohm 5% 0,33W CF Res | Philips | 2322 211 13222 | 40-32200-020 | |
| R23 | 2,2k Ohm 5% 0,33W CF Res | Philips | 2322 211 13222 | 40-32200-020 | |
| R24 | 470 Ohm 5% 0,33W CF Res | Philips | 2322 211 13471 | 40-24700-020 | |
| T1 | Transformer, Current bk/bk/bk | | | 44-80168 | |
| V1 | Transistor, NPN Si | Philips | BC548 | BC548 | |
| V2 | Diode, Zener 6,8V 5% 0,4W | Philips | BZX79-C6V8 | BZX79C6V8 | |
| V3 | Transistor, NPN Si | Philips | BC548 | BC548 | |
| V4 | Transistor, PNP Si | Philips | BC558 | BC558 | |
| V5 | Diode, Zener 10V 5% 0,4W | Philips | BZX79-C10 | BZX79C10 | |
| 1 | PCB, Filter | | | 07-00817 | |

Filter, 400W 24V PCB

| Ref | Description | Manufacturer | Manufacturer's P/N | Codan P/N | Remarks |
|-----|--------------------------|--------------|--------------------|--------------|---------|
| C2 | 3,3n 10% 100V CE Cap | Philips | 2222 630 03332 | 46-33300-200 | |
| C3 | 3,3n 10% 100V CE Cap | Philips | 2222 630 03332 | 46-33300-200 | |
| C4 | 100n 50V Z5U CE Cap | Centralab | CZ20C104M244 | 46-51000-260 | |
| C5 | 100n 50V Z5U CE Cap | Centralab | CZ20C104M244 | 46-51000-260 | |
| C6 | 3,3n 10% 100V CE Cap | Philips | 2222 630 03332 | 46-33300-200 | |
| C7 | 3,3n 10% 100V CE Cap | Philips | 2222 630 03332 | 46-33300-200 | |
| C8 | 820p 5% 250V PS Cap | Philips | 2222 426 28201 | 46-28200-320 | |
| C9 | 1n 5% 250V PS Cap | Philips | 2222 426 21002 | 46-31000-320 | |
| C10 | 120p 5% 500V N750 CE Cap | Murata | DD08 UJ 121J 500 | 46-21200-021 | |
| C12 | 47p 5% 500V N750 CE Cap | Murata | DD06 UJ 470J 500 | 46-14700-021 | |
| C14 | 56p 5% 500V N750 CE Cap | Murata | DD06 UJ 560J 500 | 46-15600-021 | |
| C16 | 56p 5% 500V N750 CE Cap | Murata | DD06 UJ 560J 500 | 46-15600-021 | |
| C17 | 56p 5% 500V N750 CE Cap | Murata | DD06 UJ 560J 500 | 46-15600-021 | |
| C18 | 82p 5% 500V N750 CE Cap | Murata | DD07 UJ 820J 500 | 46-18200-021 | |
| C19 | 82p 5% 500V N750 CE Cap | Murata | DD07 UJ 820J 500 | 46-18200-021 | |
| C20 | 47n 63V CE Cap | Samwha | TL | 46-44700-210 | |
| C21 | 100p 5% 500V N750 CE Cap | Murata | DD08 UJ 101J 500 | 46-21000-021 | |
| C22 | 56p 5% 500V N750 CE Cap | Murata | DD06 UJ 560J 500 | 46-15600-021 | |
| C23 | 27p 5% 500V N750 CE Cap | Murata | DD05 UJ 270J 500 | 46-12700-021 | |
| C24 | 100p 5% 500V N750 CE Cap | Murata | DD08 UJ 101J 500 | 46-21000-021 | |
| C25 | 82p 5% 500V N750 CE Cap | Murata | DD07 UJ 820J 500 | 46-18200-021 | |
| C26 | 100p 5% 500V N750 CE Cap | Murata | DD08 UJ 101J 500 | 46-21000-021 | |
| C27 | 120p 5% 500V N750 CE Cap | Murata | DD08 UJ 121J 500 | 46-21200-021 | |
| C28 | 3,3n 10% 100V CE Cap | Philips | 2222 630 03332 | 46-33300-200 | |
| C29 | 150p 5% 500V N750 CE Cap | Murata | DD09 UJ 151J 500 | 46-21500-021 | |
| C30 | 39p 5% 500V N750 CE Cap | Murata | DD05 UJ 390J 500 | 46-13900-021 | |
| C31 | 100p 5% 500V N750 CE Cap | Murata | DD08 UJ 101J 500 | 46-21000-021 | |
| C32 | 3,3n 10% 100V CE Cap | Philips | 2222 630 03332 | 46-33300-200 | |
| C33 | 150p 5% 500V N750 CE Cap | Murata | DD09 UJ 151J 500 | 46-21500-021 | |
| C34 | 150p 5% 500V N750 CE Cap | Murata | DD09 UJ 151J 500 | 46-21500-021 | |
| C35 | 100p 5% 500V N750 CE Cap | Murata | DD08 UJ 101J 500 | 46-21000-021 | |
| C36 | 3,3n 10% 100V CE Cap | Philips | 2222 630 03332 | 46-33300-200 | |
| C37 | 100p 5% 500V N750 CE Cap | Murata | DD08 UJ 101J 500 | 46-21000-021 | |
| C38 | 47p 5% 500V N750 CE Cap | Murata | DD06 UJ 470J 500 | 46-14700-021 | |
| C39 | 100p 5% 500V N750 CE Cap | Murata | DD08 UJ 101J 500 | 46-21000-021 | |
| C40 | 120p 5% 500V N750 CE Cap | Murata | DD08 UJ 121J 500 | 46-21200-021 | |
| C41 | 150p 5% 500V N750 CE Cap | Murata | DD09 UJ 151J 500 | 46-21500-021 | |
| C42 | 220p 5% 500V N750 CE Cap | Murata | DD10 UJ 221J 500 | 46-22200-021 | |
| C43 | 68p 5% 500V N750 CE Cap | Murata | DD07 UJ 680J 500 | 46-16800-021 | |
| C44 | 150p 5% 500V N750 CE Cap | Murata | DD09 UJ 151J 500 | 46-21500-021 | |
| C45 | 220p 5% 500V N750 CE Cap | Murata | DD10 UJ 221J 500 | 46-22200-021 | |
| C46 | 100p 5% 500V N750 CE Cap | Murata | DD08 UJ 101J 500 | 46-21000-021 | |
| C47 | 150p 5% 500V N750 CE Cap | Murata | DD09 UJ 151J 500 | 46-21500-021 | |
| C48 | 100n 50V Z5U CE Cap | Centralab | CZ20C104M244 | 46-51000-260 | |
| C49 | 120p 5% 500V N750 CE Cap | Murata | DD08 UJ 121J 500 | 46-21200-021 | |
| C50 | 100n 50V Z5U CE Cap | Centralab | CZ20C104M244 | 46-51000-260 | |
| C51 | 390p 5% 500V N750 CE Cap | Murata | DD12 UJ 391J 500 | 46-23900-021 | |
| C52 | 270p 5% 500V N750 CE Cap | Murata | DD11 UJ 271J 500 | 46-22700-021 | |
| C53 | 390p 5% 500V N750 CE Cap | Murata | DD12 UJ 391J 500 | 46-23900-021 | |
| C54 | 390p 5% 500V N750 CE Cap | Murata | DD12 UJ 391J 500 | 46-23900-021 | |
| C55 | 47n 63V CE Cap | Samwha | TL | 46-44700-210 | |
| C56 | 100n 50V Z5U CE Cap | Centralab | CZ20C104M244 | 46-51000-260 | |
| C57 | 390p 5% 500V N750 CE Cap | Murata | DD12 UJ 391J 500 | 46-23900-021 | |
| C58 | 180p 5% 500V N750 CE Cap | Murata | DD10 UJ 181J 500 | 46-21800-021 | |
| C59 | 220p 5% 500V N750 CE Cap | Murata | DD10 UJ 221J 500 | 46-22200-021 | |
| C60 | 270p 5% 500V N750 CE Cap | Murata | DD11 UJ 271J 500 | 46-22700-021 | |
| C61 | 390p 5% 500V N750 CE Cap | Murata | DD12 UJ 391J 500 | 46-23900-021 | |
| C62 | 390p 5% 500V N750 CE Cap | Murata | DD12 UJ 391J 500 | 46-23900-021 | |
| C63 | 470n 20% 50V BX CC Cap | Vitramon | VJ2321X474MFA | 46-54700-280 | |
| C64 | 27p 5% 500V N750 CE Cap | Murata | DD05 UJ 270J 500 | 46-12700-021 | |

Filter, 400W 24V PCB (cont'd)

| Ref | Description | Manufacturer | Manufacturer's P/N | Codan P/N | Remarks |
|-----|---------------------------------|------------------|--------------------|--------------|---------|
| C65 | 470n 20% 50V BX | CC Cap Vitramon | VJ2321X474MFA | 46-54700-280 | |
| C66 | 3,3n 10% 100V | CE Cap Philips | 2222 630 03332 | 46-33300-200 | |
| C67 | 3,3n 10% 100V | CE Cap Philips | 2222 630 03332 | 46-33300-200 | |
| C68 | 3,3n 10% 100V | CE Cap Philips | 2222 630 03332 | 46-33300-200 | |
| C69 | 3,3n 10% 100V | CE Cap Philips | 2222 630 03332 | 46-33300-200 | |
| C70 | 3,3n 10% 100V | CE Cap Philips | 2222 630 03332 | 46-33300-200 | |
| C71 | 3,3n 10% 100V | CE Cap Philips | 2222 630 03332 | 46-33300-200 | |
| C72 | 3,3n 10% 100V | CE Cap Philips | 2222 630 03332 | 46-33300-200 | |
| C73 | 100n 50V Z5U | CE Cap Centralab | C220C104M244 | 46-51000-260 | |
| C74 | 100n 50V Z5U | CE Cap Centralab | C220C104M244 | 46-51000-260 | |
| C75 | 68p 2% 100V N150 | CE Cap Philips | 2222 680 34689 | 46-16800-012 | |
| C76 | 100n 50V Z5U | CE Cap Centralab | C220C104M244 | 46-51000-260 | |
| C77 | 100n 50V Z5U | CE Cap Centralab | C220C104M244 | 46-51000-260 | |
| C78 | 470n 20% 50V BX | CC Cap Vitramon | VJ2321X474MFA | 46-54700-280 | |
| C79 | 470n 20% 50V BX | CC Cap Vitramon | VJ2321X474MFA | 46-54700-280 | |
| C80 | 100n 50V Z5U | CE Cap Centralab | C220C104M244 | 46-51000-260 | |
| C81 | 100n 50V Z5U | CE Cap Centralab | C220C104M244 | 46-51000-260 | |
| C82 | 56p 5% 500V N750 | CE Cap Murata | DD06 UJ 560J 500 | 46-15600-021 | |
| C83 | 56p 5% 500V N750 | CE Cap Murata | DD06 UJ 560J 500 | 46-15600-021 | |
| D1 | Diode, Si fast low cap med cond | | | 23-10002 | |
| D2 | Diode, Si fast low cap med cond | | | 23-10002 | |
| D3 | Diode, Si fast low cap med cond | | | 23-10002 | |
| D4 | Diode, Si fast low cap med cond | | | 23-10002 | |
| D5 | Diode, Si fast low cap med cond | | | 23-10002 | |
| D6 | Diode, Si fast low cap med cond | | | 23-10002 | |
| D7 | Diode, Si fast low cap med cond | | | 23-10002 | |
| D8 | Diode, Si fast low cap med cond | | | 23-10002 | |
| D9 | Diode, Si 400V 1A | | | 1N4004 | |
| D10 | Diode, Si 400V 1A | | | 1N4004 | |
| D11 | Diode, Si fast low cap med cond | | | 23-10002 | |
| D12 | Diode, Band Switch Si | Philips | BA423 | BA423 | |
| D13 | Diode, Band Switch Si | Philips | BA423 | BA423 | |
| IC1 | Array, Transistor | IC Motorola | MC1416P | XT-01416-000 | |
| IC2 | Decoder, 1 of 10 | IC National | CD4028BCN | YG-40028-000 | |
| K1 | Relay, Vert 1C 12V 8A | 306 Ohm Omron | G2L-113P-V 12V | 64-31120-232 | |
| K2 | Relay, Vert 1C 12V 8A | 306 Ohm Omron | G2L-113P-V 12V | 64-31120-232 | |
| K3 | Relay, Vert 1C 12V 8A | 306 Ohm Omron | G2L-113P-V 12V | 64-31120-232 | |
| K4 | Relay, Vert 1C 12V 8A | 306 Ohm Omron | G2L-113P-V 12V | 64-31120-232 | |
| K5 | Relay, Vert 1C 12V 8A | 306 Ohm Omron | G2L-113P-V 12V | 64-31120-232 | |
| K6 | Relay, Vert 1C 12V 8A | 306 Ohm Omron | G2L-113P-V 12V | 64-31120-232 | |
| K7 | Relay, Vert 1C 12V 8A | 306 Ohm Omron | G2L-113P-V 12V | 64-31120-232 | |
| K8 | Relay, 1C 12V 16A | 275 Ohm Omron | G2R-1117P-V-RP-US | 64-31125-227 | |
| K9 | Relay, 1C 12V 16A | 275 Ohm Omron | G2R-1117P-V-RP-US | 64-31125-227 | |
| L2 | Inductor, 100uH | Sigma | 10-10-0537-10 | 43-82100-051 | |
| L3 | Inductor, 0.32uH | bl/bl/or | | 44-70293 | |
| L4 | Inductor, 0.24uH | bl/bl/wh | | 44-70292 | |
| L5 | Inductor, 0.42uH | bl/bl/sl | | 44-70294 | |
| L6 | Inductor, 0.66uH | bl/bl/vi | | 44-70295 | |
| L7 | Inductor, 1.00uH | ye/ye/bl | | 44-70296 | |
| L8 | Inductor, 1.33uH | ye/ye/ye | | 44-70297 | |
| L9 | Inductor, 2.19uH | ye/ye/bk | | 44-70298 | |

Filter, 400W 24V PCB (cont'd)

| Ref | Description | Manufacturer | Manufacturer's P/N | Codan P/N | Remarks |
|-----|--------------------------------|--------------|----------------------|--------------|---------|
| P1 | Header (P) 10way 2row | JAE | PS-10PE-D4T1-PN1 | 60-00100-260 | |
| P2 | Plug, 25way D 90 deg PCB Fixed | ITT-Cannon | DB-25P-1B0N (9,4 sp) | 60-00250-092 | |
| P3 | Plug, 15way D 90 deg PCB Fixed | ITT-Cannon | DA-15P-1B0N (9,4 Sp) | 60-00150-093 | |
| R1 | 150 Ohm 5% 0,33W CF Res | Philips | 2322 211 13151 | 40-21500-020 | |
| R2 | 3,3k Ohm 5% 0,33W CF Res | Philips | 2322 211 13332 | 40-33300-020 | |
| R3 | 270 Ohm 5% 0,33W CF Res | Philips | 2322 211 13271 | 40-22700-020 | |
| R4 | 4,7k Ohm 5% 0,33W CF Res | Philips | 2322 211 13472 | 40-34700-020 | |
| R5 | 1,2k Ohm 5% 0,33W CF Res | Philips | 2322 211 13122 | 40-31200-020 | |
| R7 | 6,8k Ohm 5% 0,33W CF Res | Philips | 2322 211 13682 | 40-36800-020 | |
| R8 | Pot,1k Lin MG Trim | Noble | VTP | 42-31076-000 | |
| R9 | 1,5k Ohm 5% 0,33W CF Res | Philips | 2322 211 13152 | 40-31500-020 | |
| R10 | 470 Ohm 5% 0,33W CF Res | Philips | 2322 211 13471 | 40-24700-020 | |
| R11 | 120 Ohm 5% 0,5W MF Res | Philips | 2322 186 13121 | 40-21200-030 | |
| R12 | 120 Ohm 5% 0,5W MF Res | Philips | 2322 186 13121 | 40-21200-030 | |
| R13 | 100k Ohm 5% 0,33W CF Res | Philips | 2322 211 13104 | 40-51000-020 | |
| R14 | 10k Ohm 5% 0,33W CF Res | Philips | 2322 211 13103 | 40-41000-020 | |
| R15 | 10k Ohm 5% 0,33W CF Res | Philips | 2322 211 13103 | 40-41000-020 | |
| R16 | 10k Ohm 5% 0,33W CF Res | Philips | 2322 211 13103 | 40-41000-020 | |
| R17 | 2,2k Ohm 5% 0,33W CF Res | Philips | 2322 211 13222 | 40-32200-020 | |
| R18 | 4,7k Ohm 5% 0,33W CF Res | Philips | 2322 211 13472 | 40-34700-020 | |
| R19 | 270 Ohm 5% 0,33W CF Res | Philips | 2322 211 13271 | 40-22700-020 | |
| R20 | 2,2k Ohm 5% 0,33W CF Res | Philips | 2322 211 13222 | 40-32200-020 | |
| R21 | 2,2k Ohm 5% 0,33W CF Res | Philips | 2322 211 13222 | 40-32200-020 | |
| R22 | 2,2k Ohm 5% 0,33W CF Res | Philips | 2322 211 13222 | 40-32200-020 | |
| R23 | 2,2k Ohm 5% 0,33W CF Res | Philips | 2322 211 13222 | 40-32200-020 | |
| R24 | 470 Ohm 5% 0,33W CF Res | Philips | 2322 211 13471 | 40-24700-020 | |
| R25 | 120 Ohm 5% 0,5W MF Res | Philips | 2322 186 13121 | 40-21200-030 | |
| R26 | 120 Ohm 5% 0,5W MF Res | Philips | 2322 186 13121 | 40-21200-030 | |
| T1 | Transformer, Current bk/bk/bk | | | 44-80168 | |
| V1 | Transistor, NPN Si | Philips | BC548 | BC548 | |
| V2 | Diode, Zener 6,8V 5% 0,4W | Philips | BZX79-C6V8 | BZX79C6V8 | |
| V3 | Transistor, NPN Si | Philips | BC548 | BC548 | |
| V4 | Transistor, PNP Si | Philips | BC558 | BC558 | |
| V5 | Diode, Zener 10V 5% 0,4W | Philips | BZX79-C10 | BZX79C10 | |
| 1 | PCB, Filter | | | 07-00817 | |

PA, 4402 (200 watt) 24V

| Ref | Description | Manufacturer | Manufacturer's P/N | Codan P/N | Remarks |
|-----|----------------------------------|-----------------|---------------------|--------------|---------|
| C3 | 33u 40V EL Cap | Philips | 2222 030 27339 | 48-13304-011 | |
| IC1 | Regulator, Voltage +Adj | 3A IC National | LM350T | XB-00350-400 | |
| IC2 | Regulator, Voltage +Adj | 3A IC National | LM350T | XB-00350-400 | |
| J1 | Socket, UHF Single Hole Fixed | Acme | C32-28 | 60-11363-228 | |
| L1 | Core Toroid 6mm Orange F8 | Neosid | 28-503-28 | 39-04062-108 | |
| L2 | Core Toroid 6mm Orange F8 | Neosid | 28-503-28 | 39-04062-108 | |
| L3 | Core Toroid 6mm Orange F8 | Neosid | 28-503-28 | 39-04062-108 | |
| R1 | 5,6 Ohm 10% 10,0W WW Res | IRH | PW10 | 40-05600-702 | |
| R2 | 5,6 Ohm 10% 10,0W WW Res | IRH | PW10 | 40-05600-702 | |
| 1 | Tab, Connector Latch | | | 05-02262 | |
| 3 | Cable, Ribbon | | | 08-02522 | |
| 4 | Case | | | 08-02540 | |
| 6 | Cable, Power | | | 08-02615 | |
| 7 | Plate, End | | | 05-02827 | |
| 9 | Clip, 'P' 5/16 | Bowthorpe | NX3 | 30-05210-005 | |
| 16 | Clip, 'P' 3/16 | Bowthorpe | NX1 | 30-05210-003 | |
| 23 | Sleeve, Helsen H20x19 Any Colour | Hellermann | 2mmx0,75mmWallx19mm | 71-92007-199 | |
| 24 | Loom | | | 08-02543 | |
| 30 | PA, 200W,24V | PCB | | 08-02541-002 | |
| 31 | Filter, 200W 24V | | | 08-02542-002 | |
| 35 | Washer, Mica | TO-220 Motorola | 808853A001 | 30-45001-001 | |
| 38 | Clamp, Resistor | | | 05-02835 | |
| 39 | Bush, Transistor | TO-220 Motorola | B51547F019 | 30-03801-001 | |

PA, 4404 (400 watt) 24V

Assembly No 08-02641

Issue 10

Page 1 of 1

| Ref | Description | Manufacturer | Manufacturer's P/N | Codan P/N | Remarks |
|-----|----------------------------------|---------------|---------------------|--------------|---------|
| C1 | 33u 40V EL Cap | Philips | 2222 030 27339 | 48-13304-011 | |
| C2 | 33u 40V EL Cap | Philips | 2222 030 27339 | 48-13304-011 | |
| C3 | 1n 10% 100V CE Cap | Philips | 2222 630 03102 | 46-31000-200 | |
| IC1 | Regulator, Voltage +Adj 3A IC | National | LM350T | XB-00350-400 | |
| IC2 | Regulator, Voltage +Adj 3A IC | National | LM350T | XB-00350-400 | |
| J1 | Socket, UHF Single Hole Fixed | Acme | C32-28 | 60-11363-228 | |
| L1 | Core Toroid 6mm Orange F8 | Neosid | 28-503-28 | 39-04062-108 | |
| L2 | Core Toroid 6mm Orange F8 | Neosid | 28-503-28 | 39-04062-108 | |
| L3 | Core Toroid 6mm Orange F8 | Neosid | 28-503-28 | 39-04062-108 | |
| R1 | 200 Ohm 5% 7,0W MO Res | Welwyn | FA88 | 40-22000-611 | |
| R2 | 200 Ohm 5% 7,0W MO Res | Welwyn | FA88 | 40-22000-611 | |
| R3 | 5,6 Ohm 10% 10,0W WW Res | IRH | PW10 | 40-05600-702 | |
| R4 | 5,6 Ohm 10% 10,0W WW Res | IRH | PW10 | 40-05600-702 | |
| 1 | PA, 400W 24V PCB | | | 08-02640 | |
| 2 | Filter, 400W 24V PCB | | | 08-02542-004 | |
| 3 | Case | | | 08-02643 | |
| 4 | Loom | | | 08-02662 | |
| 5 | Cable, Power | | | 08-02642 | |
| 6 | Cable, Ribbon | | | 08-02522 | |
| 7 | Tab, Connector Latch | | | 05-02262 | |
| 9 | Bar, Support | | | 05-02828 | |
| 10 | Clamp, Resistor | | | 05-02835 | |
| 12 | Endplate | | | 05-02898 | |
| 13 | Spacer, M2.5x4.6mm Long | | | 05-03012-046 | |
| 15 | Bush, Transistor TO-220 | Motorola | B51547F019 | 30-03801-001 | |
| 16 | Clip, 'P' 3/16 | Bowthorpe | NX1 | 30-05210-003 | |
| 17 | Clip, 'P' 7/16 | Bowthorpe | NX5 | 30-05210-007 | |
| 18 | Sleeve, Helsyn H20x19 Any Colour | Hellermann | 2mmx0,75mmWallx19mm | 71-92007-199 | |
| 19 | Washer, Mica TO-220 | Motorola | B08853A001 | 30-45001-001 | |
| 24 | Washer, 4BA 1/8 x 1/4 x 0,005 | Gardiner Gask | Melinox | 31-30401-190 | |

6 DRAWINGS AND CIRCUITS

Power Amplifier Dimensions

4402 200W PA Chassis Component Layout

4404 400W PA Chassis Component Layout

PA 200W

PA PCB Assy 200W

Filter PCB Assy 200W

PA 400W

PA PCB Assy 400W

Filter PCB Assy 400W

04-01769

08-02541-002 (Sht 2)

08-02542-002 (Sht 2)

04-01817

08-02640

08-02542-004 (Sht 3)