

TECHNICAL MANUAL



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STORNOPHONE 5500
TECHNICAL MANUAL
136 - 174 MHz

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	NOMENCLATURE	1
	CARRIER SQUELCH/PL SOFTWARE DESCRIPTION	2
	THEORY OF OPERATION	3
	ALIGNMENT / ABGLEICHANLEITUNG / RÉGLAGE ALIGNMENT POINTS TOOLS, TEST & PROGRAMMING EQUIPMENT	4
STORNOPHONE 5500 136 - 174 MHz TECHNICAL MANUAL	MECHANICAL PARTS AND BLOCK DIAGRAMS	5
	MAIN BOARDS: CIRCUIT DIAGRAMS & PARTS LISTS	6
	CONTROL HEADS: CIRCUIT DIAGRAMS & PARTS LISTS	7
	CONTROL MICROPHONES: CIRCUIT DIAGRAMS & PART LISTS	8
APPENDIX: GRAPHICAL SYMBOLS COLOUR CODE		9
ADDITIONAL MANUALS: TECHNICAL MANUAL 403 - 470 MHz TECHNICAL MANUAL 66 - 88 MHz INSTALLATION/OPERATION/ ACCESSORIES		10

MODEL NOMENCLATURE

STORNOPHONE 5500

The diagram below is a schematic description of the radio nomenclature explaining the meaning of the different numbers and characters contained in the radio specification.

Location	Type of Unit	TX Power W	Freq. MHz	Model Series	Operation	Squelch	No. of Channels	Chan. Spac. kHz	Vers- ion	
MA	U	0	2	EZ	A	0	J	00	-	K
European Identifier	Universal	.1-1 (Adjustable)	Midband 66-88	Model Series Logic Board I	12 VDC	Binary	32 Channels	25		Package Model
		1	3	EV		1		13		
		1-6 (Adjustable)	* VHF 136-174 ** BIII 174-225	Model Series Logic Board II		Carrier Squelch		20		
		2	4			3		22		
		1-10 (Adjustable)	*** UHF 403-470			Private Line		12.5		
		3				9				
		25				Select5				

Note:

Transceiver Standard IP54, 5 ppm, Pre-/De-emphasized

Options to be reflected on nameplate are:

2 ppm on VHF or UHF

IP54

* VHF: Subbands 136-162 MHz & 146-174 MHz

** BIII: Subband I, TX 174-209 MHz/RX 174-200 MHz

BIII: Subband II, TX 191-225 MHz/RX 200-225 MHz

*** UHF 403-440 MHz: Subbands 403-433 & 410-440 MHz

STORNOPHONE 5500

GENERAL SPECIFICATIONS

Frequency Range:

66 - 88/ 136 - 162/ 146 - 174/ 174 - 225/ 403 - 433/ 422 - 450/ 438 - 470 MHz

Channel Spacing:

12.5/ 20/ 25 kHz (174 - 225 MHz: 12.5 kHz only)

Mode of Operation:

Simplex/Semi-Duplex

Number of Channels:

Up to 99

Modulation:

FM or PM

Antenna Impedance:

50 ohm

Frequency Stability:

According to PTT regulations

Operating Temperature:

FTZ	CEPT	174 - 225 MHz
-10 - +40°C	-25 - +55°C	-10 - +55°C

Dimensions (H, W, D):

	Radio	Control	Radio/Control
1 - 10 W:	44 x 168 x 130	44 x 168 x 30	44 x 168 x 160 mm
25 W:	44 x 168 x 150	44 x 168 x 30	44 x 168 x 180 mm

Weight (Radio/Control):

1320 g (1 - 10 W)

1500 g (25 W)

STORNOPHONE 5500, SPECIFICATIONS

TRANSMITTER SPECIFICATIONS

RF Output:

1.0 - 10.0 W variable
25 W (174 - 225 MHz: only 10.0/25.0)

Deviation maximum:

12.5 kHz	20 kHz	25 kHz
± 2.5 kHz	± 4.0 kHz	± 5.0 kHz

Harmonics:

< 0.25 uW

Spurious:

< 0.20 uW

Audio Response:

According to PTT regulations

Distortion:

< 3% at 70% deviation

Adjacent Channel Power (CEPT):

< -60 dB at 12.5 kHz
< -70 dB at 20/25 kHz

Channel Separation:

4.0 MHz (5.0 MHz in UHF and 174 - 225 MHz)

STORNOPHONE 5500, SPECIFICATIONS

RECEIVER SPECIFICATIONS

	12.5 kHz	20 kHz	25 kHz
Sensitivity (at 50 ohm):			
20 dB S/N:	< 0.70 μ V	< 0.50 μ V	< 0.50 μ V
12 dB SINAD:	< 0.35 μ V	< 0.35 μ V	< 0.35 μ V
Adjacent Channel Selectivity MB:			
VHF, Bd III:	> 70 dB	> 75 dB	> 80 dB
UHF:	> 65 dB	> 70 dB	> 75 dB
Image Rejection:			
	> 80 dB	> 80 dB	> 80 dB
Spurious Rejection:			
	> 80 dB	> 80 dB	> 80 dB
Intermodulation:			
	> 76 dB (μ V emf)	> 76 dB (μ V emf)	> 76 dB (μ V emf)
Conducted Spurious Emission:			
	< 2 nW	< 2 nW	< 2 nW
Audio Output: * 5 W nominal 3 CEPT			
Audio Response: According to PTT regulations			
Distortion: * < 5% nominal < 10 % CEPT			
Channel Separation: 4.0 MHz (5.0 MHz in 174 - 225 MHz)			

* Mobile and Local Control Base

STORNOPHONE 5500, SPECIFICATIONS

POWER SUPPLY

Nominal Voltage:
13.2 V

Operating Voltage:
10.8 - 15.6 V

Current Drain:

Standby:	0.5 A
Receive:	1.75 A
Transmit:	2.75 A (UHF: 3.25 A)
(6, 10, 25 W)	3.75 A (UHF: 4.25 A)
	7.25 A (UHF: 8.75 A)

CHAPTER
CHAPITRE
KAPITEL

2

CARRIER SQUELCH/PL SOFTWARE DESCRIPTION

STORNOPHONE 5500

The CQM5500 radio is offered in several tiers with differing capabilities regarding Private-Line (PL) and Select 5. This document describes the operation of the Carrier Squelch (CS)/PL radio.

Many features of the CS/PL radio were implemented to meet various customer requirements. Some of these features offer more flexibility and user friendliness than previous radios. A good example of this is the one-hand operation which allows the operator to receive in the coded squelch mode even when the microphone is not on hook.

DEFINITIONS

Channel

Transmit and receive frequencies plus data that:

1. Points to one radio mode.
2. Selects one of two synthesizer reference frequencies.
3. Selects high or low transmit power.

Trakmode

When the radio is programmed with more than one mode and each channel has one of these modes associated with it. Each mode may be used with more than one channel.

Mode

A radio operation state programmed in EEPROM consisting of:

1. A PL decode frequency.
2. A PL encode frequency.
3. A "receive enable" bit.
4. A "monitor enable" bit.
5. A "PL decode enable" bit.
6. A "PL encode enable" bit.
7. A "transmit enable" bit.
8. A "disable transmit channel when channel is busy" bit.

NOTE

The PL frequencies are actually pointers into a frequency look-up table.

Monitor mode

The radio is in the "monitor" mode if carrier (noise squelch) is selected or if the radio is unsquelched.

Coded squelch

When the radio unmutes as a result of decoding PL.

AUDIO CONTROL/ONE-HAND OPERATION

Many radio operators do not replace the microphone in the hang-up box (HUB) when they are done with a conversation. Most radios will stay in the carrier squelch mode (which can annoy the operator since he will hear all channel traffic) until the microphone is placed in the hang-up box. The CQM5500 radio handles this in a different manner.

One-hand operation automatically places the radio in the coded squelch mode 7 seconds after PL was last decoded, regardless of the HUB state. If the operator does not want to wait the full 7 seconds he may press the reset button (which is shared with the monitor button) or place the microphone on-hook. Also, changing channels will reset the timer.

Once the radio is in the coded squelch mode, the carrier squelch mode is entered (and the 7 second timer begins) when the operator goes off-hook or presses and releases the PTT button. While in the carrier squelch mode, any time the operator de-keys, or any time PL is decoded, the timer will reset to 7 seconds.

The term "one-hand operation" was chosen because the operator can enter the carrier squelch mode and then transmit without ever having to remove his hand from the microphone. Radio operation described above (the 7 second timer, etc.) is called part of the one-hand operation although it is automatic. It is patterned after the Select 5 auto reset operation.

The EEPROM may be programmed to prevent a PL decode from overriding the 7 second timer. Also, the selection of the carrier squelch by pressing PTT may be disabled. Should the one-hand operation need to be totally eliminated, that may also be done by programming the EEPROM. Modifying any of these EEPROM bits would have to be done on an SP basis.

If one-hand operation is disabled, the radio will remain in the carrier squelch mode as long as the microphone is off hook. The coded squelch mode will only be enabled when the microphone is on-hook and the monitor switch is in the coded "position".

The muting of the radio is determined by several factors. These are:

- Monitor switch selection
- The radio mode data
- The one-hand operation timer.

Assuming that the one-hand timer is not active (it has timed out), the radio will be in the coded squelch mode (PL) if the monitor switch is in the coded "position" and the radio mode has "PL decode" enabled. If not, the radio will be in the carrier squelch mode.

There is one exception to the above discussion. When the monitor switch is in the "unsquelch" position, the radio will unmute and remain unmuted until the monitor switch is changed. The only thing preventing the radio from unmuting is if the radio mode does not allow monitoring or reception on the channel.

The monitor switch is a momentary switch which the command board processor reads. It is used to select three "positions" which are used to determine the proper muting mode. The term "position" is used because the switch is functionally treated as a latching mechanical switch. An annunciator above the switch (high-tier control head only) indicates the "position" of the switch. One "position" selects the carrier squelch mode and the annunciator is turned on. Another "position" selects the unsquelch mode and the annunciator is flashing even when the switch is pressed for at least 500 milliseconds. One other function of this switch is to reset the one-hand operation 7 second timer when it is active. When this occurs, there is no change to the "position" of the switch.

A yellow LED indicates the radio muting mode. If the LED is on, it means that the radio is in the monitor mode (carrier squelch or unsquelch). If the LED is off, it means that the radio is in the coded squelch mode.

STORNOPHONE 5500 CARRIER SQUELCH/PL SOFTWARE DESCRIPTION

Usually the annunciator above the monitor switch and the LED will agree. However, it is possible for the annunciator to indicate that the switch is in the coded squelch "position" but the LED is on because the radio is in the monitor mode. One instance is when a channel is selected that does not have PL decode enabled.

Operation using a low-tier control head is identical except there is no LCD so the annunciator is not used. AND squelch is available as an SP. This simply requires that, when in the coded squelch mode, both a "PL decode" and a "carrier detect" must be present before the radio will unmute.

CARRIER SQUELCH ONLY

The "carrier squelch only" radio has a few differences in operation compared to the PL radio. The first is that the yellow LED is never on since it is not needed. If it was used to indicate the monitor mode (as in the PL radio) it would always be on. The second is the operation of the monitor switch. Since there is no coded squelch position now, there are only two "positions" allowed and these are carrier squelch and unsquelch. The monitor switch must still be depressed at least 500 milliseconds to enter the unsquelch mode. Since the coded squelch "position" is not allowed, the annunciator will always be either solid (carrier squelch mode) or flashing (unsquelch mode) when a high-tier control head is used.

CHANNEL CHANGE DISPLAY AND WRAPAROUND

The low-tier control head uses two LED's for the two-channel radio to indicate the current channel. One-channel radios have no channel indicator LED's.

When a high-tier control head is used, the situation is much more complex. One or two digits in the display are used to indicate the selected channel. The operation differs depending on the maximum number of channels programmed for the radio.

If the radio is programmed for a maximum number of channels less than ten, then the operator has one button to press in order to change channels. The displayed channel number will increment once per button pressed until the highest numbered channel is reached. Pressing the button once will wrap around to channel 1.

If the radio has two or more channels, then two buttons are used to select the desired frequency. The "units" button affects only the units of the channel number and will increment from 0 to 9 and then wrap around. The "tens" button will increment from 0 (which is displayed as a blank) to the number of tens in the largest channel number. If the radio is programmed for 32 channels, the "tens" digit will increment from 0 to 3 and then wrap around. Sometimes an invalid channel might be selected.

Consider the following example:

Assume that the radio has a maximum of 32 channels and that channel 25 is currently selected. If the operator wants to go to channel 8 he may choose to update his units first. He now has selected channel 28. Now it is time to update the "tens" digit. Pressing the "tens" button once displays channel 38 which is not a valid channel number. The number 38 will now be flashing to indicate it is invalid. The operator has 10 seconds to correct the channel number before it will automatically return to last valid channel (channel 28). By pressing the units button once more (before the 10-second time-out) channel 8 will be selected.

CONTINUOUS MEMORY

When the radio is properly installed, voltage will always be present at the power connector. When the operator turns the radio off using the switch on the control head, the microprocessor will turn off power to most of the radio's circuitry and place itself in a standby mode. Current drain during the standby mode is very small because the microprocessor is CMOS. The current state of the radio is preserved in the microprocessor memory (RAM) so that, when the radio is turned on again, the operator does not have to re-enter the channel number, etc.

STORNOPHONE 5500 CARRIER SQUELCH/PL SOFTWARE DESCRIPTION

For the high-tier control head, there are two exceptions. The first is that the state of the external PA (if this option is present) will always power on in the disabled state. The second is that the speaker override will not be active when a handset is used.

When a low-tier control head is being used, all information is preserved. One interesting point is to note that, since the channel select buttons control a latch that has power applied during standby, the channel selection can be changed even while the radio is in the standby mode. There is no indication of the change until the radio is turned on when power is applied to the LED's.

CONTROL HEAD

When a low-tier control head is used, the command board will directly poll the switches and control the LED's with a parallel interface. This is because the control head has no smarts. When the radio is placed in the programming mode, serial data is transferred between the command board and the computer on the microphone audio line and the PTT line.

When a high-tier control head is used, the command board will communicate serially with the control head microprocessor when a button is pressed or the display needs to be updated. The programming mode is similar to the low-tier control head situation except that the control head microprocessor will act like a pair of wires that connect the microphone and the PTT lines to the serial bus lines that are used during normal radio operation. This is necessary because, if microphone and PTT lines were hard-wired to the serial bus, this would interfere with normal radio operation serial bus activity.

EEPROM LIMITATIONS/MAXIMUM NUMBER OF CHANNELS AND MODELS

The command board software will support various configurations of EEPROM. These are:

1 - 128 x 8	(128 bytes)
2 - 128 x 8	(256 bytes)
1 - 256 x 8	(256 bytes)
2 - 256 x 8	(512 bytes)
1 - 512 x 8	(512 bytes)
2 - 512 x 8	(1024 bytes) MAB909

All radios require 56 bytes for system information and PL encode and decode look-up tables. The remainder of the EEPROM may be used for a combination of radio modes and channels. A maximum of 32 modes may be used since 5 bits of each channel are used to select a mode. All radios must have at least one mode. When more than one mode programmed, they are called Trakmodes because the mode will track the channel.

The following table shows some possible combinations of the maximum number of modes and channels as a function of the EEPROM size. These examples may not necessarily correspond to what is being sold as a standard offering. Six bytes of EEPROM are required for each channel and three bytes for each mode.

STORNOPHONE 5500 CARRIER SQUELCH/PL SOFTWARE DESCRIPTION

EEPROM Size	Number of channels	Number of trakmodes
1-128 x 8	8 11	8 1
1-256 x 8 or 2-128 x 8	22 32	22 2
1-512 x 8 or 2-256 x 8	60 75	32 2
2-512 x 8	99	32

ERROR TONES

There are certain circumstances that are prohibited and other conditions which are undesired that may occur during operation of the radio. Tones are generated during these situations to alert the operator.

The majority of error conditions occur when the operator presses PTT when transmission is not allowed. These situations prevail when:

- The radio is not in the monitor mode.
- The transmit time-out timer (TOT) has expired.
- The post-TOT PTT inhibit timer is active.
- The current channel does not allow transmission.

The generated tone has a frequency of 819 Hz and is continuous. The tone will stop only when the operator releases the PTT button. The frequency of 819 Hz was chosen because it is a multiple of the transmit interrupt rate.

A short (100 milliseconds) tone at 819 Hz is generated when the transmit time-out timer has 4 seconds remaining before the transmitter will be shut down.

If the synthesizer does not lock, an 819 Hz tone will be generated for 250 ms and 250 milliseconds off until lock is achieved. The synthesizer divider is re-loaded during the no-tone period in case the no-lock condition occurred as a result of noise on the data, sent to the divider.

If a button is pressed on a high-tier control head while transmitting, a short tone will be generated and the keypress will be ignored. If a button is pressed on the low-tier control head while transmitting, the transmitter is dekeyed, an error tone is generated and the radio changes the channel. However, the channel LED's are controlled by the channels buttons independently of the microprocessor.

If a hardware failure causes PTT to appear active constantly then an error tone will be generated when the radio is turned on until the problem is corrected or the radio is turned off.

HANDSET OPERATION

The handset essentially functions as a control head. The major differences are that the speaker and microphone are now in the same housing and the regular radio speaker may be disabled or enabled by pressing a button. This allows the operator to prevent other persons in the vehicle from hearing the receive audio.

STORNOPHONE 5500 CARRIER SQUELCH/PL SOFTWARE DESCRIPTION

KEY/DE-KEY TIMING

The order of events for keying the transmitter are listed below. First, the red LED is turned on. This will take about 20 milliseconds if the high-tier control head is used (if there is an error on the serial bus then this time will increase). The audio is then muted. About one millisecond is required to write to the latch to do this. Next, the transmit frequency is read from the EEPROM which takes about 6 milliseconds. The latch is updated to select either high or low power for the RF PA. This takes about one millisecond.

The synthesizer reference and frequency data is then written to the divider which takes about 5 milliseconds. Now, the processor waits for the synthesizer to lock. The delay is EEPROM-programmable and will be about 50 to 80 milliseconds, depending on which band is used. If the synthesizer is not locked when the delay time elapses, a short error tone will be generated and the synthesizer data will be re-written to it. This sequence repeats until the synthesizer locks. The delay time for the synthesizer to lock is also used to debounce the PTT switch. If PTT is no longer pressed after lock is achieved, then the synthesizer will be restored to the receive frequency, otherwise DPTT is turned on in order to enable power to the exciter. The approximate time, required from pressing PTT to enabling the transmitter, is 64 milliseconds when the low-tier control head is used and the synthesizer lock delay is 50 milliseconds.

If a high-tier control head is used with a radio that needs 80 milliseconds for the synthesizer to lock, then the time will be about 114 ms.

The order of events for de-keying the transmitter will now be described. When PTT is released, reverse burst will be generated for 180 milliseconds if PL is enabled. DPTT is then disabled and power is removed from the exciter. The red LED is turned off (timing is the same as the turn-on time mentioned earlier). The receiver VFO is selected by updating the latch. The receive frequency information is read from the EEPROM, the synthesizer is updated and a delay occurs before checking for lock (in a manner similar to the transmit sequence). The approximate times from PTT release to entering the receive mode are from 62 milliseconds to 272 milliseconds, depending on whether PL is enabled and which control head is used.

MULTI-PL DISPLAY AND OPERATION

Some radio operators need to use more than one PL code per channel. An example of this is when he has access to more than one repeater, each having different PL tones. The CQM5500 radio allows the operator to select up to 10 different PL codes by pressing a button on the high-tier control head. With this option, the display indicates the PL number (1-9 or 0) that is currently in use. Pressing the button will increment the display and the display sequence will be:

... 7890123456789012 ...

If less than 10 PL codes are desired, the EEPROM may be programmed accordingly. For example, assume that 5 is the maximum number of Multi-PL codes. The sequence will then be:

... 23451234512 ...

Note that, regardless of the maximum number of Multi-PL codes, there will always be room reserved in the EEPROM for 10 PL codes. In this discussion, PL code refers to the pair of encode and decode frequencies. The radio can be programmed to change only the encode frequency, only the decode frequency, or both frequencies when a new Multi-PL selection is made. When the channel is changed, the last selected PL will remain in effect for the new channel.

The radio may be SPed to allow use of Multi-PL and Trakmode together. This allows the operator to not only have the normal Trakmode features, but when the channel is changed, the PL selection programmed in the Trakmode may be used (this revert to mode PL is EEPROM selectable). When both of these options are selected, a (*) is displayed when the Trakmode-PL is selected. The display sequence will be:

... 890*1234567890*123 ...

OPTIONS/SP's/NON-STANDARD OPERATION

OPTIONS

Several options may be enabled by programming the EEPROM, adding the necessary hardware, or a combination of both. The CQM5500 USER GUIDE PROGRAMMER HANDBOOK describes how the EEPROM should be programmed to select certain options. The following are options offered for sale.

Options requiring only an EEPROM change

- Delete Time-Out Timer
- Non-Standard Time-Out Timer
- PL Decode only
- PL Encode only
- Delete Busy Light
- Multiple PL Encode (High-Tier Control Head)
- Multiple PL Encode/Decode (High-Tier Control Head)
- TX Inhibit on Busy Channel
- Trakmode
- 32 Channels (High-Tier Control Head)
- 20 Channels (High-Tier Control Head)
- 2 Channels (Low-Tier Control Head)
- RF Power Slaved to Channel

Options requiring only hardware changes

- Manual Public Address
- Handset

Options requiring EEPROM and hardware changes

- Low Tier Control Head

Special product features

There is flexibility in the radio for more options than will be offered for sale; these features must be enabled on an SP basis.

- Multiple PL Decode
- Up to 75 Channels
- Disable One-Hand Operation entirely
- Disable PTT Press to Enter Carrier Squelch Part of One-Hand Operation
- Disable PL Override of One-Hand Operation Timer
- Trakmode + Multi-PL
- No Revert to Mode PL at Channel Change when Trakmode + Multi-PL is selected.
- PL "AND" Squelch
- Allow TX without Monitoring (if legal)

Non-standard operation

Several modes of operation are EEPROM selectable in order to allow the CQM5500 to be used as a base station. These operations should never be enabled when the radio is used as a mobile. The following is a list of the non-standard operations:

Delete All Serial Data coming from the Radio Command Board (including echoes of data sent to it)

STORNOPHONE 5500 CARRIER SQUELCH/PL SOFTWARE DESCRIPTION

- Delete Only Command Board Originated Serial Data
- Allow PTT to Abort the Synthesizer Lock Delay of a receive frequency.

PL OPERATION

The PL encoder is a phase accumulator algorithm running at an interrupt rate of 122 microseconds. A 3-bit D/A is used to generate the sine-wave approximation. A 3-pole low-pass filter attenuates out-of-band distortion products. Distortion measured at the splatter filter output is less than 3% across the 67-250.3 Hz range of PL tones. Reverse burst is generated by advancing the phase 240 degrees and delaying 180 milliseconds before de-keying the transmitter.

The PL decoder is a correlation decoder running at an interrupt rate of 934 ms. It is basically a translation of the Syntor X PL decoder, except that the threshold is increased for PL tones less than 72 Hz to reduce the bandwidth in order to meet the RS220A specification which states that the tone must not be decoded if the frequency error is 3% or greater.

PROGRAMMING MODE

In order to program the radio EEPROM an external computer is connected to the radio. When connected, an NMI is generated. The processor will initialize all ports and the latch outputs to an idle state. Since the EEPROM contents may not be valid, the processor has no way of being sure of which type of control head is connected. In order to guarantee proper operation, the processor assumes a high-tier control head is connected and releases the control head reset line. A result of this is that, if a low-tier control head is used, the red LED will come on. The NMI line is poled via a resistor on a port so the processor will know when the computer has been disconnected. The normal radio mode of operation will commence when this occurs.

While in the programming mode, the processor will wait for a command to be sent from the computer. Any characters received that are not the beginning of a command sequence will be ignored unless they have incorrect parity, in which case a NAK will be sent to the computer.

Once the command board byte is received, the byte count and address are expected to come next. While waiting for these modified ASCII-hex characters to come, a NAK will be sent to the computer if ANY non-data character is received or if the parity is incorrect (this includes command bytes or NAK's from the computer). The processor has no time-outs while waiting for information from the computer. The computer is considered the master and performs time-out and memory verify operations. The main reason for this is to reduce the ROM burden of the radio processor. For a complete description of the modified ASCII-hex format, refer to the "CQM5500 User Guide Programmer Handbook".

NOTE

If the programmer board has a failure in the circuitry that generates the NMI, it is possible for the radio to transmit when the external computer is connected. The reason is that the PTT line becomes a data line from the computer when the programming mode is entered. If the processor does not know if the programming mode is true, then it will enable the transmitter while the computer controls the PTT line.

TEST MODE

The radio's only test is when the microprocessor is placed in reset so the circuitry it controls may be driven by an external source.

STORNOPHONE 5500 CARRIER SQUELCH/PL SOFTWARE DESCRIPTION

TIME-OUT TIMER

The time-out timer prevents the radio from continuously transmitting as a result of hardware failure in the PTT circuits or an operator who has transmitted for a lengthy amount of time. The time-out is EEPROM programmable in 5-second steps from 5 to 1275 seconds. The time-out can be disabled by programming the value to zero seconds. Four seconds before this time-out occurs, a short warning tone is generated to alert the operator that the time-out is near. When the time-out occurs, a continuous 819 Hz tone is generated until PTT is released. Before the transmitter is de-keyed, reverse burst is generated if PL encode is enabled.

In addition to the somewhat standard TOT there is another timer which prohibits transmission after the TOT occurred (or after the warning tone sounds). This forces the operator to wait an amount of time before he may transmit again and helps reduce abuse of the channel. This inhibit time is also EEPROM-programmable in one-second increments from zero to 255 seconds.

TX POWER SELECT

The RF power output can be selected to the channel-dependent. There are two levels (high and low) which are set to the desired power by adjusting potentiometers inside the radio.

CHAPTER
CHAPITRE
KAPITEL

3

THEORY OF OPERATION

STORNOPHONE 5500

RECEIVER

FRONT END (Reference Designators)

The received signal applied to the radio's antenna input is routed through the harmonic filter/antenna switch, located in the RF power amplifier compartment. The attenuation due to this path is 0.8 dB maximum. The output is applied, via a coaxial cable, to J1 on the RF board. L8 and C17 form a high-pass filter which provides additional attenuation to signals below 66 MHz, particularly the 21.4 MHz IF frequency. L1 through L4 and associated components form a shunt-coupled bandpass filter having a 3 dB bandwidth of 8 MHz and a 1 dB bandwidth of 4.5 MHz. The center frequency of this filter may be tuned anywhere from 66 to 88 MHz and allows receiving signals within 2 MHz either side of the center. This filter configuration provides more rapid attenuation above the passband than below. Since high-side first injection is used, this response is desirable as it provides greater attenuation of receiver spurs such as the "half IF" and image. The output of this filter is routed to the gate of the first mixer Q1 and presents a source impedance of approximately 800 Ohm. Resistor R3 provides a DC return for the gate.

The synthesizer provides a receiver injection signal at a frequency 21.4 MHz above the desired receive frequency and at a nominal level of +13 dBm. This signal is filtered by the injection filter, L5 through L7 and associated components. This filter has a 3 dB bandwidth of 7.5 MHz and a 1 dB bandwidth of 4 MHz; it is tuneable between 87.4 MHz and 109.4 MHz. It provides attenuation of injection noise at the receive frequency (21.4 MHz below the injection signal) and for this reason, it has a more rapid attenuation below its passband than above. The filtered injection signal is applied to the source of first mixer Q1.

Q1 has a conversion gain of 9 dB. The IF signal appears across L51, which resonates with C18, C52 and C53 at 21.4 MHz. C18 provides bypassing of very high frequency stray inductances which may lead to instability of Q1.

Q1 is biased by R2 at 5 mA with no injection signal. This current increases with injection and for this reason, the DC source voltage may be used as a means of tuning the injection filter for minimum insertion loss. This tuning is normally done at or near the center of the desired receive passband. R1 isolates the detuning effects of the voltmeter probe.

RECEIVER IF, DETECTOR AND SQUELCH STAGES

The output of the first mixer is filtered by a 4-pole, 21.4 MHz monolithic crystal filter (Y51) consisting of two 2-pole filters Y51A and Y51B. Capacitors C52 and C56 provide the correct matching and coupling impedance required by these filters. The impedance and, therefore, the component values are different, depending on whether 20/25 kHz or 12.5 kHz channel spacing is used. The 3 dB bandwidth of Y51 is 15 kHz minimum for 20/25 kHz applications and 7.5 kHz minimum for 12.5 kHz channel spacing applications.

The output of Y51 is applied to a two-stage buffer, Q51 and Q52. Q51 is a common-source voltage amplifier which is direct-coupled to Q52; it operates as a current source having very high output impedance. The output voltage, developed across the resonant network L53 and C54, C64 fUm, is applied (via C69), C65 fUm, to the input of the second mixer, U51 pin 19.

Diodes CR51 and CR52 prevent overload by very strong signals (greater than 100 mV) at the antenna input. CR51 prevents overloading of buffer stages Q51 and Q52. CR52 prevents the amplified output of the buffer from overloading the second mixer in U51.

STORNOPHONE 5500 THEORY OF OPERATION

Injection for the second mixer is obtained from an oscillator transistor whose base is U51-15 and whose emitter is U51-16. The frequency is determined by crystal Y52; it is normally 20.945 MHz but may be changed to 21.855 MHz if its harmonics interfere with a desired receive signal. In either case, the resulting second IF frequency is 455 MHz.

The second oscillator level is adjusted by divider C62 and C63. The oscillator signal, present at the top of C63, is coupled to the input of the second mixer in U51 by C64 which forms part of the output resonant circuit of the buffer.

Resistor R56 increases the bias current of the second mixer for more consistent performance over a wide temperature range.

The output of the second mixer U51-20 is applied to ceramic filter FL51. The output of this filter is fed into U51-21 where it is amplified approximately 30 dB and applied via U51-23 to the second ceramic filter FL52. Each of these ceramic filters has an insertion loss of approximately 3 dB and a bandwidth which is at least one and a half times wider than the corresponding crystal filter used in the high IF. This ensures that temperature drift in the ceramic filter elements will not degrade the receiver's passband response, while still obtaining significant attenuation of adjacent channel signals. Like the crystal filters, different ceramic filters are used for 20/25 kHz vs. 12.5 kHz channel spacing models.

The output of the last ceramic filter is applied to U51-24 where it is applied to a series of high-gain limiter/amplifier stages having an overall gain of at least 70 dB. U51-24 is also used as a convenient IF gain measurement test point, since it is behind all selectivity elements but before any non-linear (limiting) gain stages. A high impedance voltmeter, capable of reading 455 kHz signals, should indicate approximately 30 mV at this point when -85 to -95 dBm is applied to the receiver's input. The level at this pin will saturate out at approximately 150 mV RMS, and no further increase in level above this value will be seen as the receiver input level is raised.

The high-gain limiter stages are followed by a quadrature detector which uses L54 as a phase-shift element. L54 produces a varying phase vs. frequency response, and is tuned for 90° phase shift at 455 kHz. A multiplier compares the direct and phase-shifted IF signal and produces either no output when the two signals are in quadrature (90° phase difference), or a varying amount of DC offset voltage as the two phases differ. Thus, an AC signal is produced which is proportional to the FM modulation of the IF signal. Unlike a discriminator, there is a DC offset (typically 2.3 V) for an unmodulated, on-channel carrier. The variations, produced when modulation is applied, amount to typically 15 mV RMS per kHz of deviation, measured at U51-5. An active 3 pole low-pass filter reduced outband noise above 3 kHz. This audio is applied via R62 to J3 pin 10, where it goes to the receiver low-level audio stages on the command board. The value of R62 changes for 12.5 and 20/25 kHz channel spacing models, providing a consistent audio level for 60% of full system deviation. This keeps the audio reserve gain, signalling detector audio levels, etc. constant for different channel spacings without the need to change values on the control board.

A part of the audio signal at U51-5 is also applied (via R60 and C76) to U51-7, the input of the carrier squelch circuit. This signal is amplified and appears at U51-6, is adjusted by the SQUELCH control R59, and fed back to U51 (pin 8). C75 and C78 help shape the lower and upper frequency band limits. The presence or absence of noise is measured by a detector whose output is U51-11. This pin is high (4.6 V DC typical) with no on-channel signal, and goes low when a signal of sufficient quieting is received. A two-time constant circuitry provides RF-level dependent attack- and delaytimes. This output is buffered by Q53 and routed to the control board microprocessor circuits via J3 pin 9. the squelch setting is nominally 9 to 11 dB SINAD CCITT weighted.

STORNOPHONE 5500 THEORY OF OPERATION

HIGH-TIER CONTROL BOARD

DC DISTRIBUTION

The CQM5500 control board has two regulated voltage sources that provide 5.0 and 9.6 V. The 5 V source supplies power primarily to the microprocessor, the serial latch (U705) and the memory device U702. The 5 V supply is always on, even when the radio is turned off, provided that the radio is properly installed (battery voltage is always present on B+).

Since CMOS devices are used, the current drain from the 5 V source is negligible when the radio is turned off. The memory chip is also CMOS but power is completely turned off to it via Q702 except when it is being accessed during normal radio operation. The 5 V source is also used to power various transistors used for interfacing and buffering purposes.

The 9.6 V source is turned on and off by the microprocessor. It primarily supplies power to the filters, limiters, amplifiers, and RF board via P3-7. The microprocessor turns off the audio by causing U705-5 (the latch) to go low. This removes power from U401 which disables the 9.6 V regulator circuit and transmit power control circuitry.

A 4.8 V source is derived from the 9.6 V source using a resistive divider (R408 and R409) and filter capacitor (C405). This is used to bias various operational amplifiers.

The audio PA output stage is powered by B+. The microprocessor turns off the audio by causing U705-4 to go low which turns off U704F (transistor) and Q508. The biasing of the output transistors is removed and no current is drawn by them.

NOTE

The battery should always be connected to the radio, no matter whether the radio is turned on or off. This allows the continuous memory function of the radio to operate.

POWER UP (Initial battery connection)

When the battery is initially connected to the radio, C707 begins charging. While it is charging, the outputs of the serial latch (U705) are tri-state. This guarantees that U705-5 will be pulled high by R762 to allow the microprocessor to come out of reset (U701-6, 7 will go high). The watchdog timer's output Q902 is also off during this time in order to allow U701-6, 7 to go high. C902 in the watchdog circuit is discharged (0 volts across it) which places 9.6 V on U601-14. Since U601-13 is about 2.5 V, U601-12 will go low (1.4 V). The divider, formed by R904 and R908, is such that the transistor will be turned off.

U701-7 immediately goes high and the microprocessor comes out of standby. CR703 forces U701-6 (reset) to rise slowly as C705 begins to charge and the oscillator Y701 begins operation. While the voltage at C701-6 is less than about 4 V, all I/O lines of the microprocessor are high impedance. The microprocessor's mode of operation is selected by JU706 and JU707 (see jumper table below).

Once C705 has charged, the microprocessor comes out of reset and begins executing its operating program. The microprocessor will toggle the clock and data lines via U701-11 and U701-10 respectively. The serial data activity will tickle the watchdog timer in order to prevent it from resetting the micro-processor. The clock and data lines are used to write data to the latch (U703) and the synthesizer via P3-4 and P3-3.

After data is written to the latch, a positive-going pulse is generated on U701-16 to enable new data to be written to the latch output. U703-5 will be high in order to enable the 9.6 V supply.

STORNOPHONE 5500 THEORY OF OPERATION

The control head LED's and LCD display will be initialized by the processor. The synthesizer will be initialized to the proper channel by sending information on the clock and data lines. Once the data is sent, U701-32 will generate a pulse in order to latch the data.

	JU706	JU707
Single-Chip Mode:	out	in
Expanded Mode:		
External ROM	out	in
Internal and external ROM	in	out

Jumper Table

POWER DOWN

The radio will operate as long as the switch on the control head is on. When it is turned off, Q705 will turn off, U701-24 will go high and the microprocessor will cause the latch (U703-5) to go low, which turns off the 9.6 V supply and allows standby/reset to occur (U701-7, 6 are low).

Q704 will be off when the emergency switch is not pressed (emergency option) or when JU710 is installed. Q705 will be off when the microprocessor turns off the 9.6 V supply. When all three of these transistors (Q704, Q705, and Q706) are off then Q707 will turn on and put the microprocessor into standby/reset. If any one of Q704, Q705, or Q706 is on, the microprocessor will not be in standby/reset.

The microprocessor still has power applied to it and it maintains the current status of the radio (channel number, muting mode selected and other operator-selected information). When the radio is turned on by the control head switch then the radio status is restored to what it was before the switch was turned off.

CONTROL HEAD INTERFACE

The high-tier control head uses an LCD and LED's to indicate the current radio status. Momentary switches are used for changing the channel and other functions. The low-tier control head is not compatible with the high-tier control head board.

The microphone PTT switch controls Q712 via J4-2 and is read at Q701-18. The Hang-Up Box (HUB) switch controls Q710 via J4-7 and is read at U701-21. Receive audio is routed to the control head volume control at J4-3. The volume-dependent audio is returned to the command board at J4-11 and sent to the audio PA. The speaker connections at J4-5 and J4-12 serve the purpose of connecting a speaker to the control head when a remote-mount radio installation is used.

The control board communicates to the high-tier control head (serial control board) over a 2-wire asynchronous data link (Q708, J4-8 and Q709, J4-15). Please note that this serial link is different than the synchronous serial bus, used to control the serial latch and synthesizer. The control head has a microprocessor in it that processes button presses, LED display, and LCD display. Using a serial data protocol, information is exchanged between the processors to update the display or change the current status of the radio. Asynchronous 7-bit data with odd parity is sent at 1200 baud in a half-duplex manner (the control head processor is duplex). J4-1 and J4-9 are spare lines and are not used.

STORNOPHONE 5500 THEORY OF OPERATION

PROGRAMMING MODE

When the radio needs to be customized for a particular customer's channel and other radio information, a computer is connected to the radio and the data is programmed into the EEPROM. The computer may be interfaced directly to J4, or it may be connected to the radio through the microphone connector. In either case, the special programming mode is entered by raising the voltage on the HUB line (J4-7) to at least 5 V. This will cause Q714 to turn off and generate a non-maskable interrupt to the microprocessor. The microprocessor will stay in the programming mode as long as U701-8 (NMI) is low. Since the microprocessor cannot read the state of U701-8 directly, it reads it at U701-15 via R766.

When the processor sees a high at U701-15 it will exit the programming mode and begin normal operation. This allows recovery in case noise caused the programming mode to appear active momentarily.

If a high-tier control head is connected during the programming mode then the control head processor will rapidly read the PTT line and echo the information to J4-8 to get the data from the computer to the control board. Likewise, data from the control board at J4-15 will be rapidly read and echoed to the microphone audio pin of the microphone connector. Note that this control head operation is true only when it senses that the programming mode is active.

If the computer is interfaced to J4 rather than to the microphone connector of the control head, then data is transferred directly through the interface.

RF INTERFACE

The microprocessor controls what frequencies will be used for receive and transmit. It does so by sending the synthesizer the proper data. Once the data is sent, then the processor will apply a pulse on P3-2 to latch the data and begin operating at the selected frequency. The processor will wait for the synthesizer to lock on the new frequency and then check U701-23 to see if the synthesizer is actually in lock. If it has locked, then P3-5 will be low and U704A (transistor) will be off which makes U701-23 high.

When the radio needs to transmit, the processor will cause U703-6 to be high. This will cause U703-706 to be high, turning Q718 on and making P3-6 low in order to select the transmit VCO. It then brings U701-14 (DPTT) low which enables the transmit power control.

When the RF board detects carrier, it will cause P3-9 to go low, which turns Q717 off. This is read as high by the processor at U701-22. Demodulated audio from the RF board is present at P3-10. It is then routed to the control board filters.

AUDIO POWER AMPLIFIER

The audio signal from the wiper of the volume control is applied through C501 and C502 to the base of Q501. Transistors Q501 and Q502 form a differential input stage. Feedback from the speaker output is applied via R508 to the base of Q502. This feedback signal is also applied to the junction of input capacitors C501 and C502. This configuration allows these two capacitors to function as a two-pole high-pass active filter, with a cutoff frequency of approximately 300 Hz. This filter helps in attenuating "Private-Line" tones and other low-frequency noise below the desired audio passband.

The output of Q503 is direct-coupled to stage Q503. The collector load resistor of Q503 is split, and the speaker output signal is coupled to the junction of the two resistors R509 and R510 via C509. This "bootstrapping" allows increased base drive to Q504 during upward peaks in the audio waveform. This is necessary to allow the output stages to swing as close as possible to the power supply voltage.

STORNOPHONE 5500 THEORY OF OPERATION

The output of Q503 is direct-coupled to the output stages. Each output stage consists of a pair of transistors (Q504/Q506 and Q505/Q507) which are configured as "unity voltage gain collector followers), in which the collector signal of the second transistor is fed back to the emitter of the first transistor. The audio signal from Q503 appears equally at the bases of Q504 and Q505. Diodes CR501 and CR5023 provide thermal tracking of the base-emitter junctions of Q504 and Q505 to maintain constant idle current in Q504 and Q505, regardless of ambient temperature. Resistors R517 and R518 also help maintain constant idle current by eliminating any tendency toward thermal run-away. The output devices are biased just below cutoff, and draw low idle current with no audio input signal. As the audio signal across R512 and R513 increases sufficiently, Q506 and Q507 begin to conduct, supplying the high-current audio signal to the 2 Ohm speaker load coupling capacitor C514.

Transistor Q508 is a switch which electronically turns the audio power amplifier on and off by switching the base bias voltage to Q501 and Q504/Q505. This is used as an audio mute control which mutes the speaker when squelched or in the transmit mode. This is also used to turn the audio PA off when the radio is turned off, since the audio PA circuit does not draw any current when muted in this manner.

Capacitors C505, C506, and C510 through C513 protect against rectification of radio signals produced by the radio's own transmitter or other external sources which may otherwise cause noise in the speaker.

TRANSMITTER AUDIO

Microphone audio from the control head (via J4 pin 10) is applied to mute gate Q601-E. R601 and R602 provide filtered DC to operate the amplifier stages in the microphone.

A "high" at U705 pin 12 saturates U704G (transistor), which biases gate Q601 into saturation, allowing audio to pass. Flat or pre-emphasized audio is selected by JU601 or JU602 respectively. The two R-C networks both provide the same impedance at 1 kHz, therefore the microphone gain at 1 kHz is the same. However, the reactance of C605 varies through the audio range, causing 6 dB/octave pre-emphasis, whereas the reactance of C604 is constant and very low through the same range, causing a flat response.

Operational amplifier U601A provides limiting against the supply and ground rails. Diode CR601 in the supply lead ensures that limiting occurs symmetrically about the 4.8 V reference. The output of U601A, when limiting, is a 7.2 V p-p square wave.

The output of U601A is attenuated 6 dB by a resistive divider, consisting of R611 (upper resistor in divider) and the parallel combination of R612, R613 and R610 (lower resistor). This attenuation prevents the splatter filter U601B from limiting on overshoot peaks.

U601B is a 3-pole active low-pass filter with a -1 dB frequency of approximately 3200 Hz and approximately 1 dB ripple. Additional attenuation is provided by L601 and C608, which form a series L-C trap at 8650 Hz, further reducing adjacent channel splatter components produced by the limiter. The output of U601B is applied to the VCO and reference oscillator circuits on the RF board via P3 pin 1.

Select 5 tones from the Select 5 encoding circuits are applied (via R835, R603 and C603) to the summing input of stage U601A, where they are processed in the same manner as microphone signals. Mute gate Q601 is always cut off during Select 5 tone transmission to prevent voice from interfering with the signalling tones.

In some applications it is necessary to attenuate the Select 5 tone path to allow continuous low-level transmission of an emergency tone while the microphone is simultaneously enabled. The attenuation is accomplished by Q719; when saturated, a resistor divider is formed by R835 which provides approximately 12 dB attenuation.

STORNOPHONE 5500 THEORY OF OPERATION

"Private-Line" (PL) tones are transmitted continuously and therefore are applied after the limiter stage U601A, so that the PL tones are not removed if the limiter is captured by loud voice signals. The tones, generated by the microprocessor and filtered by stage U601C, are applied via resistive divider made of R610 (upper resistor in the divider) and the parallel combination of R611, R612 and R613 (lower resistor). These values are chosen so that PL tone deviation is approximately 10% of full system deviation.

LOW-LEVEL RECEIVER AUDIO STAGES

Detector audio from the RF board is obtained at P3 pin 10 and applied to stage U551A. A resistor on the RF board (R62) adjusts the level of the audio for 12.5 kHz or 20/25 kHz channel spacing systems, so that the level applied to U551A is approximately 18 mV RMS for 60% of full system deviation.

The gain of U551A is adjusted so that limiting occurs (against the supply and ground rails) for audio levels, corresponding to approximately 15% of full system deviation. Diode CR551 in the supply lead of Q551 ensures that limiting is symmetrical about the 4.8 V reference. The limiting action greatly reduces the level of impulse noises, noise due to fading, and squelch tail noise bursts, while having no effect on modulated signals.

The output level of U551A is attenuated by divider R565/R566 before being applied to accessory connector J5 pin 7. Audio at this point is also applied to stage U551B, which is a 3-pole high-pass active filter with a -1 dB point of approximately 300 Hz. This filter removes "PL" tones and noise below 300 Hz.

The output of stage U551B is applied to stage U551C. This stage determines the "flat" or "de-emphasized" receive audio characteristic as selected by jumpers JU551 or JU552 respectively. For flat response, R558 determines the attenuation of this stage, which is the same as the attenuation at 1 kHz due to the reactance of C557 when de-emphasis is selected. However, the reactance of C557 varies through the 300-3000 Hz audio band, providing a 6 dB/octave de-emphasis response.

The output of U551C is applied to mute gate Q551. This gate provides muting of the receiver audio by the microprocessor, based on signals received from the carrier squelch circuits (via Q720), hang-up line status, selective signalling decoders, etc. When U705 pin 11 is "high", U704E is saturated, which biases Q551 into saturation, allowing audio to pass to stage U551D. This stage is a buffer with 10 dB gain which delivers the audio from a low-impedance source to the top of the volume control in the control head.

Audio from U551A is routed to low-pass filter U801A, and then via JU802 to the limiter and tone detection circuits of the microprocessor. This audio is used for decoding low-frequency signalling tones, such as "PL".

Similarly, the audio from U551B, from which low-frequency noise has been filtered, is routed via JU801 to the same limiter and tone detection circuits; this path is used to decode audible signalling tones such as Select 5.

Tones, generated by the Select 5 encoder circuits, are routed via JU805 to the summing input of stage U551D and are then applied to the volume control. They function as sidetones to verify transmission of the Select 5 tones. Sidetones are defeated when JU805 is removed.

Alert tones, generated as a square wave by the microprocessor, are filtered by C812 and applied (via C813, JU803 and R833) to the summing input of stage U551D. Tones, applied in this manner, are controlled by the setting of the volume control. Optionally, with JU803 out and JU804 in, the alert tones are applied to R507 in the audio power amplifier, where they are reproduced at a constant level, regardless of the volume control setting.

STORNOPHONE 5500 THEORY OF OPERATION

WATCHDOG TIMER

The watchdog timer is a circuit that monitors the microprocessor activity. If it sees that the microprocessor is not functioning properly, it will force a reset condition. When the processor is working properly, it will cause U701-10 to change state periodically. These transistors will cause Q901 (SCR) to trigger and discharge C902. If the processor stops toggling U701-10, then C902 will charge and the voltage on U601D-14 will fall enough to cause U601D-12 to go high. This will turn Q902 on and force the processor to enter standby/reset.

When U601D-12 goes high, it causes the voltage in U601D-13 to increase via R907. It also causes C902 to discharge and raise the voltage at U601D-14. When C902 discharges sufficiently, then the voltage at U601D-14 will be high enough to cause U601D-12 to go low again. This will turn Q902 off and allow the processor to come out of standby/reset.

This process will be repeated as long as the processor fails to toggle U701-10.

EMERGENCY

Select 5 radios with an emergency option will have JU710 removed and a normally closed switch installed between J5-9 and ground. The emergency switch will cause transmission of the emergency tones, even when the radio is turned off (at the control head switch). When the emergency switch is pressed, Q704 will turn on and cause the processor (U701) to be interrupted by a low at U701-17. To prevent noise from causing an emergency condition, the processor will read the emergency switch status at U701-17 for a period of time to ensure that it is still pressed. If so, the processor will begin transmitting the emergency data or tone sequence.

	JU710
Emergency Enabled	out
Emergency Disabled	in

Jumper Table

EXTERNAL ALARM

Select 5 radios with the external alarm option enabled will turn on the vehicle's horn or lights when it receives the proper data or tone sequence. This is done by causing U703-14 to go low which turns on transistors Q713 and Q714. An external relay, connected to J5-8, is then enabled which will activate the external indication.

SIDETONES AND ALERT TONES

When JU805 is installed, the mobile operator will hear the Select 5 tones as they are being generated. If JU805 is removed, then the sidetones will be deleted.

Alert tones will be generated at U701-15 when certain conditions exist. An example is when PTT is pressed while the radio is not in the monitor mode. These tones are filtered by R831 and C812. If JU803 is installed, then the amplitude of the tones will depend on the setting of the volume control. If JU804 is installed, the amplitude will be fixed by R834 regardless of the volume control setting.

STORNOPHONE 5500 THEORY OF OPERATION

	JU803	JU804	JU805
Volume Control Dependent Alert Tones	in	out	-
Fixed Level Alert Tones	out	in	-
Select 5 Sidetone Enable	-	-	in
Select 5 Sidetone Disable	-	-	out

Jumper Table

STATIC PROTECTION

VR651, VR652, VR653, VR654, VR655, VR656, and VR657 are Zener diodes which protect the radio circuitry from static electricity that may enter on the radio connectors.

TEST PADS

Not used.

EPROM ADDRESSING AND PROTECTION

The socket for U702 has 28 pins. This allows flexibility for various memory devices to be used. Jumpers are used to configure the radio for the type of memory that is used.

JU703 is used to select the 5 V supply to be connected either to A13 (U701-36) or to U702-26. This allows the use of memories larger than 8 kilobytes for SP requirements. For the standard Select 5 configuration (a 8k x 8 EPROM is used), the following jumper table applies:

JU704	JU705	JU703	JU708	JU709	JU711	JU712	JU713	JU714	JU715
out	in	out	in	out	out	out	in	out	out

LOW-TIER CONTROL BOARD

DC DISTRIBUTION

The CQM5500 control board has two regulated voltage sources that provide 5.0 and 9.6 V. The 5 V source supplies power primarily to the microprocessor, the serial latch (U705) and the memory device(s) (U702 and U703). The 5 V supply is always on, even when the radio is turned off, provided that the radio is properly installed (battery voltage is always present on B+). Since CMOS devices are used, the current drain from the 5 V source is negligible when the radio is turned off. The memory chip(s) is NMOS but power is completely turned off to them via Q705 except when they are being accessed during normal radio operation. The 5 V source is also used to power various transistors used for interfacing and buffering purposes.

The 9.6 V source is turned on and off by the microprocessor. It primarily supplies power to the filters, limiters, amplifiers, and RF board via P3-7.

STORNOPHONE 5500 THEORY OF OPERATION

The microprocessor turns this supply off by causing U705-5 (the latch) to go low. This removes power operational amplifier U401 which disables the 9.6 V regulator circuit and transmit power control circuitry.

A 4.8 V source is derived from the 9.6 V source using a resistive divider (R408 and R409) and filter capacitor (C405). This is used to bias various operational amplifiers.

The audio PA output stage is powered by B + . The microprocessor turns off the audio by causing U705-4 to go low which turns off U704F (transistor) and Q508. The biasing of the output transistors is removed and no current is drawn by them.

POWER UP (Initial battery connection)

When the battery is initially connected to the radio, C710 begins charging. While it is charging, the outputs of the serial latch (U705) are tri-state. This guarantees that U705-5 will be pulled high by R772 and Q708 will be turned on. This turns off Q709 to allow the microprocessor to come out of reset (U701-6, 7 will go high). The watchdog timer's output Q902 is also off during this time in order to allow U701-6, 7 to go high.

C902 in the watchdog circuit is discharged (0 volts across it) which places 9.6 V on U601-14. Since U601-13 is about 2.5 V, U601-12 will go low (1.4 V). The divider, formed by R904 and R908, is such that the transistor will be turned off.

U701-7 immediately goes high and the microprocessor comes out of standby. CR703 forces U701-6 (reset) to rise slowly as C707 begins to charge and the oscillator Y701 begins operation. While the voltage at C701-6 is less than about 4 V, all I/O lines of the microprocessor are high impedance. The voltages on U701-8, 9, 10 are all 5 V to cause the microprocessor to enter the proper mode of operation when it comes out of reset. U701-8 is high because Q722 is on which turns off Q801, allowing R830 to pull the voltage high. U701-9 is high because Q701 is off and R745 pulls it high. U701-10 is high due to R707.

Once C707 has charged, the microprocessor comes out of reset and begins executing its operating program. The microprocessor turns off Q722 to enable information to be read on U701-8. It will toggle the clock and data lines via U701-35 and U701-26. The serial data activity will tickle the watchdog timer in order to prevent it from resetting the microprocessor. The clock and data lines are used to write data to the latch (U705) and to read data from the EEPROM(s) (U702 and U703).

After data is written to the latch, a positive-going pulse is generated on U701-33 to enable new data to be written to the latch output. U705-5 will be high in order to enable the 9.6 V supply.

When data is read from the EEPROM, information is sent to the EEPROM via the clock and data lines mentioned above, but data from the EEPROM is read by the microprocessor at U701-9. While writing data, U701-36 is low which turns off Q701 and allows the EEPROM to control the data line.

PL radio: If the memory is faulty or has improper data, then the microprocessor will continuously re-try reading from it.

Some EEPROMs require that JU705 be cut. These EEPROMs use R713 and C705 as part of an RF oscillator. If this type of EEPROM is used then U703-7 should be a sawtooth waveform with a period of about 12 microseconds any time U701-34 is low. U701-34 is used to turn on power to the EEPROM(s) and is low (enabled) when the EEPROM is being accessed.

If an EEPROM is being installed for U702, it will use R712 and C704 for its oscillator. U702-7 should have a similar sawtooth waveform under the same conditions as above. SP applications may require JU706 to be installed in order to use the larger EEPROMs..

STORNOPHONE 5500 THEORY OF OPERATION

	JU705	JU706
128 x 8 EEPROMs	out	out
256 x 8 EEPROMs	in	in
512 x 8 EEPROMs	in	-

Jumper Table

After the EEPROM memory is read, the control head LEDs will be initialized. If it is a high-tier control head, the LCD display will become active.

The synthesizer will be initialized to the proper channel by sending the information on the clock and data lines. Once the data is sent U701-32 generates a pulse to latch the data.

POWER DOWN

The radio will operate as long as the switch on the control head is on. When it is turned off, U701-16 will go high and the microprocessor will cause the latch (U705-5) to go low, which turns off the 9.6 V supply and allows standby/reset to occur (U701-7, 6 are low).

Q707 will be off when the emergency switch is off. Q708 will be off when the microprocessor turns off the 9.6 V supply. When both transistors (Q707 and Q708) are off, then Q709 will turn on and put the microprocessor into standby/reset. If any one of Q707 or Q708 is on, the microprocessor will not be in standby/reset.

The microprocessor still has power applied to it and it maintains the current status of the radio (channel number, muting mode selected and other operator-selected information). When the radio is turned on by the control head switch then the radio status is restored to what it was before the switch was turned off.

NOTES

When a low-tier control head is used, the channel may be changed even with the switch off but no LED's are on to indicate the change.

If the channel switch is pressed while transmitting (PTT, call, ...) the LED will change but the microprocessor does not set the new channel immediately; this will be done automatically after transmission is completed.

PL RADIO CONTINUOUS MEMORY EXCEPTION

The CS/PL radio will turn off the external audio PA and clear the speaker override function of the handset any time the radio is turned on.

CONTROL HEAD INTERFACE

Two types of control heads may be used. The low-tier control head uses LEDs as the primary way of indicating the radio status. The high-tier control status uses an LCD. Both control heads have momentary switches used for changing the channel and other functions.

Some functions operate the same way, regardless of which type of control head is used. The PTT switch on the microphone controls Q715 via J4-2 and is read at U701-15. The Hang-Up Box (HUB) switch controls Q713 via J4-7 and is read at U701-17. Receive audio is routed to the control head volume control at J4-3.

STORNOPHONE 5500 THEORY OF OPERATION

The volume-dependent audio is returned to the command board at J4-11 and sent to the audio PA. The speaker connections at J4-5 and J4-12 serve the purpose of connecting a speaker to the control head when a remote-mount radio installation is used.

LOW-TIER CONTROL HEAD

When a low-tier control head (parallel control head) is used, the control board will directly control the TX/Busy LED (yellow) via Q703. The channel annunciator LEDs are controlled by the control head logic. The monitor/squelch/reset button and the call button are read directly by the control board. The monitor/squelch/reset button controls the state of Q712 which is read at U701-20.

The call switch (Select 5 models only) is read in a more complex way. A single control line is used to either read the call switch or to control the call LED. To turn on the call LED, Q703 is turned on which brings its output low. To read the switch, Q703 is turned off. This allows the call switch to control Q704 and the microprocessor reads the switch status at U701-22. Thus, if the microprocessor has the call LED on, it must briefly turn it off to read the call switch. Logic on the control head is used to indicate if channel 1 or 2 is selected. The channel information is sent to U701-13 via Q710.

HIGH-TIER CONTROL HEAD

The control board communicates to the high-tier control head (serial control board) over a 2-wire asynchronous data link (Q710, J4-8 and Q711, J4-15). Please note that this serial link is different from the synchronous serial bus, used to control the serial latch, EEPROMs and synthesizer. The control head has a microprocessor in it that processes button presses, LED display, and LCD display. The command board microprocessor resets the control head microprocessor via Q702 at power-up or if communication between the two processors fails. Using a serial data protocol, information is exchanged between the processors to update the display or change the current status of the radio. Asynchronous 7-bit data with odd parity is sent at 1200 baud in a half-duplex manner (the control head processor is simplex and the control board processor is duplex). J4-1 is a spare line and is not used.

PROGRAMMING MODE

When the radio needs to be customized for a particular customer's channel and other radio information, a computer is connected to the radio and the data is programmed into the EEPROMs. The computer may be interfaced directly to J4, or it may be connected to the radio through the microphone connector. In either case, the special programming mode is entered by raising the voltage on the HUB line (J4-7) to at least 5 V. This will cause Q714 to turn off and generate a non-maskable interrupt to the microprocessor. The microprocessor will stay in the programming mode as long as U701-4 (NMI) is low. Since the microprocessor cannot read the state of U701-8 directly, it reads it at U701-15 via R774.

When the processor sees a high at U701-14 it will exit the programming mode and begin normal operation. This allows recovery in case noise caused the programming mode to appear active momentarily.

PROGRAMMING MODE, LOW-TIER CONTROL HEAD

If a low-tier control head is connected during the programming mode, the data from the computer is sent on the PTT pin of the microphone connector to J4-2 where it controls Q715 which is the microprocessor's serial data input.

STORNOPHONE 5500 THEORY OF OPERATION

Data from the microprocessor is sent to the computer at U701-12 (its serial data output) to Q711. JU704 must be installed for the data to go to the microphone audio pin of the microphone connector.

Control Head	JU701	JU702	JU703	JU704
Low-Tier	out	in	out	in
High-Tier	in	out	in	out

Jumper Table

PROGRAMMING MODE, HIGH-TIER CONTROL HEAD

If a high-tier control head is connected during the programming mode, the situation is very different from the low-tier control head operation. The reason for this is that the normal (not programming mode) operation of the radio requires that the microprocessor serial data input and output be routed to J4-8 and J4-15 in order to communicate with the control head serially. If PTT and microphone audio were also connected to the data lines, then the radio could not function properly. In order to solve this problem, the high-tier control head processor will rapidly read the PTT line and echo the information to J4-8 to get the data from the computer to the control board. Likewise, data from the control board at J4-15 will be rapidly read and echoed to the microphone audio pin of the microphone connector. Note that this control head operation is true only when it senses that the programming mode is active.

Control Head	JU701	JU702	JU703	JU704
Low-Tier	out	in	out	in
High-Tier	in	out	in	out

Jumper Table

RF INTERFACE

The microprocessor controls what frequencies will be used for receive and transmit. It does so by sending the synthesizer the proper data. Once the data is sent, then the processor will apply a pulse on P3-2 to latch the data and begin operating at the selected frequency. The processor will wait for the synthesizer to lock on the new frequency and then check U701-19 to see if the synthesizer is actually in lock. If it has locked, then P3-5 will be low and U704A (transistor) will be off which makes U701-19 high.

When the radio needs to transmit, the processor will cause U705-6 to be high. This will cause U705-6 to be high, turning Q721 on and making P3-6 low in order to select the transmit VCO. It then brings U701-37 low which enables the transmit power control.

When the RF board detects carrier, it will cause P3-9 to go low, which turns Q720 off. This is read as high by the processor at U701-18. Demodulated audio from the RF board is present at P3-10. It is then routed to the control board filters.

STORNOPHONE 5500 THEORY OF OPERATION

AUDIO POWER AMPLIFIER

The audio signal from the wiper of the volume control is applied through C501 and C502 to the base of Q501. Transistors Q501 and Q502 form a differential input stage. Feedback from the speaker output is applied via R508 to the base of Q502. This feedback signal is also applied to the junction of input capacitors C501 and C502. This configuration allows these two capacitors to function as a two-pole high-pass active filter, with a cutoff frequency of approximately 300 Hz. This filter helps in attenuating "Private-Line" tones and other low-frequency noise below the desired audio passband.

The output of Q501 is direct-coupled to stage Q503. The collector load resistor of Q503 is split, and the speaker output signal is coupled to the junction of the two resistors R509 and R510 via C509. This "bootstrapping" allows increased base drive to Q504 during upward peaks in the audio waveform. This is necessary to allow the output stage to swing as close as possible to the power supply voltage.

The output of Q503 is direct-coupled to the output stages. Each output stage consists of a pair of transistors (Q504/Q506 and Q505/Q507) which are configured as "unity voltage gain collector followers", in which the collector signal of the second transistor is fed back to the emitter of the first transistor. The audio signal from Q503 appears equally at the bases of Q504 and Q505. Diodes CR501 and CR5023 provide thermal tracking of the base-emitter junctions of Q504 and Q505 to maintain constant idle current by eliminating any tendency toward thermal run-away. The output devices are biased just below cutoff, and draw low idle current with no audio input signal. As the audio signal across R512 and R513 increases sufficiently, Q506 and Q507 begin to conduct, supplying the high-current audio signal to the 2 Ohm speaker load coupling capacitor C514.

Transistor Q508 is a switch which electronically turns the audio power amplifier on and off by switching the base bias voltage to Q501 and Q504/Q505. This is used as an audio mute control which mutes the speaker when squelched or in the transmit mode. This is also used to turn the radio PA off when the radio is turned off, since the audio PA circuit does not draw any current when muted in this manner.

Capacitors C505, C506, and C510 through C513 protect against rectification of radio signals produced by the radio's own transmitter or other external sources which may otherwise cause noise in the speaker.

TRANSMITTER AUDIO

Microphone audio from the control head (via J4 pin 10) is applied to mute gate Q601-E. R601 and R602 provide filtered DC to operate the amplifier stages in the microphone.

A "high" at U705 pin 12 saturates U704G (transistor), which biases gate Q601 into saturation, allowing audio to pass. Flat or pre-emphasized audio is selected by JU601 or JU602 respectively. The two R-C networks both provide the same impedance at 1 kHz, therefore the microphone gain at 1 kHz is the same. However, the reactance of C605 varies through the audio range, causing 6 dB/octave pre-emphasis, whereas the reactance of C604 is constant and very low through the same range, causing a flat response.

Operational amplifier U601A provides limiting against the supply and ground rails. Diode CR601 in the supply lead ensures that limiting occurs symmetrically about the 4.8 V reference. The output of U601A, when limiting, is a 7.2 V p-p square wave.

The output of U601A is attenuated 6 dB by a resistive divider, consisting of R611 (upper resistor in divider) and the parallel combination of R612, R613 and R610 (lower resistor). This attenuation prevents the splatter filter U601B from limiting on overshoot peaks.

STORNOPHONE 5500 THEORY OF OPERATION

U601B is a 3-pole active low-pass filter with a -1 dB frequency of approximately 3200 Hz and approximately 1 dB ripple. Additional attenuation is provided by L601 and C608, which form a series L-C trap at 8650 Hz, further reducing adjacent channel splatter components produced by the limiter. The output of U601B is applied to the VCO and reference oscillator circuits on the RF board via P3 pin 1.

Select 5 tones from the Select 5 encoding circuits are applied (via R835, R603 and C603) to the summing input of stage U601A, where they are processed in the same manner as microphone signals. Mute gate Q601 is always cut off during Select 5 tone transmission to prevent voice from interfering with the signalling tones.

In some applications it is necessary to attenuate the Select 5 tone path to allow continuous low-level transmission of an emergency tone while the microphone is simultaneously enabled. The attenuation is accomplished by Q719; when saturated, a resistor divider is formed by R835 which provides approximately 12 dB attenuation.

"Private-Line" (PL) tones are transmitted continuously and therefore are applied after the limiter stage U601A, so that the PL tones are not removed if the limiter is captured by loud voice signals. The tones, generated by the microprocessor and filtered by stage U601C, are applied via resistive divider made of R610 (upper resistor in the divider) and the parallel combination of R611, R612 and R613 (lower resistor). These values are chosen so that PL tone deviation is approximately 10% of full system deviation.

LOW-LEVEL RECEIVER AUDIO STAGES

Detector audio from the RF board is obtained at P3 pin 10 and applied to stage U551A. A resistor on the RF board (R62) adjusts the level of the audio for 12.5 kHz or 20/25 kHz channel spacing systems, so that the level applied to U551A is approximately 18 mV RMS for 60% of full system deviation. The gain of U551A is adjusted so that limiting occurs (against the supply and ground rails) for audio levels, corresponding to approximately 15% of full system deviation. Diode CR551 in the supply lead of Q551 ensures that limiting is symmetrical about the 4.8 V reference. The limiting action greatly reduces the level of impulse noises, noise due to fading, and squelch tail noise bursts, while having no effect on modulated signals.

The output level of U551A is attenuated by divider R565/R566 before being applied to accessory connector J5 pin 7. Audio at this point is also applied to stage U551B, which is a 3-pole high-pass active filter with a -1 dB point of approximately 300 Hz. This filter removes "PL" tones and noise below 300 Hz.

The output of stage U551B is applied to stage U551C. This stage determines the "flat" or "de-emphasized" receive audio characteristic as selected by jumpers JU551 or JU552 respectively. For flat response, R558 determines the attenuation of this stage, which is the same as the attenuation at 1 kHz due to the reactance of C557 when de-emphasis is selected. However, the reactance of C557 varies through the 300-3000 Hz audio band, providing a 6 dB/octave de-emphasis response.

The output of U551C is applied to mute gate Q551. This gate provides muting of the receiver audio by the microprocessor, based on signals received from the carrier squelch circuits (via Q720), hang-up line status, selective signalling decoders, etc. When U705 pin 11 is "high", U704E is saturated, which biases Q551 into saturation, allowing audio to pass to stage U551D. This stage is a buffer with 10 dB gain which delivers the audio from a low-impedance source to the top of the volume control in the control head.

Audio from U551A is routed to low-pass filter U801A, and then via JU802 to the limiter and tone detection circuits of the microprocessor. This audio is used for decoding low-frequency signalling tones, such as "PL".

STORNOPHONE 5500 THEORY OF OPERATION

Similarly, the audio from U551B, from which low-frequency noise has been filtered, is routed via JU801 to the same limiter and tone detection circuits; this path is used to decode audible signalling tones such as Select 5.

Tones, generated by the Select 5 encoder circuits, are routed via JU805 to the summing input of stage U551D and are then applied to the volume control. They function as sidetones to verify transmission of the Select 5 tones. Sidetones are defeated when JU805 is removed.

Alert tones, generated as a square wave by the microprocessor, are filtered by C812 and applied (via C813, JU803 and R833) to the summing input of stage U551D. Tones, applied in this manner, are controlled by the setting of the volume control. Optionally, with JU803 out and JU804 in, the alert tones are applied to R507 in the audio power amplifier, where they are reproduced at a constant level, regardless of the volume control setting.

WATCHDOG TIMER

The watchdog timer is a circuit that monitors the microprocessor activity. If it sees that the microprocessor is not functioning properly, it will force a reset condition. When the processor is working properly, it will cause U701-36 to change state periodically. These transistors will cause Q901 (SCR) to trigger and discharge C902. If the processor stops toggling U701-36, then C902 will charge and the voltage on U601D-14 will fall enough to cause U601D-12 to go high. This will turn Q902 on and force the processor to enter standby/reset.

When U601D-12 goes high, it causes the voltage in U601D-13 to increase via R907 and C902 to discharge and raise the voltage at U601D-14. When C902 discharges sufficiently, then the voltage at U601D-14 will be high enough to cause U601D-12 to go low again. This will turn Q902 off and allow the processor to come out of standby/reset. This will be repeated as long as the processor fails to toggle U701-10.

EMERGENCY

Select 5 radios with an emergency option will have JU710 removed and a normally closed switch installed between J5-9 and ground. The radio must be turned on and functioning before the emergency switch will cause transmission of the emergency tones.

When the emergency switch is pressed, Q706 will turn on and cause the processor (U701) to be interrupted by a low at U701-39. To prevent noise from causing an emergency condition, the processor will read the emergency switch status at U701-22 for a period of time to ensure that it is still pressed. In order to read the emergency switch, the processor will first cause U701-10 to go high, which causes Q703 to turn on and Q704 to turn off. When the switch has been pressed long enough, the processor will begin transmitting the emergency tone sequence.

	JU710
Emergency Enabled	out
Emergency Disabled	in

Jumper Table

EXTERNAL ALARM

Select 5 radios with the external alarm option enabled will turn on the vehicle's horn or lights when it receives the proper tone sequence. This is done by causing U705-14 to go low which turns Q716 and Q717 on. An external relay, connected to J5-8, is then enabled which will activate the external indication.

STORNOPHONE 5500 THEORY OF OPERATION

EXTERNAL PA

PL radios with the external PA option enabled will route audio to an external speaker/amplifier when PL is decoded and the PA is enabled by pressing a button on the high-tier control head. The external PA is enabled in the same way the external alarm is enabled in Select 5 radios. Audio is then routed to the external PA at J5-7 (buffered receive audio).

SIDETONES AND ALERT TONES

Select 5 radios will generate sidetones so the mobile operator can hear the Select 5 tones as they are being transmitted. If JU805 is removed, then the sidetones will be deleted.

Both PL and Select 5 radios will generate alert tones at U701-14 when certain conditions exist. An example is when PTT is pressed while the radio is not in the monitor mode. These tones are filtered by R831 and C812. If JU803 is installed, then the amplitude of the tones depends on the setting of the volume control.

If JU804 is installed, the level will be fixed by R834, regardless of the volume setting.

	JU803	JU804	JU805
Volume Control Dependent Alert Tones	in	out	-
Fixed Level Alert Tones	out	in	-
Select 5 Sidetone Enable	-	-	in
Select 5 Sidetone Disable	-	-	out

Jumper Table

Error tones are generated by the control board. Major alert (key pressing during PTT) is generated by the control head. Key feedback on the high-tier control head is generated by the control head.

STATIC PROTECTION

VR651, VR652, VR653, VR654, VR655, VR656, and VR657 are Zener diodes which protect the radio circuitry from static electricity that may enter on the radio connectors.

TEST PADS

Not used.

TRANSMITTER POWER CONTROL

When the microprocessor switches the radio from receive to transmit, the 9.6 V source is turned on via Q403. This supplies power to part of the RF power amplifier stage.

The exciter A + source is enabled when transmitting as long as the synthesizer is in lock (P3-5 is low). When the transmitter is not in lock, U704D (transistor) will turn on and inhibit the A +.

STORNOPHONE 5500 THEORY OF OPERATION

The voltage at P6-4 is used to control the RF power output. As the voltage increases, the output power increases. A significant variation of this voltage will be seen between a channel that is programmed for low power and a channel that is programmed for high power. Potentiometers R453 and R455 will control the actual voltage, measured for high and low power respectively.

U705-7 will be high when low power is selected and low when high power is selected. This controls Q453 and varies the bias at U401B.

CHAPTER
CHAPITRE
KAPITEL

4

ALIGNMENT

STORNOPHONE 5500, 136 - 174 MHz

NOTE

Key the radio while making adjustments or measurements.

GENERAL

Perform all adjustments at a supply voltage of 13.2 ± 0.1 VDC, unless the instructions call for a different voltage.

Interpret instructions to turn controls clockwise (CW) or counterclockwise (CCW) to mean "as viewed from the component side of the circuit board."

The locations of the adjustable components are shown at the back of this chapter.

When you perform any of the tune-up procedures given in the following sections, the radio must be completely assembled except for the chassis cover, the top cover of the synthesizer compartment, and the radio sleeve. When you have completed the tune-up, install the synthesizer cover, chassis cover, and sleeve before testing the radio against specifications.

The following test equipment is recommended for aligning and servicing the CQM5500 radio:

RECOMMENDED TEST EQUIPMENT:

R2001	Communication System Analyzer or
R2200	Service Monitor
GTF180	Mobile Test Set with
GTF244	Adapter Cable for CQM5500
PFT4053	Psophometric Filter
FTP3005	Select 5 Test Unit (not required with R2001)
R1011	Power Supply or
S1347	Power Supply (for radios with 10 W or less power)
R1037	Digital Multimeter or
R1024	Digital Multimeter

TRANSMITTER ADJUSTMENT

1. Preset the following pots:

HI PWR	R453	Fully CCW
LO PWR	R455	Fully CCW
VOLT LIMIT	R463	Fully CW

ALIGNMENT 136 - 174 MHz, STORNOPHONE 5500

2. Adjust the radio's DC supply voltage to 13.2 ±0.1 VDC (12.6 VDC for MAU1, 6 Watt models).
3. Select the channel with the highest transmit frequency.
4. Connect the radio antenna output to an accurate RF power meter that provides a 50 ohm load.
5. Connect a DC voltmeter from the steering line test point (SL) to ground. Meter impedance should be 11 megohms or more.
6. Key the radio and adjust coil L210 until the voltmeter reads 7.0 VDC
7. Select the channel with the lowest transmit frequency. Key the radio and verify that the DC voltage is at least 2.5 VDC
8. Select any transmit channel. (If the radio has the MAB889 slaved RF power option, select any high-power transmit channel.)
9. Key the radio and adjust R453 (HI PWR) for:

Model Number	Power Setting
MAU0	1.0 W
MAU1	6.0 W
MAU2	10.0 W
MAU3	25.0 W

10. Switch through all channels (all high-power channels for MAB889). On each channel, key the radio and note the power output. For MAU0, MAU2, and MAU3 models, note the channel that gives the minimum power output; for MAU1 models note the channel that gives the maximum power output. If more than one channel gives the same maximum or minimum power, choose any one of those channels.
11. Switch through all transmit channels (all high-power channels for MAB889). On each channel, key the radio while watching the DC voltage at Pin 4 of connector P6, or at test point CV on the command board. Record the number of the channel that gives the greatest voltage, and what that voltage is. (If more than one channel gives the same maximum voltage, choose any one of those channels.) If it is greater than 10.0 VDC go to Step 14. If not, go to Step 12.
12. On the channel that Step 11 showed to have the highest DC voltage, turn R463, fully CCW. Turn R453 fully CW.
13. Key the radio. Adjust the voltage limit pot, R463, for a DC voltage 2.0 V higher than the voltage level recorded in Step 11, as measured at pin 4 of P6 or at test point CV.
14. Set the channel selector to the channel that was noted in Step 10. Key the radio and adjust R453, for:

Model Number	Power Setting
MAU0	1.1 W
MAU1	5.6 W
MAU2	10.7 W
MAU3	26.8 W

15. Verify that all channels (all high-power channels in MAB889) produce at least 1.0, 10.0, or 25.0 W, as appropriate, for MAU0, MAU2, and MAU3 models. Verify that no channel produces more than 6.0 W for MAU1 models.

ALIGNMENT 136 - 174 MHz, STORNOPHONE 5500

16. If the radio has Option MAB889 (slaved RF power level), select any low-power channel. Key the radio and adjust R455 for an output power of 1.0 W (or other specified power setting) for MAU1 and MAU2 models. Verify that the RF power output on all low-power channels is between 0.7 and 1.4 W. Readjust R455 slightly if necessary. For MAU0 models, adjust R455, for an output power of 0.1 W or some other specified power level. Verify that the RF power output on all low-power channels is between 70 and 140 mW.

REFERENCE OSCILLATOR ADJUSTMENT

1. Connect the radio antenna output to an accurate frequency counter through a suitable attenuator.
2. Select any transmit channel.
3. Key the radio and adjust L151 (all models except those with 2 ppm stability) or R163 (models with 2 ppm stability) until the exact transmit frequency (± 100 Hz) appears on the counter.
4. Check all transmit channels to verify that the correct transmit frequencies have been programmed.

DEVIATION ADJUSTMENT

1. Connect the radio antenna output to a modulation analyzer or test receiver through a suitable attenuator.
2. Connect an audio oscillator to the microphone audio input through the circuit shown in Figure 1. Set the oscillator frequency to 1 kHz and the output level to 800 mV RMS.

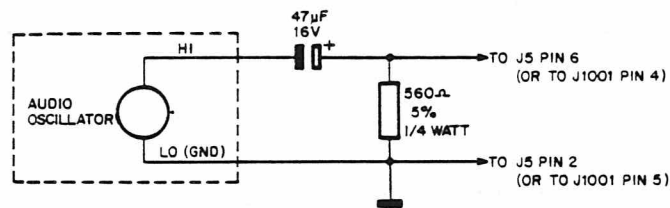


Figure 1
Connection of audio oscillator to the microphone input

ALIGNMENT 136 - 174 MHz, STORNOPHONE 5500

3. Preset pots R302 (VCO MOD) and R305 (REF MOD) fully CCW.
4. Select any transmit channel. For PL models select any channel that transmits PL.
5. Key the radio and adjust the VCO MOD pot, R302, for the appropriate deviation level:

Channel Spacing	Deviation Setting
25 kHz	± 4.6 kHz
20 kHz	± 3.7 kHz
12.5 kHz	± 2.3 kHz

NOTE

If + and - deviation readings differ, use only the higher reading.

6. For 25 kHz channel spacing models only, the procedure is complete. For others, continue with Step 7.
7. Change the audio oscillator frequency to 200 Hz, and maintain the output level at 800 mV RMS.
8. Key the radio and observe the waveform on an oscilloscope connected to the demodulated output of a test receiver. The test receiver should be non-deemphasized, and there must be DC coupling between the test receiver and the scope. (AC Coupling is suitable if the corner frequency is 2 Hz or lower.) Adjust R305 (REF MOD) for the flattest square-wave response with minimum tilt.
9. Return the audio oscillator frequency to 1 kHz, 800 mV RMS, and repeat Step 5.

RECEIVER ADJUSTMENT

NOTE

Adjust the transmitter VCO and reference oscillator (see the section: TRANSMITTER ADJUSTMENT) before aligning the receiver.

RECEIVER VCO

1. Connect a high-impedance (11 megohms or greater) DC voltmeter from the steering line test point (SL) to ground.
2. (Radios with more than one receive frequency) Select the channel with the lowest frequency.
3. Adjust Capacitor C201 until the voltmeter reads 7.0 VDC

ALIGNMENT 136 - 174 MHz, STORNOPHONE 5500

RECEIVER

1. Find the tune-up frequency, f_{tune} , as follows:

- a) On single-channel radios and multi-channel radios with a single receive frequency:

$$f_{\text{tune}} = f_{\text{receive}}$$

- b) On multi-channel radios that have a receive bandwidth of 2 MHz or less:

$$f_{\text{tune}} = \text{frequency of highest-frequency channel}$$

- c) On multi-channel radios that have a receive bandwidth greater than 2 MHz but less than or equal to 4 MHz, find f_{mid} , where:

$$f_{\text{mid}} = (f_{\text{highest}} + f_{\text{lowest}}) : 2$$

If one of the radio's channels has a frequency within 500 kHz of f_{mid} , perform the tune-up on that channel. If not, you must either get a tune-up PROM programmed to f_{mid} , or program the tune-up frequency, f_{mid} , into the radio (EZ models only). EV models contain a preprogrammed tune-up channel, accessed by temporarily shorting the TEST pins on the command board.

2. Set the channel selector switch to the channel of the tune-up frequency as determined in Step 1, above.
3. Connect a 2 ohm resistive load across Pin 4 of J5 (hot head) and Pin 5 of J5 (ground lead). Monitor the audio output across this load resistor.
4. Preset the slugs of L1 through L7 for f_{tune} flush with the circuit board.
5. Connect a DC voltmeter from the local oscillator test point (L0) to ground.
6. Peak the injection filter coils, L6, L5, and L7, in that order, for a maximum DC voltage, typically between 2.1 and 3.5 VDC. Repeat until you cannot make the DC voltage increase any farther.
7. Connect an RF signal generator to the antenna connector and adjust it to generate an unmodulated on-channel signal strong enough to quiet the receiver.
8. Connect an AC voltmeter with bandwidth of at least 500 kHz (an HP331A distortion analyzer, for example) from the IF test point to ground. Increase the RF generator output until the AC voltmeter indicates approximately 30 mV. Adjust the RF filter coils L1, L3, L4, and L5 until the voltmeter peaks. Reduce the generator's RF level as necessary to maintain approximately 30 mV RMS on the meter during this process. Repeat the adjustment until you can get no further increase in voltage.
9. Set the RF level of the generator to 1 mV. Modulate it with a 1 kHz tone at 60% of full system deviation. Full system deviation for a channel spacing of 25 kHz is ± 5 kHz; for 20 kHz ± 4 kHz; for 12.5 kHz ± 2.5 kHz. Adjust the volume control to get an audio level of about 1 Volt RMS across the 2 ohm load. Slowly peak the quad coil, L54 for maximum audio output.
10. Adjust the squelch as follows:
 - a) Preset the squelch control R59, fully CCW.
 - b) Apply an on-channel RF signal at a level of 1 mV. Modulate with a 1 kHz tone at 60% of full system deviation.

ALIGNMENT 136 - 174 MHz, STORNOPHONE 5500

- c) Adjust the volume control for 1.7 V RMS across the 2 ohm load.
- d) Reduce the RF level until the CCITT-weighted SINAD is 10 dB.
- e) Enable the carrier-squelch mode with the front panel switch.
- f) Slowly turn the squelch control CW until the audio is squelched (muted), then very slowly turn CCW until the radio just unsquelches (unmutes).
- g) Reduce the generator RF level to zero, slowly increase the level until the radio just unsquelches, and verify that the CCITT-weighted SINAD at this RF level is between 8 and 12 dB SINAD. Readjust R59 slightly if necessary.

Jumper	Description	State	Command Board	
		Signalling Type:	GLN6984	GLN6628
			CS/PL	SELECT 5
JU551 JU552	RX Audio	Flat Response De-Emphasis Response	Out In	Out In
JU601 JU602	TX Audio	Flat Response Pre-Emphasis Response	Out In	Out In
JU701 JU702 JU703 JU704	Control Head I/O	Serial Mode	In Out In Out	In Out In Out
JU705	U702 I.C. Type	*	Out	Out
JU706	U703 I.C. Type	*	Out	Out
JU707	Osc. Pull	Disable	In	Out
JU710	Emergency **	Disable	Out	Out
JU801 JU802	Decode Filter	Select 5 (GLN6628) PL (GLN6984)	Out In	In Out
JU803 JU804	Alert Tones	Variable Level Fixed Level	In Out	In Out
JU805	Sidetone	Enable	dc***	In

* If Part 5197014B03 or 5197014B06 is installed, the corresponding jumper should be installed. If Part 5197014B02 is installed, the corresponding jumper should not be installed.

** JU710 is installed when a normally-closed switch is used.

*** dc = don't care

Table 1
Jumper Table for EZ Command Board

ALIGNMENT 136 - 174 MHz, STORNOPHONE 5500

Option	Jumper	State	Command Board	
			GLN6984	GLN6628
Signalling Type:			CS/PL	SELECT 5
MAB470 MAB688 MAB873	JU710	Emergency with Extension Switch	dc*	Out
MAB459	JU805	Sidetone Disabled	dc*	Out
MAB875	JU803 JU804	Fixed-Level Alert Tones	Out In	Out In
MAB884	JU551 JU552 JU601 JU602	Flat Audio Response	In Out In Out	In Out In Out
MAB891	JU701 JU702 JU703 JU704	Control Head I/O Parallel Mode	Out In Out In	Out In Out In
MAB888	JU706	32-Channel PL Radio	In	-

* dc = don't care

Table 2
Jumper Table for EZ Options

ALIGNMENT 136 - 174 MHz, STORNOPHONE 5500

Jumper	Description	State	Command Board GLN6627 with Select 5
JU551 JU552	RX Audio	Flat Response De-Emphasis Response	Out In
JU601 JU602	TX Audio	Flat Response Pre-Emphasis Response	Out In
JU701 JU702	Serial EEPROM Power Strobe	Via U705-6 Via 701-19	Out In
JU703 JU704 JU705	Memory Type Configuration	+5 Volts to U702-26 WR an U702-23 Ground U702-20	Out Out In
JU706 JU707	Memory Mode	MP0 MP1	Out In
JU709	Emergency	Special Application	Out
JU801 JU802	Decode Filter	Select 5 Private-Line	In Out
JU803 JU804	Alert Tones	Variable Level Fixed Level	In Out
JU805	Sidetone	Enable	In
JU806	Decode Filter	Select 5	

Table 3
Jumper Table for EV Command Board

ALIGNMENT 136 - 174 MHz, STORNOPHONE 5500

Option	Jumper	State	Command Board GLN6627 with SELECT 5
MAB459	JU805	Sidetone Disabled	Out
MAB875	JU803 JU804	Fixed-Level Alert Tones	Out In
MAB884	JU551 JU552 JU601 JU602	Flat Audio Response	In Out In Out

Table 4
Jumper Table for EV Options

Board	Medium	Indication	Meaning and Remedial Action
GLN6627	LCD's on Control Head	ERR 1	ROM Error: The pattern stored in U702 is incorrect. Replace U702. EEPROM-Error: The pattern stored in U703 is incorrect. Order or program a replacement for U703. ROM and EEPROM error. Perform the remedial actions for each.
		ERR 2	
		ERR 3	
GLN6628	Sound	Rapid beeping	EEPROM-Error: Order or program a replacement.

Table 5
Error Indications

Tone	GLN6984, GLN6627	GLN6628
800 Hz/200 msec 600 Hz/200 msec	Illegal Key -	- Illegal Key
800 Hz continuous 800 Hz intermittent	Illegal PTT (Example:Radio not in Monitor Mode) Synthesizer Out of Lock	

Table 6
Error Tones

ABGLEICHANLEITUNG

STORNOPHONE 5500, 136 - 174 MHz

ACHTUNG

Den Sender nur beim Abgleichen oder zur Durchführung von Messungen tasten!

ALLGEMEINES

Wenn nicht anders angegeben sind alle Messungen bei einer Versorgungsspannung von $13,2 \text{ V} \pm 0,1 \text{ V}$ durchzuführen. Den Sender nur beim Abgleichen oder zur Durchführung von Messungen tasten. Anweisungen, einen Regler rechtsherum (im Uhrzeigersinn) oder linksherum (entgegen dem Uhrzeigersinn) zu drehen, sind bei Ansicht von der Bestückungsseite zu verstehen. Die Lage der Abgleichpunkte ist hinten im Kapitel abgebildet.

Beim Abgleich gemäß den folgenden Abschnitten muß das Gerät bis auf das Chassis und die Abschirmbleche des Chassis und des Synthesizers zusammengebaut sein. Alle Teile müssen sich allerdings wieder an vorgesehener Stelle befinden, wenn das Gerät nach dem Abgleich zur Überprüfung seiner Daten gemessen wird.

EMPFOHLENE MEßGERÄTE

R2001	Funk-System-Meßplatz, oder
R2200	Service-Monitor
GTF180	Prüfgerät für Mobilgeräte mit
GTF244	Adapterkabel für CQM5500
PFT4053	Psophometrisches Filter
FTP3005	Fünfton-Prüfgerät (bei Verwendung des R2001 nicht erforderlich)
R1011	Netzteil, oder
S1347	Netzteil für Funkgeräte mit niedriger HF-Ausgangsleistung (unter 10 W)
R1037	Digitales Multimeter, oder
R1024	Digitales Multimeter

SENDERABGLEICH

1. Voreinstellungen:
 - * R453 (HI PWR) an den linken Anschlag
 - * R455 (LO PWR) an den linken Anschlag
 - * R463 (VOLT LIMIT) an den rechten Anschlag
2. Die Stromversorgung auf $13,2 \text{ V} \pm 0,1 \text{ V}$ einstellen (bzw. auf $12,6 \text{ V}$ bei 6 W Modellen der Modellreihe MAU1).

ABGLEICHANLEITUNG 136 - 174 MHz, STORNOPHONE 5500

- Den Kanal mit der höchsten Sendefrequenz einstellen.
- Am Sender ein genaues HF-Wattmeter (mit 50 Ohm Anschluß) anschließen.
- Ein Gleichspannungsvoltmeter mit mindestens 11 MegOhm Eingangsimpedanz zwischen dem Prüfpunkt der Steuerleitung (SL) und Masse anschließen.
- Den Sender tasten und Spule L210 abgleichen bis am Voltmeter eine Anzeige von 7,0 V erfolgt.
- Den Kanal mit der niedrigsten Sendefrequenz wählen, den Sender tasten und sicherstellen, daß die Prüfspannung mindestens 2,5 V beträgt.
- Irgendeinen Sendekanal einstellen (bei der Option MAB899 "Kanalabhängige HF-Ausgangsleistung" ist ein Kanal mit hoher HF-Leistung einzustellen).
- Den Sender tasten und die HF-Ausgangsleistung mit dem Potentiometer R453 (HI PWR) auf folgende Werte einstellen:

Modell	HF-Leistung
MAU0	1,0 W
MAU1	6,0 W
MAU2	10,0 W
MAU3	25,0 W

- Die Sendeleistung aller Kanäle (alle Kanäle mit hoher HF-Leistung bei MAB889) überprüfen und notieren. Bei den Modellen MAU0, MAU2 und MAU3 den Kanal mit der niedrigsten HF-Ausgangsleistung ermitteln. Werden mehrere Kanäle mit gleicher Maximal- bzw. Minimal-Leistung gefunden, ist auf einen dieser Kanäle zu schalten.
- Auf allen Sendekanälen (bei der Option MAB889 auf allen Sendekanälen mit hoher HF-Leistung) beim Tasten des Senders die Prüfspannung am Anschluß 4 des Steckverbinders P6 (oder am Prüfpunkt CV der Logikplatine) ermitteln. Die Kanalnummer des ermittelten Kanals samt dazugehöriger Prüfspannung notieren. Werden mehrere Kanäle mit gleicher Maximalanzeige gefunden, so ist auf einen dieser Kanäle zu schalten. Wenn diese Spannung mehr als 10 V beträgt ist mit Schritt 14 fortzufahren, sonst fahre man mit Schritt 12 fort.
- Den bei Schritt 11 ermittelten Kanal mit der Höchsten Prüfspannung einschalten und das Spannungsbegrenzungspotentiometer R463 (VOLT LIMIT) an den linken Anschlag sowie das Potentiometer R453 (HI PWR) an den rechten Anschlag drehen.
- Den Sender tasten und mit dem Spannungsbegrenzungspotentiometer R463 (VOLT LIMIT) die in Schritt 11 ermittelte Prüfspannung (an P6-4 bzw. Prüfpunkt CV gemessen) um 2,0 V erhöhen.
- Den bei Schritt 10 ermittelten Kanal einstellen, den Sender tasten und mit dem Potentiometer R453 (HI PWR) die folgenden Werte der HF-Ausgangsleistung einstellen:

Modell	HF-Leistung
MAU0	1,1 W
MAU1	5,6 W
MAU2	10,7 W
MAU3	26,8 W

- Sicherstellen, daß alle Kanäle (alle Kanäle hoher Leistung bei der Option MAB889) die geforderte HF-Leistung von 1 W (MAU0), 10 W (MAU2) bzw. 25 W (MAU3) aufweisen. Beim Modell MAU1 darf die HF-Ausgangsleistung der einzelnen Kanäle einen Wert von 6,0 W nicht überschreiten.

- Bei Geräten mit der Option MAB889 (Kanalabhängiger HF-Ausgangsleistung) ist ein Kanal mit niedriger Ausgangsleistung einzustellen. Dann den Sender tasten und bei MAU1- und MAU2-Modellen mit dem Potentiometer R455 (LO PWR) eine Ausgangsleistung von 1 W (Bzw. die geforderte HF-Ausgangsleistung) einstellen. Sicherstellen, daß die Ausgangsleistung 0,7 bzw. 1,4 W beträgt, ggf. R455 geringfügig nachjustieren. Bei MAU0-Modellen ist an diesem Regler eine Leistung von 100 mW (oder die geforderte HF-Ausgangsleistung) einzustellen, die zwischen 70 und 140 mW variieren darf.

ABGLEICH DES REFERENZOSZILLATORS

- Die Antennenbuchse über einen geeigneten Abschwächer mit einem genauen Frequenzzähler verbinden.
- Einen beliebigen Sendekanal einstellen.
- Den Sender tasten und L151 (oder, bei 2 ppm-Geräten, R163) auf genauer Sendefrequenz ± 100 Hz abgleichen.
- Die Trägerfrequenzen aller Sendekanäle überprüfen und sicherstellen, daß sie dem Programm entsprechen.

HUBEINSTELLUNG

- Die Antennenbuchse über einen geeigneten Abschwächer mit einem genauen Hubmeter verbinden.
- An die Mikrofonbuchse wird ein NF-Generator angeschlossen, wie in Abbildung 1 gezeigt. Der Generator soll eine Tonfrequenz von 1000 Hz bei einer Amplitude von 800 mV eff. abgeben.

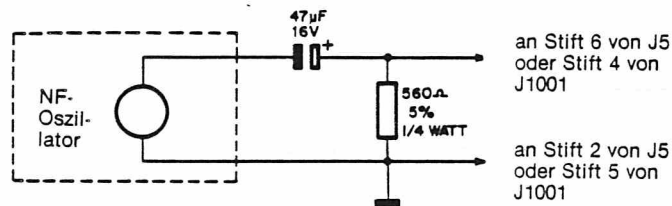


Abbildung 1
Einspeisung eines NF-Signals in die Mikrofonbuchse

- Die Modulationssteller R302 (VCO MOD) und R305 (REF MOD) an den linken Anschlag drehen.
- Einen beliebigen Sendekanal einstellen. Bei "Private-Line"-Geräten ist ein Kanal mit "PL"-Modulation zu wählen.

ABGLEICHANLEITUNG 136 - 174 MHz, STORNOPHONE 5500

5. Den Sender tasten und mit dem Poti R302 (VCO MOD) den Hub wie folgt einstellen:

$\pm 4,6$ kHz bei 25 kHz Kanalabstand
 $\pm 3,7$ kHz bei 20 kHz Kanalabstand
 $\pm 2,3$ kHz bei 12,5 kHz Kanalabstand

HINWEIS

Bei asymmetrischem Hub ist nur die höhere Anzeige zu bewerten.

6. Bei Geräten für 25 kHz Kanalabstand ist die Volleinstellung jetzt beendet. Für die Geräte mit 20 und 12,5 kHz Kanalabstand ist mit Schritt 7 fortzufahren.
7. Den NF-Generator auf 200 Hz justieren. Der Ausgangspegel bleibt auf 800 mV eff. eingestellt.
8. Der Oszillograph muß an den Demodulator-Ausgang des Hubmessers angeschlossen sein. Dieser Ausgang darf keine De-Emphasis aufweisen und muß gleichstromgekoppelt sein (Wechselspannungskopplung ist erlaubt, wenn die Eckfrequenz maximal 2 Hz beträgt). Den Sender tasten und das demodulierte Signal am Oszillographen beobachten. Mit Hilfe des Reglers R305 (REF MOD) ein möglichst flaches Rechtecksignal mit minimaler Neigung einstellen.
9. Am NF-Generator wieder eine Tonfrequenz von 1 kHz bei einer Amplitude von 800 mV eff. einstellen und Schritt 5 wiederholen.

EMPFÄNGERABGLEICH

HINWEIS

Der Empfänger darf erst nach dem Abgleich des VCO und des Referenzoszillators (siehe SENDERABGLEICH) abgeglichen werden.

EMPFÄNGER-VCO

1. Ein Gleichspannungsvoltmeter mit mindestens 11 MegOhm Impedanz an Prüfpunkt SL anschließen.
2. Bei Mehrkanalgeräten den Kanal mit der niedrigsten Empfangsfrequenz einstellen.
3. Die VCO-Spule des Empfängers (L201) abgleichen, bis eine Spannung von 7,0 V abgelesen wird.

EMPFÄNGER

1. Die Abgleichfrequenz wie folgt ermitteln:
 - a) Bei Einkanalgeräten und Vielkanalgeräten mit einer Empfangsfrequenz ist dies die Betriebsfrequenz des Empfängers
 - b) Bei Mehrkanalgeräten mit einer Schaltbandbreite von weniger als 2 MHz ist dies die höchste Empfangsfrequenz.

ABGLEICHANLEITUNG 136 - 174 MHz, STORNOPHONE 5500

- c) Bei Mehrkanalgeräten mit einer Schaltbandbreite zwischen 2 und 4 MHz wird die Mittenfrequenz F_m gefunden, indem die höchste (F_h) und tiefste (F_t) Betriebsfrequenzen addiert und dann durch zwei geteilt werden:

$$F_m = (F_h + F_t) : 2$$

Auf dieser Mittenfrequenz ± 500 kHz wird abgeglichen, wenn ein Betriebskanal in diese Toleranz fällt; sonst muß eine Abgleichfrequenz $= F_m$ programmiert werden (gilt nur für EZ-Typen).

2. Den Kanal mit der Abgleichfrequenz (wie in Schritt 1 ermittelt) einstellen. Bei geräten der Typenreihe EV ist werkseitig ein Abgleichkanal vorprogrammiert. Um diesen Kanal einzuschalten, müssen die beiden mit TEST bezeichneten Stifte auf der Logikplatine durchverbunden werden.
3. Zwischen den Stiften 4 und 5 (Masse) von J5 einen NF-Lastwiderstand von 2 Ohm anschließen. Die NF über diesen Widerstand wird als Prüfspannung herangezogen.
4. Die Spulenkern der sieben Eingangsspulen (L1 bis L7) bis zur Oberkante der Platine eindrehen.
5. Ein Gleichspannungsvoltmeter zwischen dem Oszillatorprüfpunkt L0 und Masse anschließen.
6. Die Spulen L6, L5 und L7 in dieser Reihenfolge auf maximale Prüfspannung (typ. 2,1...3,5 V) abgleichen und wiederholen, bis keine weitere Zunahme der Anzeige erzielt wird.
7. An der Antennenbuchse des Gerätes einen Meßsender anschließen, so daß das Empfängerrauschen vom unmodulierten Meßsendersignal vollständig unterdrückt wird.
8. Zwischen dem ZF-Prüfpunkt IF und Masse ein NF-Voltmeter mit einem Frequenzbereich von mindestens 500 kHz anschließen (z.B. HP331A Distorsion Analyzer). Das Ausgangssignal des Meßsenders ständig solange erhöhen, bis am Voltmeter eine Prüfspannung von 30 mV eff. abgelesen wird. Danach die Spulen L1 bis L5 auf Maximalanzeige abgleichen und dabei das Ausgangssignal des Meßsenders während des Abgleichvorganges ständig soweit verringern, daß die Anzeige immer etwa 30 mV eff. bleibt. Der Abgleichvorgang wird sooft wiederholt, bis keine Verbesserung mehr erzielt werden kann.
9. Den Ausgangspegel des Meßsenders auf 1 mV einstellen.
Modulationsfrequenz: 1 kHz.
Hub:

- $\pm 3,0$ kHz bei 25 kHz Kanalabstand
- $\pm 2,4$ kHz bei 20 kHz Kanalabstand
- $\pm 1,5$ kHz bei 12,5 kHz Kanalabstand.

Am Lautstärkeregel eine NF-Ausgangsspannung (am 2 Ohm Lastwiderstand) von 1 V einstellen. Dann langsam die Spule des Quadraturdetektors L54 auf maximale NF-Ausgangsspannung einstellen.

10. Die Rauschsperrung wird wie folgt eingestellt:
 - a) R59 (SQCH) an den linken Anschlag drehen.
 - b) Ein HF-Signal mit einer Amplitude von 1 mV einspeisen.
Modulationsfrequenz: 1 mV.
Hub:

- $\pm 3,0$ kHz bei 25 kHz Kanalabstand
- $\pm 2,4$ kHz bei 20 kHz Kanalabstand
- $\pm 1,5$ kHz bei 12,5 kHz Kanalabstand.

ABGLEICHANLEITUNG 136 - 174 MHz, STORNOPHONE 5500

- c) Am Lautstärkereger ein Ausgangssignal von 1,7 V am 2 Ohm Lastwiderstand einstellen.
- d) Den HF-Eingangspegel verringern, bis ein SINAD-Wert von 10 dB (bewertet gemäß CCITT) erzielt wird.
- e) Mit der entsprechenden Taste auf der Frontplatte die Rauschsperre ausschalten.
- f) Den Rauschsperreregler zuerst langsam nach rechts drehen, bis das Empfängerrauschen gerade verschwindet, und danach langsam in entgegengesetzter Richtung, bis das Rauschen gerade wieder hörbar wird.
- g) Das Eingangssignal zuerst auf null drehen und dann langsam erhöhen, bis der Empfänger gerade öffnet. In diesem Zustand muß der CCITT bewertete SINAD-Wert zwischen 8 und 12 dB liegen. Ggf. R59 geringfügig nachgleichen.

Draht-Brücke	Beschreibung	Zustand	Logikplatine	
		Art des Selektivrufs:	GLN6984	GLN6628
JU551 JU552	Empfänger-NF	ohne De-Emphasis (Freq.mod.) mit De-Emphasis (Phasenmod.)	ausgebaut eingebaut	ausgebaut eingebaut
JU601 JU602	Sender-NF	ohne De-Emphasis (Freq.mod.) mit De-Emphasis (Phasenmod.)	ausgebaut eingebaut	ausgebaut eingebaut
JU701 JU702 JU703 JU704	I/O-Leitungen des Bedienteils	Serieller Betrieb	eingebaut ausgebaut eingebaut ausgebaut	eingebaut ausgebaut eingebaut ausgebaut
JU705	IC Type U702	*	ausgebaut	ausgebaut
JU706	IC Type U703	*	ausgebaut	ausgebaut
JU707	Osz. mitziehen	nicht aktiviert	eingebaut	ausgebaut
JU710	Notruf **	nicht aktiviert	ausgebaut	ausgebaut
JU801 JU802	Auswerterfilter Notruf **	Select 5 (GLN6628) PL (GLN6984)	ausgebaut eingebaut	eingebaut ausgebaut
JU803 JU804	Wecktöne	regelbare Lautstärke feste Lautstärke	eingebaut ausgebaut	eingebaut ausgebaut
JU805	Mithörtöne	aktiviert	egal	eingebaut

* Brücke eingebaut für Teilenummer 5197014B06, bzw. 5197014B06 ausgebaut für Teilenummer 5197014B02.

** JU710 ist eingebaut, wenn der Schalter normalerweise geschlossen ist.

Tabelle 1
Drahtbrücken auf den Logikplatinen GLN6984 und GLN6628
bei Standardgeräten der Modellreihe EZ

ABGLEICHANLEITUNG 136 - 174 MHz, STORNOPHONE 5500

Option	Brücke	Zustand	Logikplatine	
			GLN6984	GLN6628
		Art des Selektivrufs:	ohne/PL	Select 5
MAB470 MAB688 MAB873	JU710	Notruf mit Notrufschalter	egal	ausgebaut
MAB459	JU805	ohne Mithörfunktion	egal	ausgebaut
MAB875	JU803 JU804	Wecktonlautstärke fest eingestellt	ausgebaut eingebaut	ausgebaut eingebaut
MAB884	JU551 JU552 JU601 JU602	Frequenzmodulation	eingebaut ausgebaut eingebaut ausgebaut	eingebaut ausgebaut eingebaut ausgebaut
MAB891	JU701 JU702 JU703 JU704	Parallelbetrieb des Bedienteiles	ausgebaut eingebaut ausgebaut eingebaut	ausgebaut eingebaut ausgebaut eingebaut
MAB888	JU706	"PL"-Gerät mit 32 Kanälen	eingebaut	-

Tabelle 2
 Drahtbrücken auf den Logikplatinen GLN6984 und GLN6628
 bei optionsbestückten Geräten der Modellreihe EZ

ABGLEICHANLEITUNG 136 - 174 MHz, STORNOPHONE 5500

Drahtbrücke	Beschreibung	Zustand	Logikplatine GLN6627 mit Select 5
JU551 JU552	Empfänger-NF	Frequenzmodulation Phasenmodulation	ausgebaut eingebaut
JU601 JU602	Sender-NF	Frequenzmodulation Phasenmodulation	ausgebaut eingebaut
JU701 JU702	Serieller EEPROM Power Strobe	über U705-6 über 701-19	ausgebaut eingebaut
JU703 JU704 JU705	Konfiguration mit Speicher	über U705-6 WR an U702-23 Masse an U702-20	ausgebaut ausgebaut eingebaut
JU706 JU707	Speicherbetrieb	MP0 MP1	ausgebaut eingebaut
JU709	Notruf	Spezialanwendungen	ausgebaut
JU801 JU802	Auswerterfilter	Select 5 "Private-Line"	eingebaut ausgebaut
JU803 JU804	Wecktöne	Regelbare Lautstärke Feste Lautstärke	eingebaut ausgebaut
JU805	Mithörtöne	aktiviert	eingebaut
JU806	Auswerterfilter	Select 5	

Tabelle 3
Drahtbrücken auf der Logikplatine GLN6627 bei Geräten der Modellreihe EV

ABGLEICHANLEITUNG 136 - 174 MHz, STORNOPHONE 5500

Option	Brücke	Zustand	Logikplatine GLN6627 mit Select 5
MAB459	JU805	ohne Mithörfunktion	ausgebaut
MAB875	JU803 JU804	Wecktonlautstärke, fest eingestellt	ausgebaut eingebaut
MAB884	JU551 JU552 JU601 JU602	Frequenzmodulation	eingebaut ausgebaut eingebaut ausgebaut

Tabelle 4
Drahtbrücken auf der Logikplatine GLN6984
bei optionsbestückten Geräten der Modellreihe EV

Platine	Anzeiger	Anzeige	Bedeutung
GLN6627	LCD's auf Logik- platine	ERR 1 ERR 2	ROM-Fehler: Fehlerhaftes Muster in U702. U702 ersetzen. EEPROM-Fehler: Fehlerhaftes Muster in U703. Neues EEPROM bestellen/ programmieren
GLN6628	Schnelle Ton- folge	ERR 3	ROM- oder EEPROM-Fehler. EEPROM-Fehler. Neues EEPROM bestel- len/programmieren.

Tabelle 5
Fehleranzeigen

Ton	GLN6984, GLN6627	GLN6628
800 Hz/200 ms 600 Hz/200 ms	Unerlaubter Tastendruck -	- Unerlaubter Tastendruck
800 Hz Dauerton	Unerlaubter Tastversuch (z.B.: Funkgerät nicht in Mithörbetrieb)	
800 Hz pulsierender Ton	Synthesizer nicht eingerastet	

Tabelle 6
Warntöne

RÉGLAGE

STORNOPHONE 5500, 136 - 174 MHz

REMARQUE

Pendant le réglage, ne transmettre qu'en cas de nécessité.

REMARQUES GENERALES

Effectuez le réglage avec une tension d'alimentation de $13,2 \text{ V} \pm 0,1 \text{ V c.c.}$, sauf indication contraire dans les instructions. Dans le cadre de ces instructions, la rotation des potentiomètres sous-entend que l'on regarde le côté composants de la platine. Les emplacements des composants réglables sont présentés sur un diagramme en fin du chapitre.

Lorsque vous effectuez les procédures présentées dans les paragraphes suivantes, l'appareil doit être complètement assemblé à l'exception du couvercle du synthétiseur et le boîtier. Lorsque vous avez fini le réglage, installez toutes les couvercles et le boîtier avant de tester l'appareil aux spécifications

APPAREILS DE MESURE RECOMMANDÉS:

R2001 R2200	Communications Service Monitor, ou Service Monitor
GTF180 GTF244	Testeur mobile, avec Câble adaptateur pour CQM5500
PFT4053	Filtre Psophometrique
FTP3005	Unité d'essai cinq tonalités (non requis avec R2001.)
R1011 S1347	Bloc d'alimentation, ou Bloc d'alimentation (pour émetteurs avec puissance HF inférieure à 10 W)
R1037 R1024	Multimètre numérique, ou Multimètre numérique.

REGLAGE DE L'EMETTEUR

1. Pré-consignez les potentiomètres comme suit:
 - * R453 (HI PWR) à fond à gauche
 - * R455 (LO PWR) à fond à gauche
 - * R463 (VOLT LIMIT) à fond à droite

RÉGLAGE 136 - 174 MHz, STORNOPHONE 5500

- Ajustez la tension d'alimentation à $13,2 \text{ V} \pm 0,1 \text{ V}$.
- Choisissez le canal d'émission ayant la fréquence la plus élevée.
- Branchez la sortie de l'émetteur à un wattmètre fournissant une charge de 50 Ohm.
- Branchez un voltmètre cc entre le point de mesure SL et la masse. L'impédance du voltmètre doit être de 11 Megohm ou plus.
- Transmettez et ajustez L210 jusqu'à ce que le voltmètre affiche 7,0 V cc
- Choisissez le canal de fréquence d'émission la plus basse. Vérifiez que la tension cc soit au moins 2,5 V en transmettant.
- Choisissez un canal quelconque (en cas d'appareil avec option MAB889 un canal haute puissance).
- Transmettez et ajustez R453 (HI PWR) pour une puissance HF comme suit:

Modèle	Puissance HF
MAU0	1,0 W
MAU1	6,0 W
MAU2	10,0 W
MAU3	25,0 W

- Passez en émission sur tous les canaux (tous les canaux haute puissance pour MAB889). Pour chaque canal, transmettez et notez la puissance de sortie. Pour les modèles MAU0, MAU2 et MAU3, notez le canal produisant la puissance de sortie minimale; pour MAU1 notez le canal produisant la puissance de sortie maximale. Si plus d'un canal produit la même puissance de sortie minimale ou maximale, choisissez l'un quelconque de ces canaux.
- Passer en émission sur tous les canaux (tous les canaux haute puissance pour MAB889). Sur chaque canal, transmettez en surveillant la tension cc à la broche 4 du connecteur P6, ou au point de mesure CV sur la platine de commande. Notez le numéro du canal produisant la tension la plus forte, et la valeur de cette tension. Si plus d'un canal produit la même tension maximale, choisissez l'un quelconque des canaux. Si cette valeur est supérieur à 100 V cc, passer à l'opération 14. Sinon, passez à l'opération 12.
- Sur le canal ayant produit la tension cc la plus forte lors de l'opération 11, tournez le potentiomètre VOLT LIMIT (R463) à fond vers la gauche. Tournez le potentiomètre HI PWR (R453) à fond vers la droite.
- Transmettez et ajustez R463 pour une tension cc de 2,0 V plus forte que le niveau de tension noté lors de l'opération 11, et mesuré à la broche 4 du connecteur P6 ou au point de mesure CV.
- Consignez le sélecteur de canal au canal noté lors de l'opération 10. Transmettez et ajustez le potentiomètre HI PWR (R453) pour:

Modèle	Puissance HF
MAU0	1,1 W
MAU1	5,6 W
MAU2	10,7 W
MAU3	25,0 W

- Vérifiez que tous les canaux (tous les canaux haute puissance pour MAB889) produisent au moins 1,0 W, 10,0 W, ou 25,0 W, comme requis, pour les modèles MAU0, MAU2 et MAU3. Vérifiez qu'aucun canal ne produise plus de 6,0 W pour les modèles MAU1.

RÉGLAGE 136 - 174 MHz, STORNOPHONE 5500

16. Si l'appareil comprend l'option MAB889, choisissez un quelconque canal basse puissance. Transmettez et ajustez R455 (LO PWR) pour produire une puissance de sortie de 1,0 W (ou toute autre consigne de puissance spécifiée) pour les modèles MAU1 et MAU2. Vérifiez que la puissance de sortie HF pour tous les canaux basse fréquence tombe entre 0,7 W et 1,4 W. Réajustez légèrement R455 si nécessaire. Pour les modèles MAU0, ajustez R455 pour obtenir une puissance de 0,1 W ou toute autre puissance spécifiée. Vérifiez que la puissance de sortie pour tout canal basse puissance tombe entre 70 mW et 140 mW.

REGLAGE DE L'OSCILLATEUR DE REFERENCE

1. Branchez un compteur de fréquence précis par l'intermédiaire d'un atténuateur convenable sur la prise d'antenne.
2. Choisissez un quelconque canal d'émission.
3. Transmettez et ajustez L151 (R163 dans les modèles 2 ppm) jusqu'à ce que la fréquence d'émission ± 100 Hz sera affichée.
4. Vérifiez tous les canaux pour vous assurer de la programmation correcte des fréquences d'émission.

AJUSTAGE DE L'EXCURSION EN FREQUENCE

1. Branchez la prise d'antenne sur un compteur de fréquence précis par l'intermédiaire d'un atténuateur convenable.
2. Branchez un générateur B.F. ayant une impédance de sortie de 600 Ohm sur l'entrée microphone (voir figure 3). Consignez la fréquence du générateur sur 1 kHz et le niveau de sortie sur 800 mV efficaces.

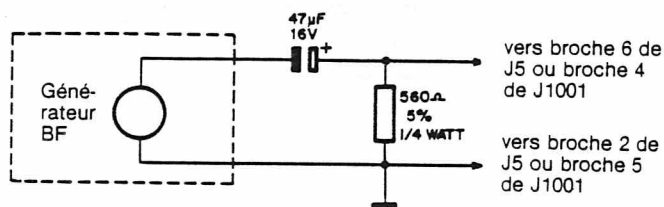


Figure 1
Branchement du générateur BF sur l'entrée microphone

3. Pré-consignez les potentiomètres R302 (VCO MOD) et R305 (REF MOD) à fond vers la gauche.
4. Choisissez un canal d'émission ayant une fréquence près du milieu de la gamme. Pour les modèles "Private-Line", choisissez un canal transmettant la tonalité "Private-Line".

RÉGLAGE 136 - 174 MHz, STORNOPHONE 5500

5. Passez en émission et tournez R302 pour obtenir:

± 4,6 kHz (espacement 25 kHz)
± 3,7 kHz (espacement 20 kHz)
± 2,3 kHz (espacement 12,5 kHz)

REMARQUE

Si les lectures d'excursion positive et négative diffèrent, utilisez seulement la lecture supérieure.

6. Pour les modèles à espacement entre voies de 25 kHz seulement, la procédure est terminée. Pour les autres modèles, passez à l'opération 7.
7. Changez la fréquence du générateur BF à 200 Hz, et maintenez le niveau de sortie à 0,8 V.
8. Transmettez et observez la forme d'onde sur un oscilloscope branché sur la sortie démodulée d'un récepteur d'essai. Ce récepteur devrait être non-atténué, et il doit y avoir un couplage cc entre le récepteur et l'oscilloscope (un couplage alternatif convient si la fréquence de coin est de 2 Hz ou moins). Tournez R305 (REF MOD) pour produire la réponse onde carrée la plus plate avec une inclinaison minimale.
9. Retournez la fréquence du générateur BF à 1 kHz, 0,8 V efficace, et répétez l'opération 5.

REGLAGE DU RECEPTEUR

ATTENTION

Ajustez l'oscillateur VCO de l'émetteur et l'oscillateur de référence (voir les sections: REGLAGE DE L'EMETTEUR et REGLAGE DE L'OSCILLATEUR) avant de procéder à l'alignement du récepteur.

VCO DU RÉCEPTEUR

1. Branchez un voltmètre c.c. de haute impédance (11 MegOhm minimum) entre le point de mesure SL et la masse.
2. Appareils multicanaux: Choisissez le canal de réception ayant la fréquence la plus basse.
3. Ajustez la bobine VCO (L201) pour obtenir une affichage de 7,0 V c.c.

RÉCEPTEUR

1. Trouvez la fréquence d'accord (f_{accord}) comme suit:
 - a) Pour les récepteurs monocanal et multicanal avec de fréquence de réception unique:

$$f_{\text{accord}} = f_{\text{réception}}$$

RÉGLAGE 136 - 174 MHz, STORNOPHONE 5500

- b) Pour les appareils multicanaux ayant une largeur de bande réceptrice de 2 MHz ou moins:

$$f_{\text{accord}} = \text{fréquence du canal de plus haute fréquence}$$

- c) Pour les appareils multicanaux ayant une largeur de bande de réception de plus de 2 MHz mais moins de 4 MHz (inclus), trouvez f_{accord} comme suit:

$$f_{\text{accord}} = (f_{\text{haut}} + f_{\text{bas}}) : 2$$

Si l'un des canaux a une fréquence à moins de 500 kHz de f_{accord} , effectuez l'accord sur ce canal. Sinon, vous devrez obtenir une puce PROM d'accord (seulement pour les modèles EZ).

2. Consignez le sélecteur de canal au canal de la fréquence d'accord déterminée lors de l'opération ci-dessus. La fréquence d'accord est pré-programmée dans les modèles EZ. Pour le réglage sur f_{accord} , il suffit de court-circuiter les deux bornes d'essai TEST sur la platine de commande.
3. Branchez une charge résistive entre les broches 4 et 5 de J5. Surveillez la sortie audio dans cette charge résistive.
4. Pré-consignez les noyaux des sept bobines L1 à L7 de niveau avec la platine.
5. Branchez un voltmètre c.c. entre le point de mesure LO et la masse.
6. Ajustez les bobines L6, L5 et L7 dans cet ordre pour produire une tension c.c. maximale, typiquement entre 2,1 et 3,5 V c.c. Répétez cette opération jusqu'à ce que vous ne puissiez plus augmenter cette valeur.
7. Branchez un générateur HF (non modulé) sur le connecteur d'antenne, calé sur la fréquence de trafic. Réglez le niveau de sortie pour étouffer le récepteur.
8. Branchez un voltmètre c.a. avec une largeur de bande d'au moins de 500 kHz (un analyseur de distorsion HP331A par exemple) entre le point de mesure IF et la masse. Augmentez la sortie de générateur jusqu'à ce que le voltmètre c.a. indique environ 30 mV. Tournez les noyaux des bobines L1, L3, L4, et L5 jusqu'à ce que le voltmètre atteigne le maximum. Réduisez le niveau de sortie du générateur comme requis pour maintenir 30 mV eff. sur l'appareil lors de cette procédure. Répétez cette mise à point jusqu'à ce que vous ne puissiez plus faire augmenter la tension de mesure.
9. Consignez le niveau de sortie du générateur à 1 mV. Modulez-le avec une tonalité de 1 kHz à une excursion de fréquence de:

- ± 3,0 kHz (espacement 25 kHz)
- ± 2,4 kHz (espacement 20 kHz)
- ± 1,5 kHz (espacement 12,5 kHz)

Ajustez la commande de volume pour produire un niveau audio d'environ 1 V eff. sur la charge de 2 Ohm. Ajustez lentement la bobine L52 pour produire un signal audio maximal.

10. Ajustez le squelch comme suit:
 - a) Pré-consignez le potentiomètre R59 (SQCH) à fond vers la gauche.
 - b) Appliquez un signal HF, modulé d'un ton de 1 kHz à un niveau de 1 mV et une excursion en fréquence de:

- ± 3,0 kHz (espacement 25 kHz)
- ± 2,4 kHz (espacement 20 kHz)
- ± 1,5 kHz (espacement 12,5 kHz).

RÉGLAGE 136 - 174 MHz, STORNOPHONE 5500

- c) Ajustez la commande de volume pour produire un niveau audio d'environ 1,7 V eff. sur la charge de 2 Ohm.
- d) Réduisez le niveau de sortie du générateur jusqu'à ce qu'une valeur SINAD de 10 dB (mesurée selon CCITT) soit obtenu.
- e) Coupez le squelch par la touche correspondante sur le panneau avant.
- f) Tournez le squelch vers la droite jusqu'à ce que le bruit de fond cesse. Puis, tournez dans le sens inverse jusqu'à ce que le bruit redevienne tout juste audible.
- g) Réduisez le niveau de sortie du générateur à zéro ce que le bruit devient audible, et vérifiez que la valeur SINAD (mesurée selon CCITT) se trouve entre 8 et 12 dBQ. Réajustez R59 un peu si requis.

Pont	Description	Condition	
		Type d'appel sélectif:	Platine de commande GLN6984 GLN6628
			sans/PL Select 5
U551 JU552	Audio du récepteur	Modulation de fréquence Modulation de phase	non inséré non inséré inséré inséré
JU601 JU602	Audio de l'émetteur	Modulation de fréquence Modulation de phase	non inséré non inséré inséré inséré
JU701 JU702 JU703 JU704	Circuits I/O de la boîte de commande	Opération sérielle	inséré inséré non inséré non inséré inséré inséré non inséré non inséré
JU705	IC Type U702	*	non inséré non inséré
JU706	IC Type U703	*	non inséré non inséré
JU707	Variation osc.	Hors circuit	inséré non inséré
JU710	Urgence **	Hors circuit	non inséré non inséré
JU801 JU802	Filtre décodage Urgence **	Select 5 (GLN6628) PL (GLN6984)	non inséré inséré inséré non inséré
JU803 JU804	Tonalité d'alerte	Niveau variable Niveau fixe	inséré inséré non inséré non inséré
JU805	Moniteur	En circuit	n'importe inséré

* Pont inséré pour pièce no. 5197014B03 ou 5197014B06, non inséré pour pièce no. 5197014B02.

** JU710 est inséré lorsqu'on utilise un contact d'urgence au repos.

Tableau 1
Ponts soudés sur les platines de commande GLN6984 et GLN6628
pour les modèles standard de la série EZ

RÉGLAGE 136 - 174 MHz, STORNOPHONE 5500

Option	Pont	Conditions	Platine de commande	
			GLN6984	GLN6628
		Type d'appel sélectif:	Sans/PL	Select 5
MAB470 MAB688 MAB873	JU710	Urgence avec contact d'urgence	n'importe	non inséré
MAB459	JU805	Sans fonction moniteur	n'importe	non inséré
MAB875	JU803 JU804	Tonalités d'alerte à niveau fixe	non inséré inséré	non inséré inséré
MAB884	JU551 JU552 JU601 JU602	Modulation de fréquence	inséré non inséré inséré non inséré	inséré non inséré inséré non inséré
MAB891	JU701 JU702 JU703 JU704	Opération parallèle de la boîte de commande	non inséré inséré non inséré inséré	non inséré inséré non inséré inséré
MAB888	JU706	Appareil "PL" à 32 canaux	inséré	-

Tableau 2
Ponts soudés sur les platines de commande GLN6984 et GLN6628
pour les appareils à options de la série EZ

RÉGLAGE 136 - 174 MHz, STORNOPHONE 5500

Pont	Description	Condition	Platine de commande GLN6627 avec Select 5
JU551 JU552	Audio du récepteur	Modulation de fréquence Modulation de phase	non inséré inséré
JU601 JU602	Audio de l'émetteur	Modulation de fréquence Modulation de phase	non inséré inséré
JU701 JU702	EEPROM sérielle Power Strobe	par U705-6 par 701-19	non inséré inséré
JU703 JU704 JU705	Configuration avec mémoire	par U705-6 WR à U702-23 Terre à U702-20	non inséré non inséré inséré
JU706 JU707	Opération avec mémoire	MPO MP1	non inséré inséré
JU709	Urgence	Application spéciale	non inséré
JU801 JU802	Filtre décodage	Select 5 "Private-Line"	inséré non inséré
JU803 JU804	Tonalité d'alerte	Niveau variable Niveau fixe	inséré non inséré
JU805	Moniteur	En circuit	inséré
JU806	Filtre décodage	Select 5	

Tableau 3
Ponts sur la platine de commande GLN6627 pour appareils standard de la série EV

RÉGLAGE 136 - 174 MHz, STORNOPHONE 5500

Option	Pont	Condition	Platine de commande GLN6984 avec Select 5
MAB459	JU805	Sans fonction moniteur	non inséré
MAB875	JU803 JU804	Niveau d'alerte fixe	non inséré inséré
MAB884	JU551 JU552 JU601 JU602	Modulation de fréquence	inséré non inséré inséré non inséré

Tableau 4
Ponts sur la platine de commande GLN6984
pour appareils à options de la série EV

Platine	Indicateur	Indicat	Signification
GLN6627	Affichage LCD sur platine	ERR 1 ERR 2	Erreur ROM: Le modèle en mémoire dans U702 est incorrect. Changez U702. Erreur EEPROM: U703 en panne. Commandez une EEPROM de rechange ou reprogrammez
GLN6628	Tonalités rapides	ERR 3	Erreur ROM ou EEPROM. Erreur EEPROM. Commandez une EEPROM de rechange ou reprogrammez.

Tableau 5
Indications d'erreur

Ton	GLN6984, GLN6627	GLN6628B
800 Hz/200 ms 600 Hz/200 ms	Manipulation illégale -	- Manipulation illégale
800 Hz continu 800 Hz intermittent	Manipulation illégale (p.e.: Appareil n'est pas en mode moniteur) Synthesizer hors programmation	

Tableau 6
Tonalités d'avertissement

STORNOPHONE 5500 SERIES

SERVICE INSTRUMENTS
AND SOFTWARE

TOOLS
TEST AND
PROGRAMMING
EQUIPMENT



TEST EQUIPMENT

GTF180

TEST SET, mobile test box.



GTF244

TEST CABLE, between GTF180 and Stornophone 5500

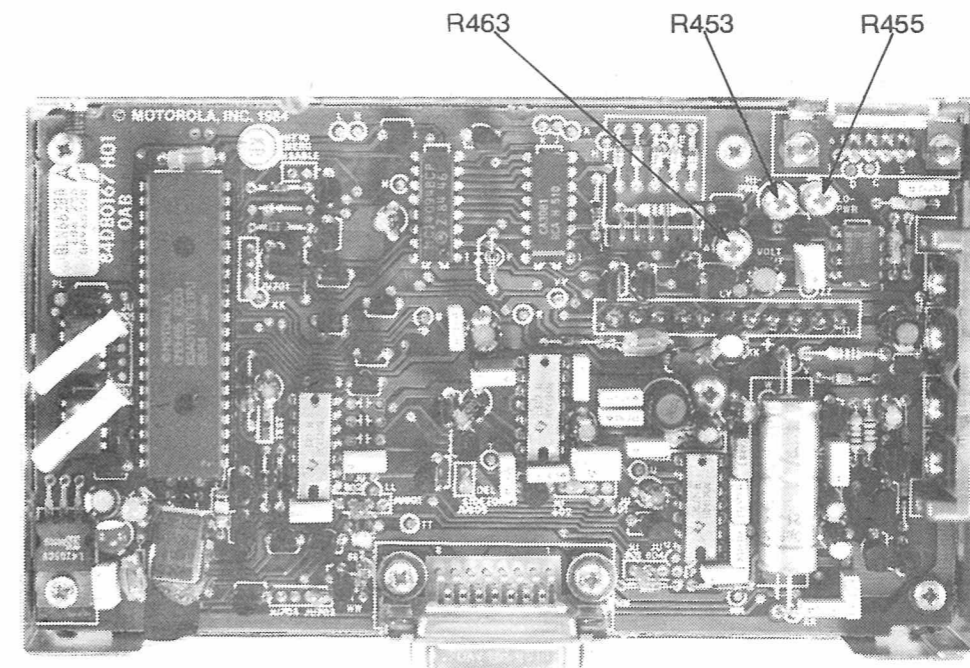
STORNOPHONE 5500 SERIES

SERVICE INSTRUMENTS
AND SOFTWARE

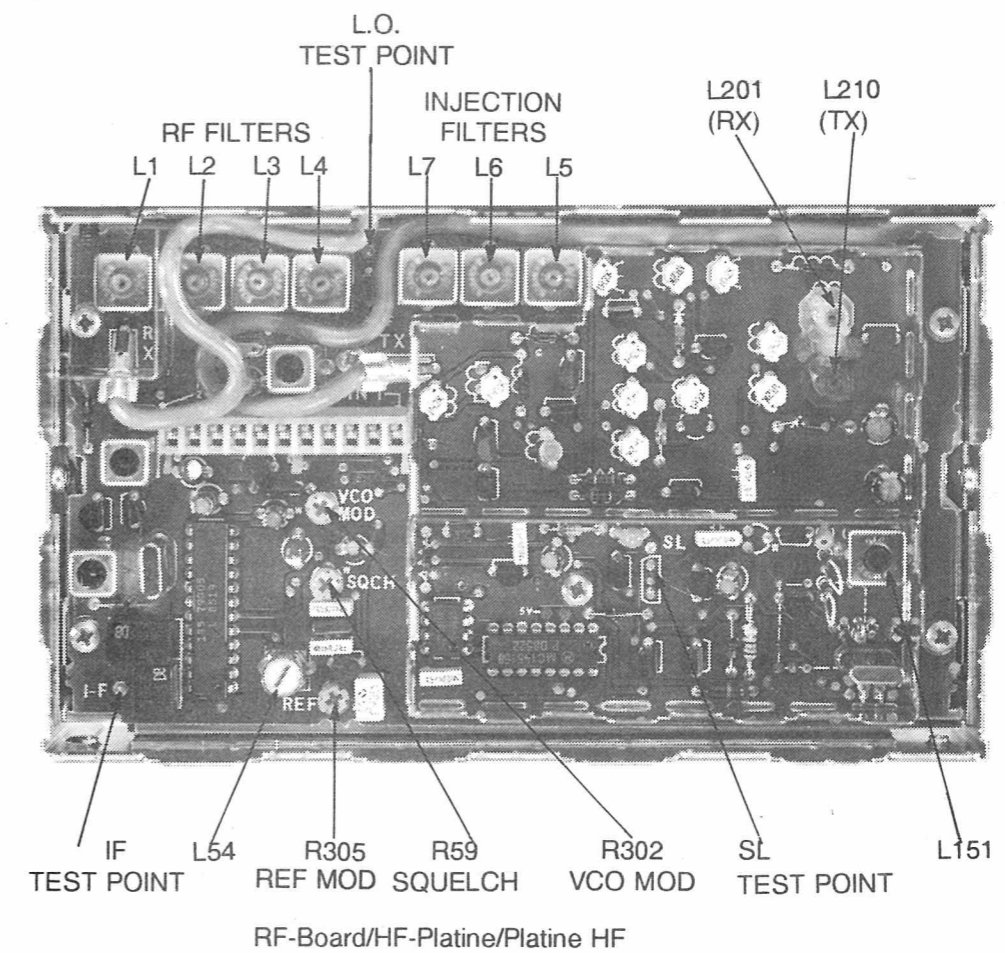
TOOLS
TEST AND
PROGRAMMING
EQUIPMENT

PROGRAMMING EQUIPMENT

- GTF297 PROGRAMMING INTERFACE CABLE
To connect the IBM PC compatible to the
radio or base station.
- GTF303 PROGRAMMER SOFTWARE FOR IBM PC COMPATIBLE
5 1/4" DISK WITH USER MANUAL
Provides the user with the capability of
editing the configuration of the
Stornophone 5500.



Command Board/Logikplatine/Platine de Commande



RF-Board/HF-Platine/Platine HF

CHAPTER
CHAPITRE
KAPITEL

5

MECHANICAL PARTS & BLOCK DIAGRAMS

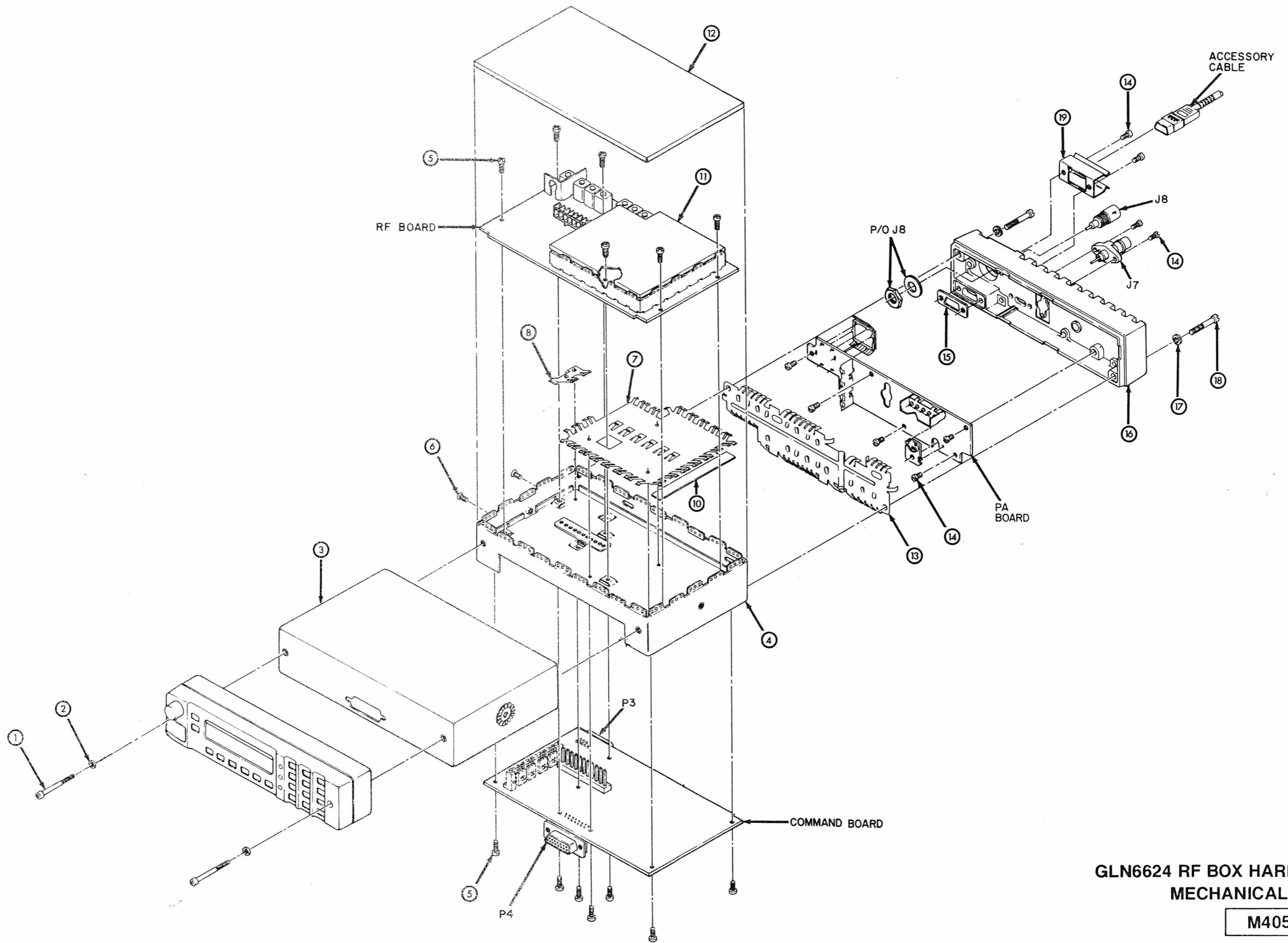
STORNOPHONE 5500

(136 - 174 MHz)

RADIO BOX HARDWARE GLN6624 PARTS LIST	MPL405.512
RADIO BOX HARDWARE GLN6624 MECHANICAL	M405.512
EZ MODEL WITH LCD CONTROL HEAD G104X	D405.113
EZ MODEL WITH LCD COMMAND BOARD G104X	D405.114
EZ MODEL WITH LCD RF BOARD G104X	D405.116
EV MODEL WITH LCD CONTROL HEAD G1053	D405.117
EV MODEL WITH LCD COMMAND BOARD G1053	D405.118
EV MODEL WITH LCD RF BOARD G1053	D405.120
EZ MODEL WITH OPTIONAL CONTROL HEAD G103X	D405.121
EZ MODEL WITH OPTIONAL COMMAND BOARD G103X	D405.122
EZ MODEL WITH OPTIONAL RF BOARD G103X	D405.124

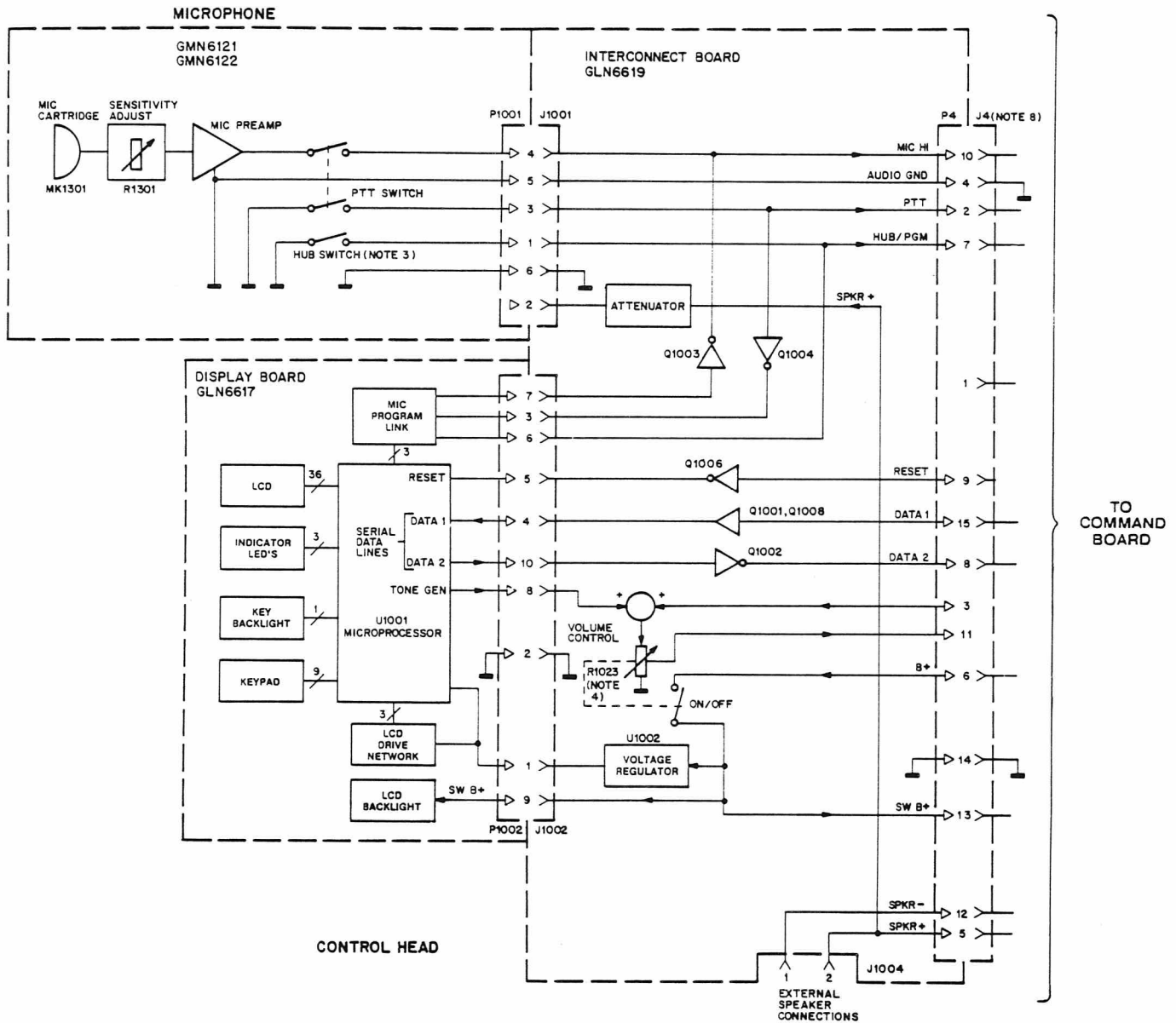
MECHANICAL PARTS LIST FOR RF BOARD HARDWARE GLN6624A

Pos	Code No.	Description	Qt	Pos	Code No.	Description	Qt
1	0380029J01	SCREW MOUNTING	2				
2	0402145B05	GASKET	2				
3	1580175H01	COVER RADIO HOUSING	1				
4	2780174H01	FRAME CHASSIS	1				
5	0302607B02	SCREW M3X6	13				
6	0380269H02	SCREW M2.5X8	2				
7	2680156J03	SHIELD RF	1				
8	2680198J02	SHIELD RF GROUND	1				
10	1180202J01	ADHESIVE RF SHIELD	1				
11	1580136J02	COVER RF SHIELD	1				
12	1580129J02	COVER CHASSIS FRAME	1				
13	2680197J01	SHIELD PA GROUND	1				
14	0302607B02	SCREW M3X8	11				
15	3280266H01	GASKET	1				
16	2680176H01	HEATSINK 10W RADIO (SHOWN)	1				
16	2680176H02	HEATSINK 25W RADIO	1				
17	0480171J01	LOCKWASHER	2				
18	0380165J01	SCREW METRIC	2				
19	4280276H01	RETAINER ACCESSORY CABLE	1				



**GLN6624 RF BOX HARDWARE
MECHANICAL PARTS**

M405.512



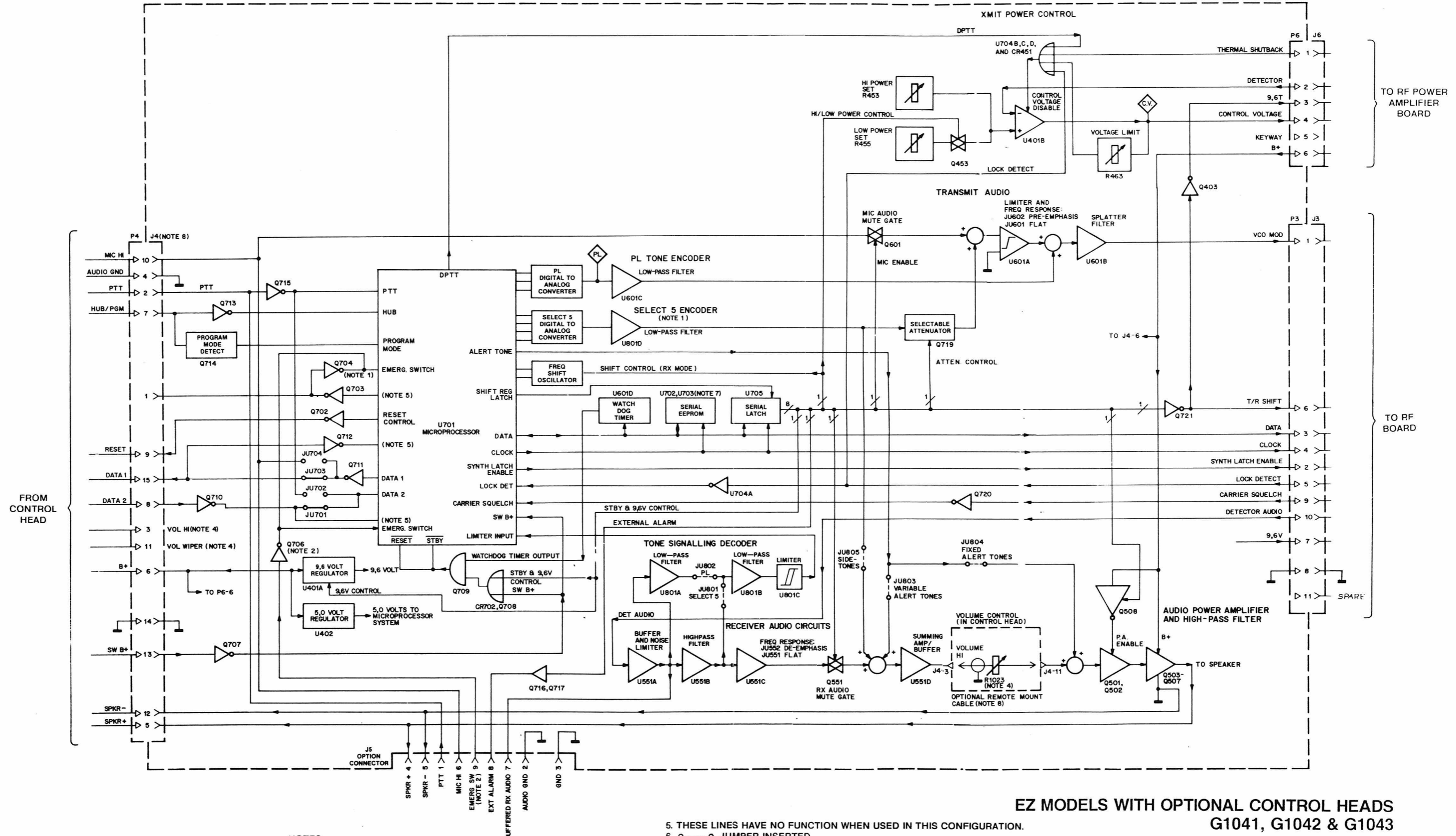
NOTES:

1. SELECT 5 CIRCUITS INCLUDED ONLY ON GLN6628
2. EMERGENCY CIRCUITS INCLUDED ONLY ON GLN6628
3. HUB SWITCH FOR GMN6122 ONLY
4. THE VOLUME CONTROL, R1023, IS LOCATED IN THE CONTROL HEAD. IT IS REPEATED ON THE COMMAND BOARD TO CLEARLY SHOW ITS FUNCTION IN THE RECEIVER AUDIO CIRCUITS.
5. THESE LINES HAVE NO FUNCTION WHEN USED IN THIS CONFIGURATION.
6. ○ — ○ JUMPER INSERTED.
○ — — — ○ JUMPER DEPENDS ON MODEL TYPE AND OPTIONS ORDERED.
○ ○ JUMPER NOT INSERTED.
7. PART TYPE AND USAGE DEPENDS ON RADIO TYPE AND OPTIONS.
8. AN OPTIONAL REMOTE MOUNT CABLE CAN BE USED TO CONNECT THE CONTROL HEAD AND THE RADIO TOGETHER
9. NOT ALL VERSIONS (VHF ONLY)

EZ MODELS WITH LCD CONTROL HEADS
G1041, G1042 & G1043
FUNCTIONAL BLOCK DIAGRAM
CONTROL HEAD

D405.113

COMMAND BOARD

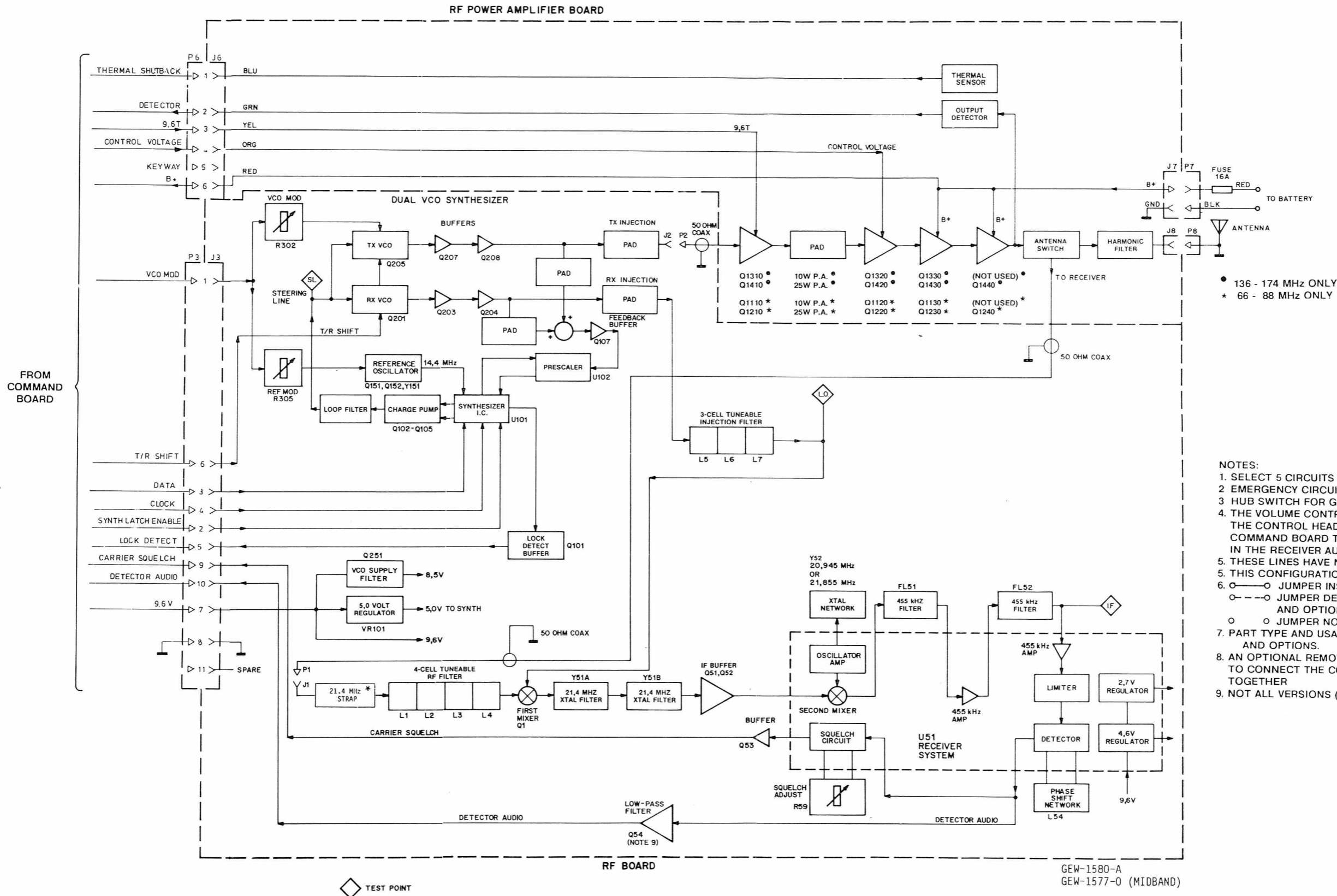


- NOTES:
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 2. EMERGENCY CIRCUITS INCLUDED ONLY ON GLN6628
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○ - - - ○ JUMPER DEPENDS ON MODEL TYPE AND OPTIONS ORDERED.
○ ○ JUMPER NOT INSERTED.
7. PART TYPE AND USAGE DEPENDS ON RADIO TYPE AND OPTIONS.
8. AN OPTIONAL REMOTE MOUNT CABLE CAN BE USED TO CONNECT THE CONTROL HEAD AND THE RADIO TOGETHER
9. NOT ALL VERSIONS (VHF ONLY)

EZ MODELS WITH OPTIONAL CONTROL HEADS
G1041, G1042 & G1043
FUNCTIONAL BLOCK DIAGRAM
COMMAND BOARD

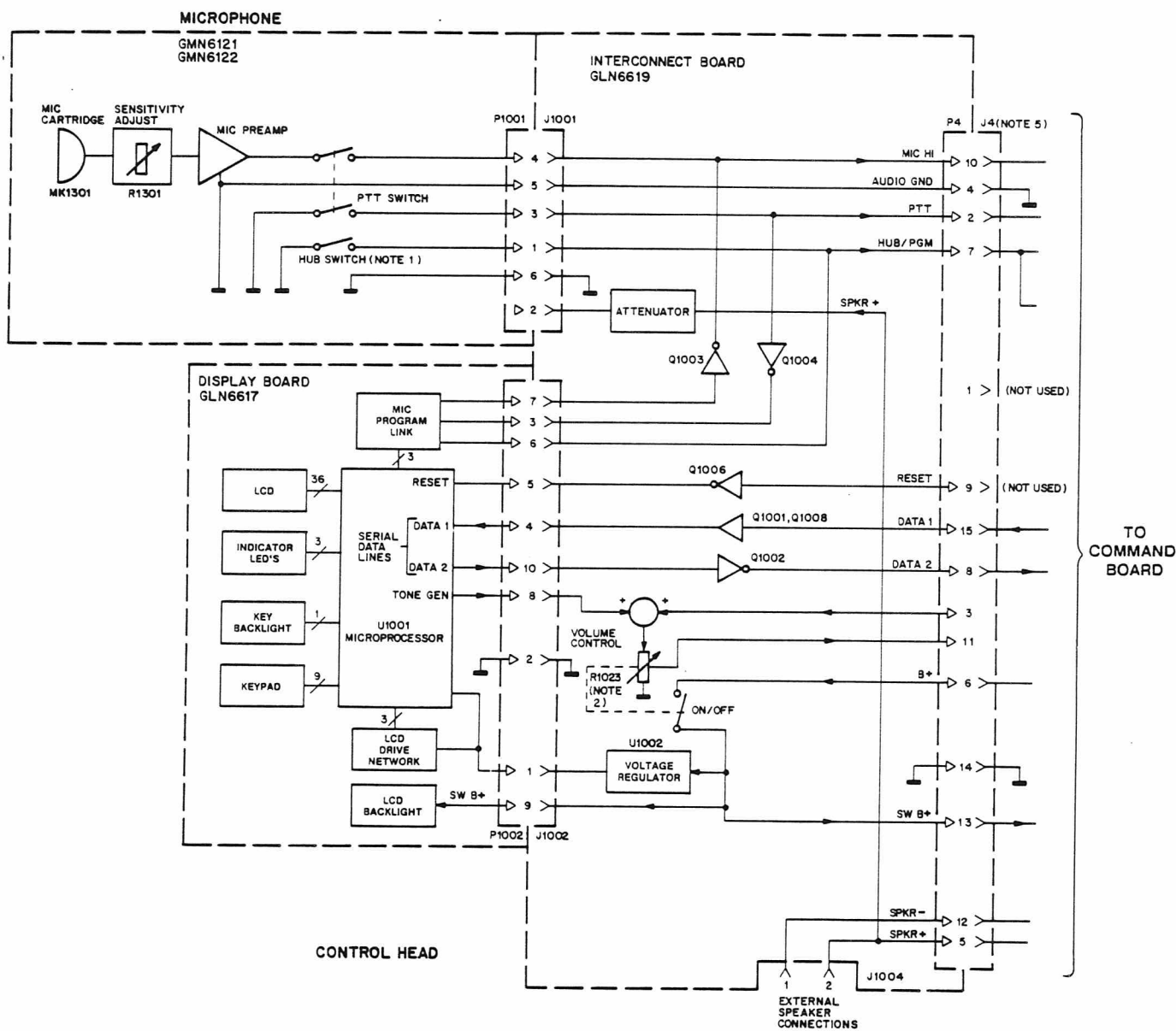
D405.114



- NOTES:**
1. SELECT 5 CIRCUITS INCLUDED ONLY ON GLN6628
 2. EMERGENCY CIRCUITS INCLUDED ONLY ON GLN6628
 3. HUB SWITCH FOR GMN6122 ONLY
 4. THE VOLUME CONTROL, R1023, IS LOCATED IN THE CONTROL HEAD. IT IS REPEATED ON THE COMMAND BOARD TO CLEARLY SHOW ITS FUNCTION IN THE RECEIVER AUDIO CIRCUITS.
 5. THESE LINES HAVE NO FUNCTION WHEN USED IN THIS CONFIGURATION.
 6. ○ ○ ○ JUMPER INSERTED.
 - - - - ○ JUMPER DEPENDS ON MODEL TYPE AND OPTIONS ORDERED
 - ○ ○ JUMPER NOT INSERTED.
 7. PART TYPE AND USAGE DEPENDS ON RADIO TYPE AND OPTIONS.
 8. AN OPTIONAL REMOTE MOUNT CABLE CAN BE USED TO CONNECT THE CONTROL HEAD AND THE RADIO TOGETHER
 9. NOT ALL VERSIONS (VHF ONLY)

EZ MODELS WITH LCD CONTROL HEADS
G1041, G1042 & G1043 - VHF
FUNCTIONAL BLOCK DIAGRAM
RF POWER AMPLIFIER BOARD - RF BOARD

D405.116

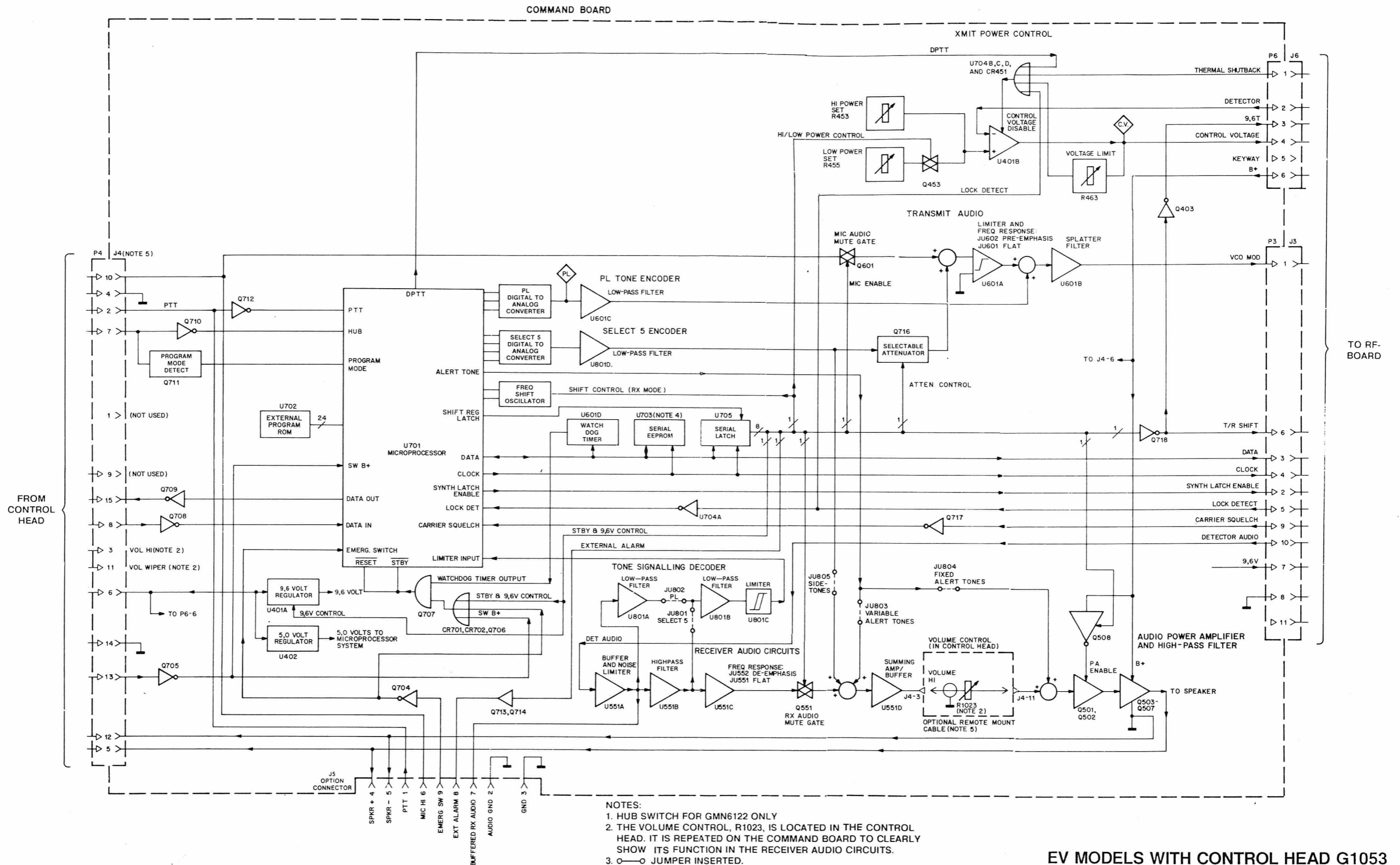


NOTES:

1. HUB SWITCH FOR GMN6122 ONLY
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3. ○—○ JUMPER INSERTED.
○--○ JUMPER DEPENDS ON MODEL TYPE AND OPTIONS ORDERED.
○ ○ JUMPER NOT INSERTED.
4. PART TYPE AND USAGE DEPENDS ON RADIO TYPE AND OPTIONS.
5. AN OPTIONAL REMOTE MOUNT CABLE CAN BE USED TO CONNECT THE CONTROL HEAD AND THE RADIO TOGETHER.
6. NOT IN ALL VERSIONS.

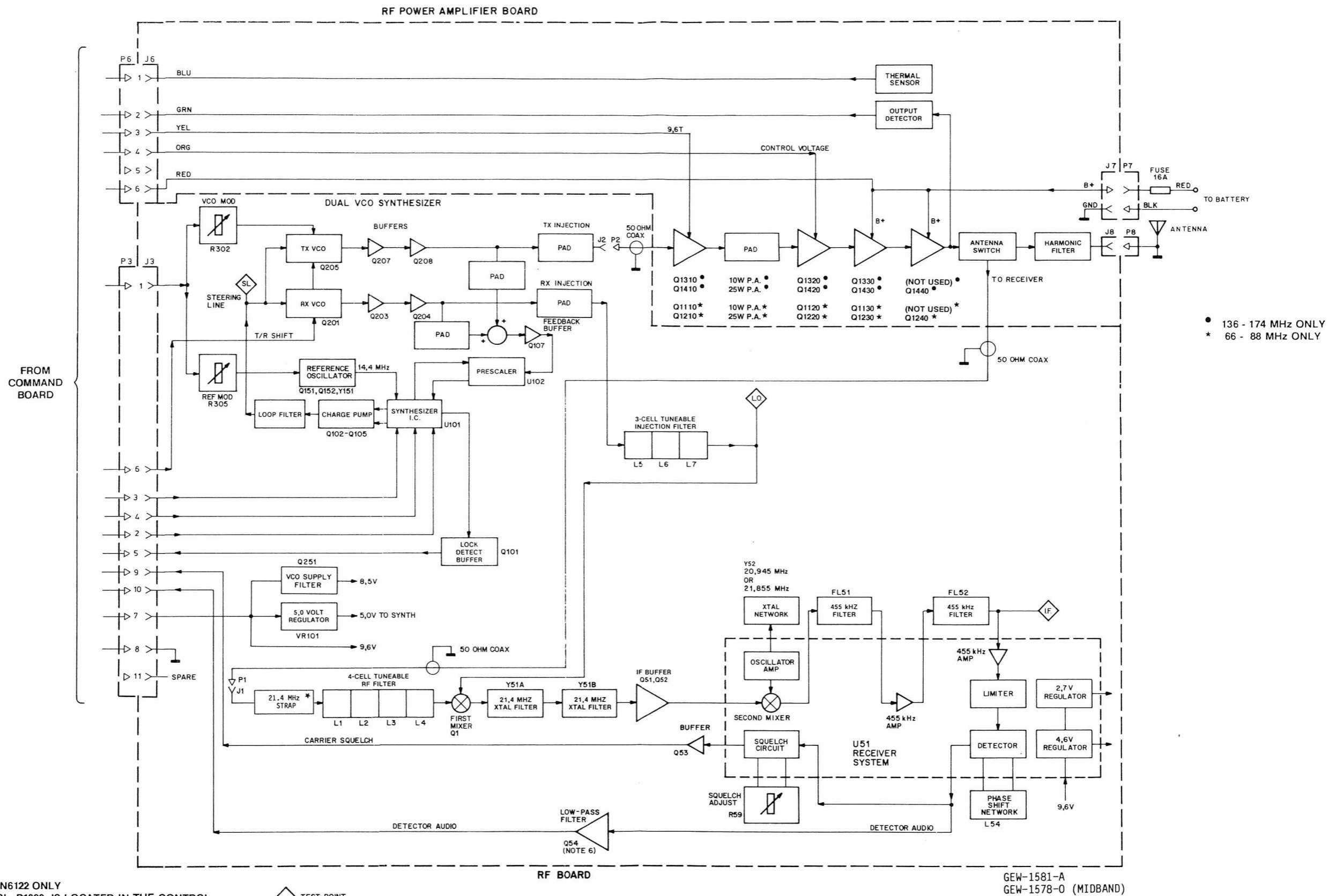
EV MODELS WITH CONTROL HEAD G1053
FUNCTIONAL BLOCK DIAGRAM
CONTROL HEAD

D405.117



**EV MODELS WITH CONTROL HEAD G1053
FUNCTIONAL BLOCK DIAGRAM
COMMAND BOARD**

D405.118

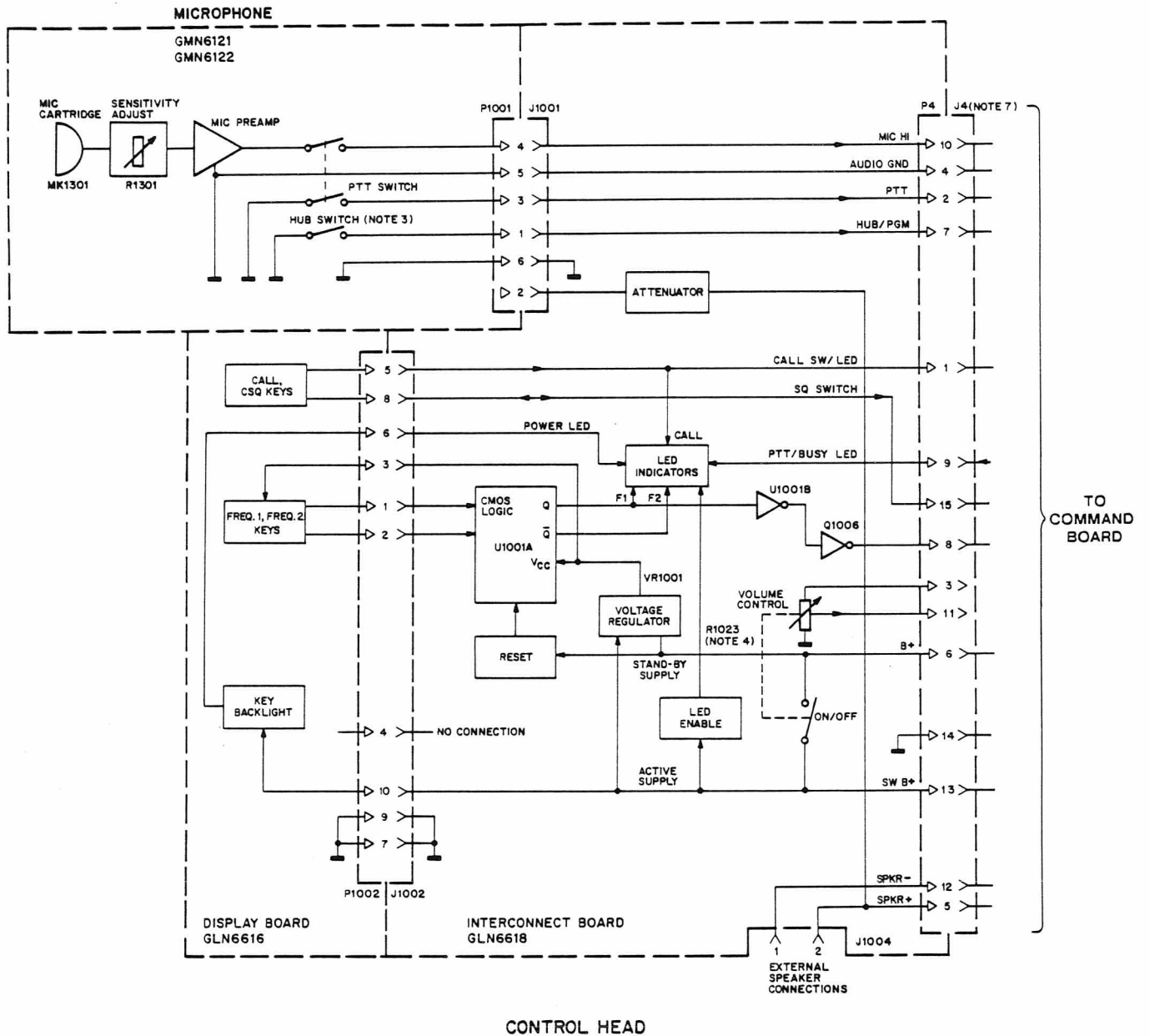


NOTES:

1. HUB SWITCH FOR GMN6122 ONLY
2. THE VOLUME CONTROL, R1023, IS LOCATED IN THE CONTROL HEAD. IT IS REPEATED ON THE COMMAND BOARD TO CLEARLY SHOW ITS FUNCTION IN THE RECEIVER AUDIO CIRCUITS.
3. JUMPER INSERTED.
JUMPER DEPENDS ON MODEL TYPE AND OPTIONS ORDERED.
JUMPER NOT INSERTED.
4. PART TYPE AND USAGE DEPENDS ON RADIO TYPE AND OPTIONS.
5. AN OPTIONAL REMOTE MOUNT CABLE CAN BE USED TO CONNECT THE CONTROL HEAD AND THE RADIO TOGETHER.
6. NOT IN ALL VERSIONS.

EV MODELS WITH LCD CONTROL HEAD
G1053 VHF
FUNCTIONAL BLOCK DIAGRAM
RF POWER AMPLIFIER BOARD - RF BOARD

D405.120

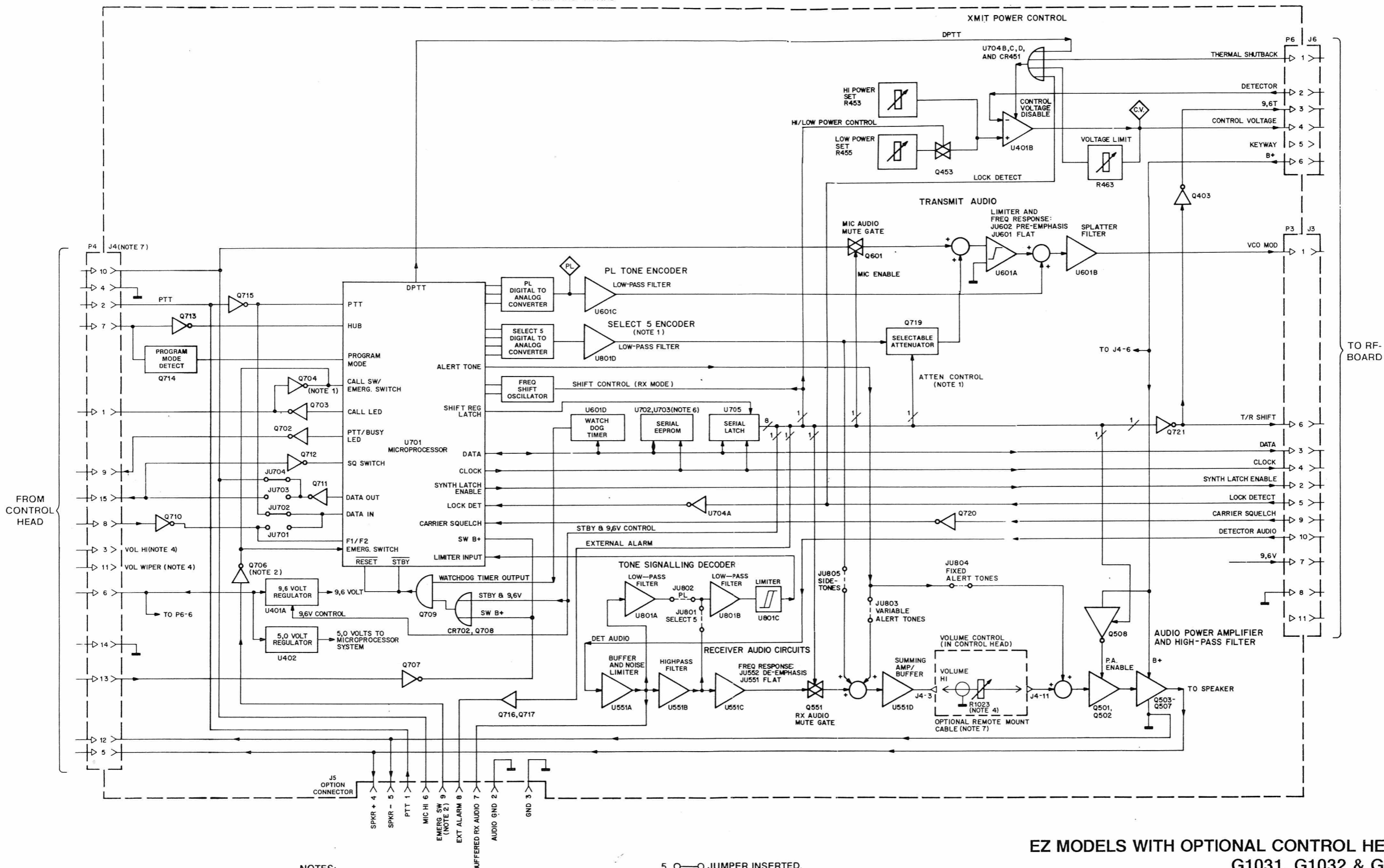


- NOTES:**
1. SELECT 5 CIRCUIT INCLUDED ONLY ON GLN6628
 2. EMERGENCY CIRCUITS INCLUDED ONLY ON GLN6628
 3. HUB SWITCH FOR GMN6122 ONLY
 4. THE VOLUME CONTROL, R1023, IS LOCATED IN THE CONTROL HEAD. IT IS REPEATED ON THE COMMAND BOARD TO CLEARLY SHOW ITS FUNCTION IN THE RECEIVER AUDIO CIRCUITS.
 5. ○ ○ JUMPER INSERTED.
○ - - ○ JUMPER DEPENDS ON MODEL TYPE AND OPTIONS ORDERED.
○ ○ JUMPER NOT INSERTED.
 6. PART TYPE AND USAGE DEPENDS ON RADIO TYPE AND OPTIONS.
 7. AN OPTIONAL REMOTE MOUNT CABLE CAN BE USED TO CONNECT THE CONTROL HEAD AND THE RADIO TOGETHER.
 8. NOT IN ALL VERSIONS.

**EZ MODELS WITH OPTIONAL CONTROL HEADS
G1031, G1032 & G1033
FUNCTIONAL BLOCK DIAGRAM
CONTROL HEAD**

D405.121

COMMAND BOARD

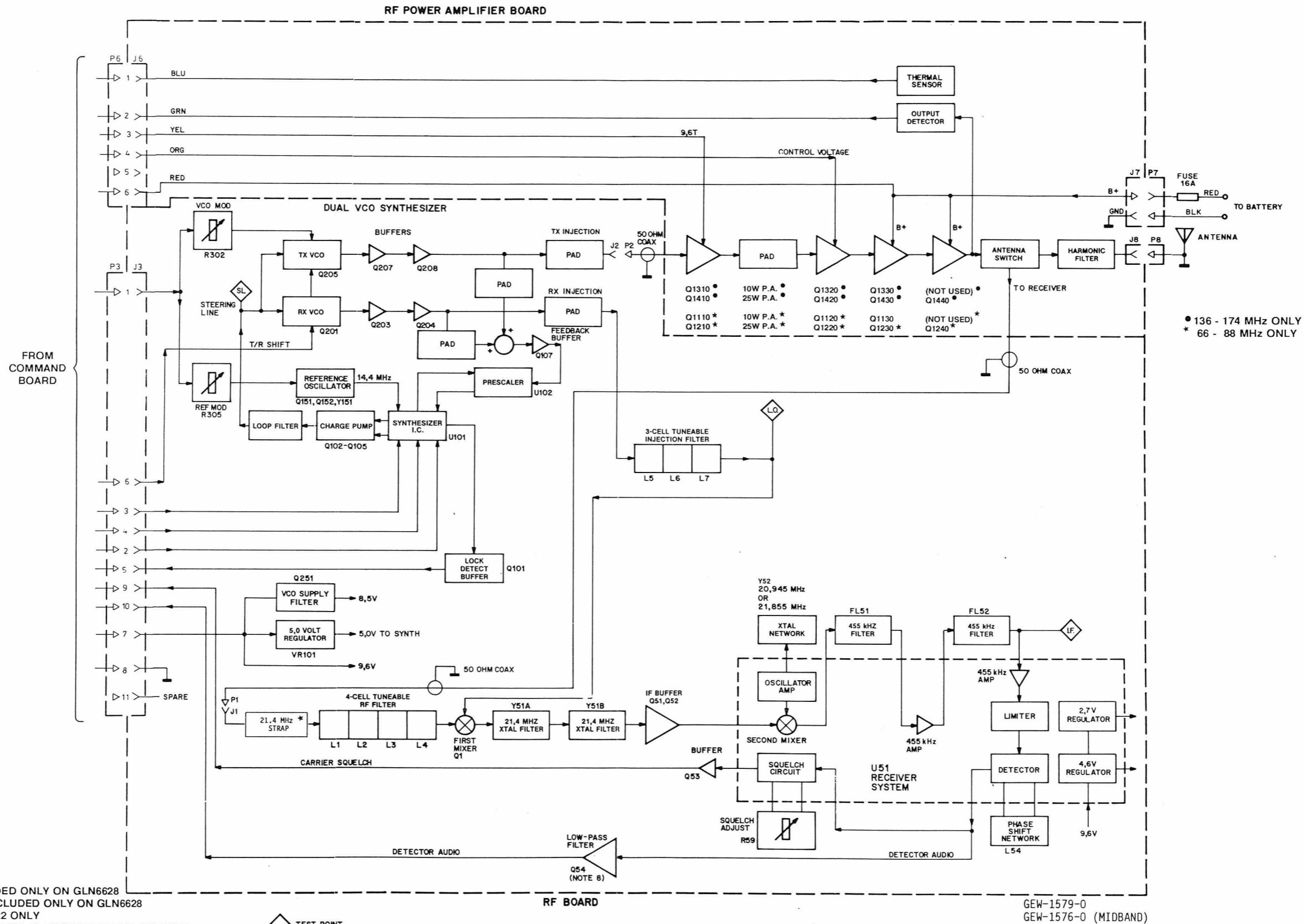


- NOTES:
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 3. HUB SWITCH FOR GMN6122 ONLY
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5. ○—○ JUMPER INSERTED.
- JUMPER DEPENDS ON MODEL TYPE AND OPTIONS ORDERED.
- ○ JUMPER NOT INSERTED.
6. PART TYPE AND USAGE DEPENDS ON RADIO TYPE AND OPTIONS.
7. AN OPTIONAL REMOTE MOUNT CABLE CAN BE USED TO CONNECT THE CONTROL HEAD AND THE RADIO TOGETHER.
8. NOT IN ALL VERSIONS.

EZ MODELS WITH OPTIONAL CONTROL HEADS
 G1031, G1032 & G1033
 FUNCTIONAL BLOCK DIAGRAM
 COMMAND BOARD

D405.122



- NOTES:
1. SELECT 5 CIRCUIT INCLUDED ONLY ON GLN6628
 2. EMERGENCY CIRCUITS INCLUDED ONLY ON GLN6628
 3. HUB SWITCH FOR GMN6122 ONLY
 4. THE VOLUME CONTROL, R1023, IS LOCATED IN THE CONTROL HEAD. IT IS REPEATED ON THE COMMAND BOARD TO CLEARLY SHOW ITS FUNCTION IN THE RECEIVER AUDIO CIRCUITS.
 5. ○ JUMPER INSERTED.
○--○ JUMPER DEPENDS ON MODEL TYPE AND OPTIONS ORDERED.
○ ○ JUMPER NOT INSERTED.
 6. PART TYPE AND USAGE DEPENDS ON RADIO TYPE AND OPTIONS.
 7. AN OPTIONAL REMOTE MOUNT CABLE CAN BE USED TO CONNECT THE CONTROL HEAD AND THE RADIO TOGETHER.
 8. NOT IN ALL VERSIONS.

● 136 - 174 MHz ONLY
* 66 - 88 MHz ONLY

CHAPTER
CHAPITRE
KAPITEL

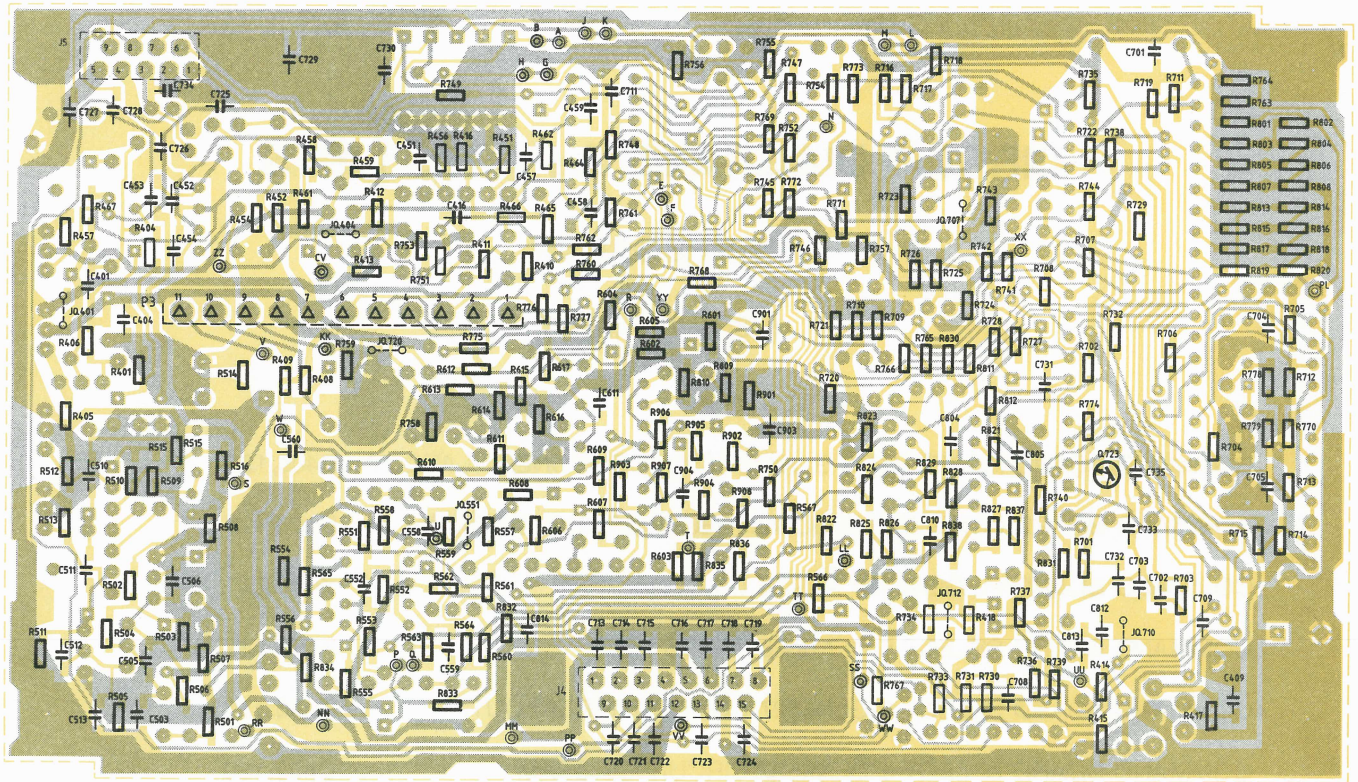
6

CIRCUIT DIAGRAMS & PARTS LISTS

MAIN BOARDS

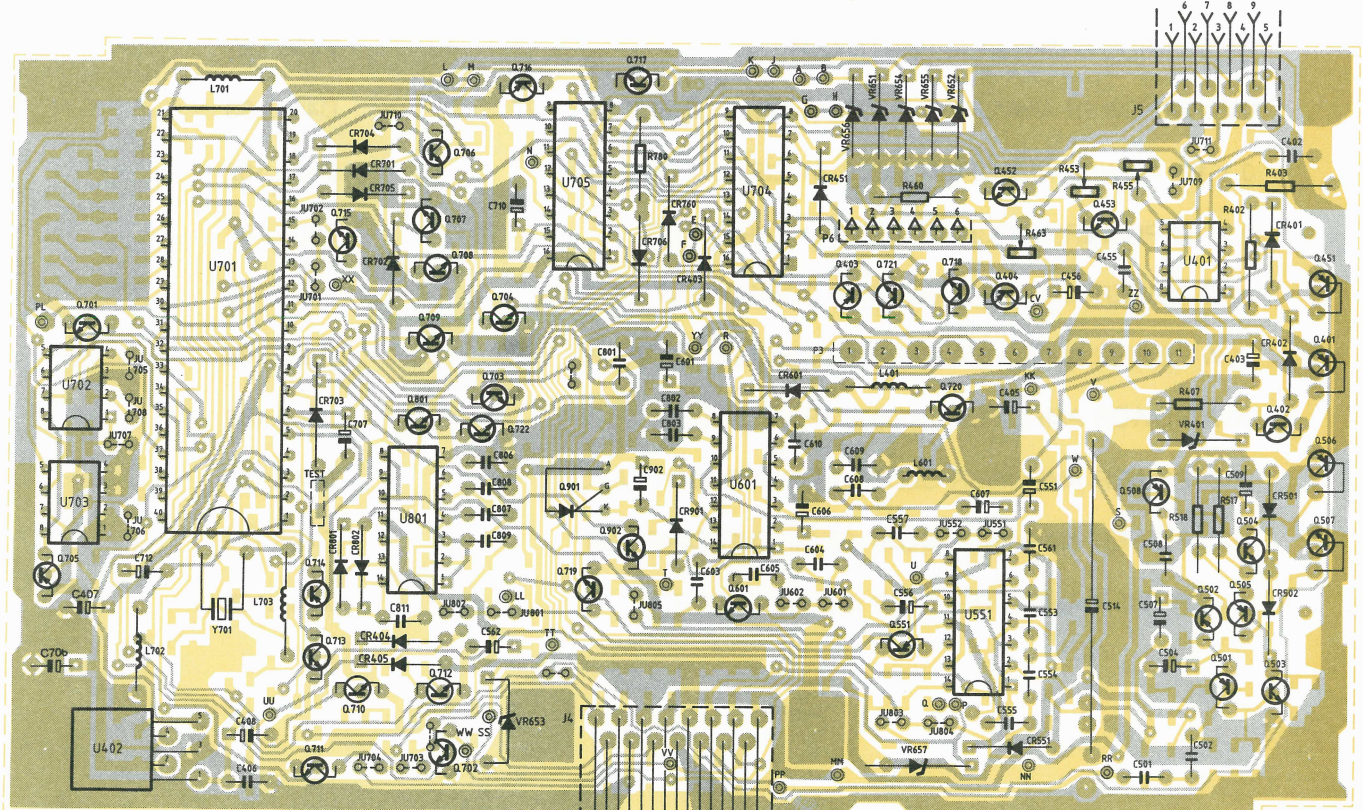
(136 - 174 MHz)

COMMAND BOARD PL/SELECT 5 GLN6984/6628 COMPONENT LAYOUT	D405.126
COMMAND BOARD PL/SELECT 5 GLN6984/6628 CIRCUIT DIAGRAM	D405.125
COMMAND BOARD PL GLN6984 PARTS LIST	X405.227
COMMAND BOARD SELECT 5 GLN6628 PARTS LIST	X405.194
COMMAND BOARD SELECT 5 GLN6627 COMPONENT LAYOUT	D405.151
COMMAND BOARD SELECT 5 GLN6627 CIRCUIT DIAGRAM	D405.150
COMMAND BOARD SELECT 5 GLN6627 PARTS LIST	X405.193
RF BOARDS GLD6165/66/69/70 COMPONENT LAYOUT	D405.147
RF BOARDS GLD6165/66/69/70 CIRCUIT DIAGRAM	D405.146
RF BOARDS GLD6165/66 PARTS LIST	X405.188
RF BOARDS GLD6169/70 PARTS LIST	X405.189
0.1-1W POWER AMPLIFIER GLD6161 COMPONENT LAYOUT	D405.133
0.1-1W POWER AMPLIFIER GLD6161 CIRCUIT DIAGRAM	D405.132
0.1-1W POWER AMPLIFIER GLD6161 PARTS LIST	X405.187
10W POWER AMPLIFIER GLD6157 COMPONENT LAYOUT	D405.135
10W POWER AMPLIFIER GLD6157 CIRCUIT DIAGRAM	D405.134
10W POWER AMPLIFIER GLD6157 PARTS LIST	X405.186
25W POWER AMPLIFIER GLD6153 COMPONENT LAYOUT	D405.137
25W POWER AMPLIFIER GLD6153 CIRCUIT DIAGRAM	D405.136
25W POWER AMPLIFIER GLD6153 PARTS LIST	X405.185



SHOWN FROM SOLDER SIDE

COMPONENT SIDE ● GEPD 4416 (8402693M01-B)
 SOLDER SIDE ● GEPD 4417 (8402693M01-B)
 OVERLAY ● GEPD 4419-1

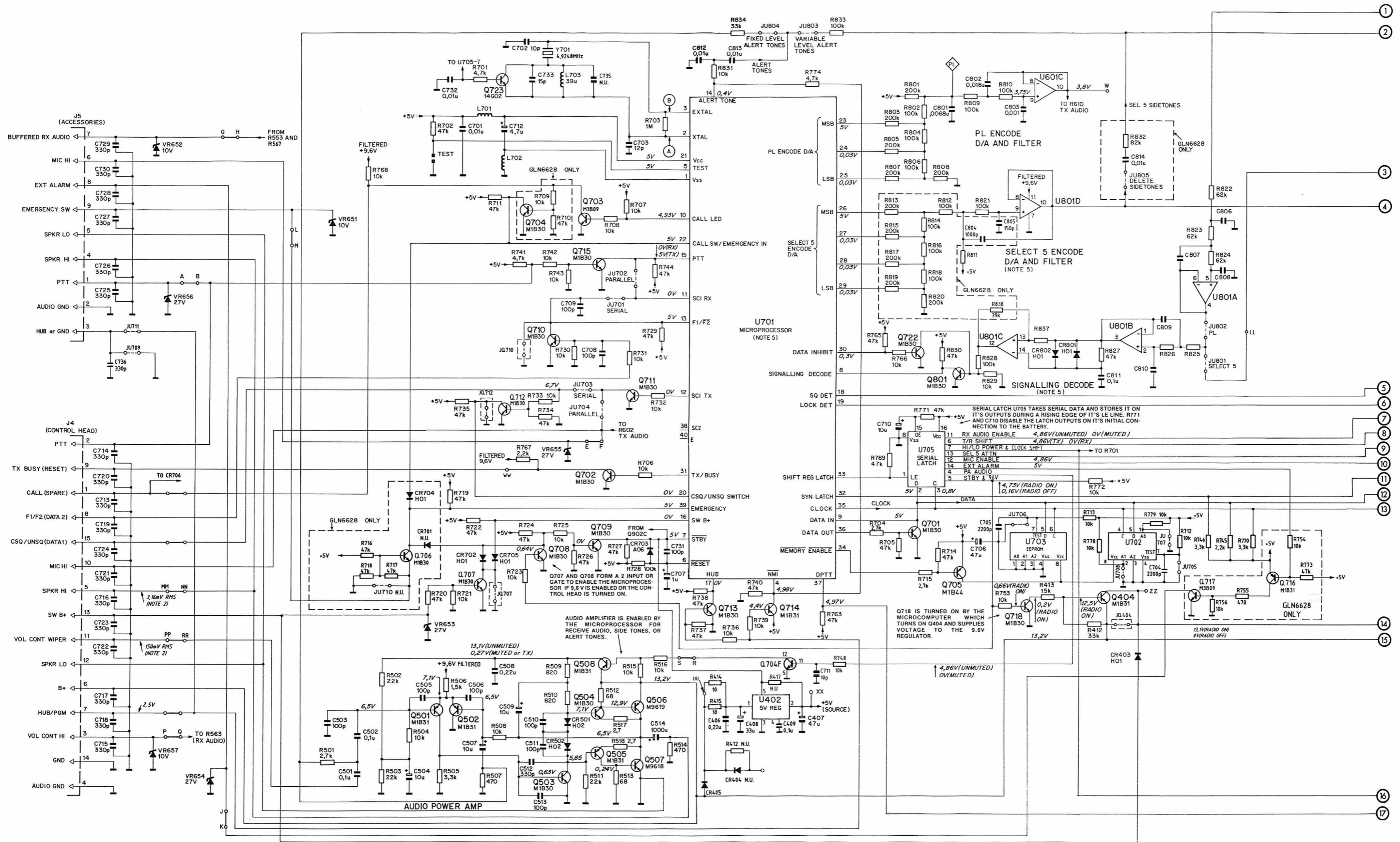


GLN6984A COMMAND BOARD (PL)
 GLN6628B COMMAND BOARD (SELECT 5 - HIGH - TIER)
 COMPONENT LAYOUT

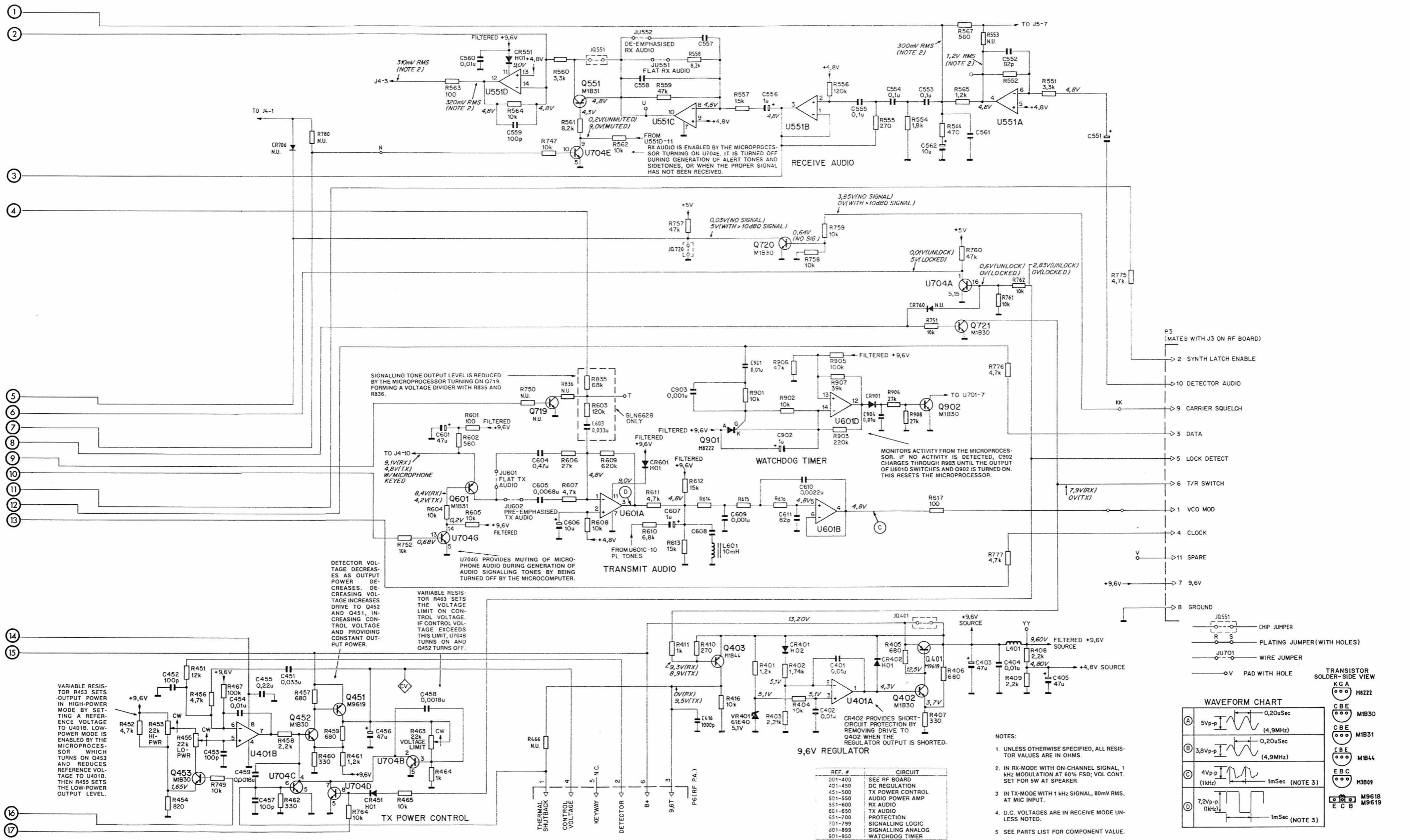
D405.126/2

SHOWN FROM COMPONENT SIDE

DOC. ISSUE 10.29.90



GLN6984 COMMAND BOARD (PL)
 GLN6628 COMMAND BOARD (SELECT 5 - HIGH - TIER)
 SH.1 OF 2 D405.125



PARTS LIST FOR COMMAND BOARD NOISE SQUELCH & "PL" GLN6984

Pos	Code No.	Description	Qt	Pos	Code No.	Description	Qt
C401	2111032A21	Capacitor 0.01uF 10% 50V X7R	1	C706	2311048B19	Capacitor 47uF 20% 16V	1
C402	0811051A07	Capacitor 0.01uF 5% 63V	1	C707	2311048B05	Capacitor 1uF 20% 50V	1
C403	2311048B19	Capacitor 47uF 20% 16V	1	C708	2111031A39	Capacitor 100pF 5% 50V NPO	1
C404	2111032A21	Capacitor 0.01uF 10% 50V X7R	1	C709	2111031A39	Capacitor 100pF 5% 50V NPO	1
C405	2311048B19	Capacitor 47uF 20% 16V	1	C710	2311048B13	Capacitor 10uF 20% 16V	1
C406	0811051A15	Capacitor 0.22uF 5% 63V	1	C711	2111031A39	Capacitor 100pF 5% 50V NPO	1
C407	2384538G29	Capacitor 47uF 20% 10V	1	C712	2311013D55	Capacitor 4.7pF 20% 20V	1
C408	2311048B17	Capacitor 33uF 20% 25V	1	C713	2111031A51	Capacitor 330pF 5% 50V NPO	1
C409	2111032A33	Capacitor 0.1uF 10% 50V X7R	1	C714	2111031A51	Capacitor 330pF 5% 50V NPO	1
C416	2111031A61	Capacitor 1000pF 5% 50V NPO	1	C715	2111031A51	Capacitor 330pF 5% 50V NPO	1
C451	2111032A27	Capacitor 0.033uF 10% 50V X7R	1	C716	2111031A51	Capacitor 330pF 5% 50V NPO	1
C452	2111031A39	Capacitor 100pF 5% 50V NPO	1	C717	2111031A51	Capacitor 330pF 5% 50V NPO	1
C453	2111031A39	Capacitor 100pF 5% 50V NPO	1	C718	2111031A51	Capacitor 330pF 5% 50V NPO	1
C454	2111032A21	Capacitor 0.01uF 10% 50V X7R	1	C719	2111031A51	Capacitor 330pF 5% 50V NPO	1
C455	0811051A15	Capacitor 0.22uF 5% 63V	1	C720	2111031A51	Capacitor 330pF 5% 50V NPO	1
C456	2311048B19	Capacitor 47uF 20% 16V	1	C721	2111031A51	Capacitor 330pF 5% 50V NPO	1
C457	2111031A39	Capacitor 100pF 5% 50V NPO	1	C722	2111031A51	Capacitor 330pF 5% 50V NPO	1
C458	2111031A65	Capacitor 1800pF 5% 50V NPO	1	C723	2111031A51	Capacitor 330pF 5% 50V NPO	1
C459	2111031A65	Capacitor 1800pF 5% 50V NPO	1	C724	2111031A51	Capacitor 330pF 5% 50V NPO	1
C501	0811051A13	Capacitor 0.1uF 5% 63V	1	C725	2111031A51	Capacitor 330pF 5% 50V NPO	1
C502	0811051A13	Capacitor 0.1uF 5% 63V	1	C726	2111031A51	Capacitor 330pF 5% 50V NPO	1
C503	2111031A39	Capacitor 100pF 5% 50V NPO	1	C727	2111031A51	Capacitor 330pF 5% 50V NPO	1
C504	2311048B13	Capacitor 10uF 20% 16V	1	C728	2111031A51	Capacitor 330pF 5% 50V NPO	1
C505	2111031A39	Capacitor 100pF 5% 50V NPO	1	C729	2111031A51	Capacitor 330pF 5% 50V NPO	1
C506	2111031A39	Capacitor 100pF 5% 50V NPO	1	C730	2111031A51	Capacitor 330pF 5% 50V NPO	1
C507	2311048B13	Capacitor 10uF 20% 16V	1	C731	2111031A39	Capacitor 100pF 5% 50V NPO	1
C508	0811051A15	Capacitor 0.22uF 5% 63V	1	C732	2111032A21	Capacitor 0.01uF 10%50V X7R	1
C509	2311048B13	Capacitor 10uF 20% 16V	1	C733	2111031A19	Capacitor 15pF 5% 50V NPO	1
C510	2111031A39	Capacitor 100pF 5% 50V NPO	1	C734	2111031A51	Capacitor 330pF 5% 50V NPO	1
C511	2111031A39	Capacitor 100pF 5% 50V NPO	1	C801	0811051A06	Capacitor 0.0068uF 5% 63V	1
C512	2111031A51	Capacitor 330pF 5% 50V NPO	1	C802	0811044A34	Capacitor 0.018uF 5% 63V	1
C513	2111031A39	Capacitor 100pF 5% 50V NPO	1	C803	0811051A01	Capacitor 0.001uF 5% 63V	1
C514	2302308M01	Capacitor 1000uF 20% 16V	1	C806	0811051A10	Capacitor 0.033uF 5% 63V	1
C551	2311048B13	Capacitor 10uF 20% 16V	1	C807	0811051A12	Capacitor 0.068uF 5% 63V	1
C552	2111031A37	Capacitor 82pF 5% 50V NPO	1	C808	0811051A04	Capacitor 0.0033uF 5% 63V	1
C553	0811051A13	Capacitor 0.1uF 5% 63V	1	C809	0811051A13	Capacitor 0.1uF 5% 63V	1
C554	0811051A13	Capacitor 0.1uF 5% 63V	1	C810	2111031A63	Capacitor 1200pF 5% 50V NPO	1
C555	0811051A13	Capacitor 0.1uF 5% 63V	1	C811	0811051A13	Capacitor 0.1uF 5% 63V	1
C556	2311048B05	Capacitor 1uF 20% 50V	1	C812	2111032A21	Capacitor 0.01uF 10%50V X7R	1
C557	0811051A09	Capacitor 0.022uF 5% 63V	1	C813	2111032A21	Capacitor 0.01uF 10%50V X7R	1
C558	2111032A13	Capacitor 0.0022uF 10%50V X7R	1	C901	2111032A21	Capacitor 0.01uF 10%50V X7R	1
C559	2111031A39	Capacitor 100pF 5% 50V NPO	1	C902	2311048B05	Capacitor 1uF 20% 50V	1
C560	2111032A21	Capacitor 0.01uF 10% 50V X7R	1	C903	2111031A61	Capacitor 1000pF 5% 50V NPO	1
C561	0811051A12	Capacitor 0.068uF 5% 63V	1	C904	2111032A21	Capacitor 0.01uF 10%50V X7R	1
C562	2311048B13	Capacitor 10uF 20% 16V	1	CR:			
C601	2311048B19	Capacitor 47uF 20% 16V	1	401	4883654H02	Diode Silicon	1
C604	0811051A17	Capacitor 0.47uF 5% 63V	1	402	4883654H01	Diode Silicon	1
C605	0811051A06	Capacitor 0.0068uF 5% 63V	1	403	4883654H01	Diode Silicon	1
C606	2311048B13	Capacitor 10uF 20% 16V	1	405	4802225M01	Diode Silicon	1
C607	2311048B05	Capacitor 1uF 20% 50V	1	451	4883654H01	Diode Silicon	1
C608	0811051A10	Capacitor 0.033uF 5% 63V	1	501	4883654H02	Diode Silicon	1
C609	0811051A01	Capacitor 0.001uF 5% 63V	1	502	4883654H02	Diode Silicon	1
C610	0811051A03	Capacitor 0.0022uF 5% 63V	1	551	4883654H01	Diode Silicon	1
C611	2111031A37	Capacitor 82pF 5% 50V NPO	1	601	4883654H01	Diode Silicon	1
C701	2111032A21	Capacitor 0.01uF 10% 50V X7R	1	702	4883654H01	Diode Silicon	1
C702	2111031A15	Capacitor 10pF 0.5% 50V NPO	1	703	4811034G15	Diode Germanium	1
C703	2111031A17	Capacitor 12pF 5% 50V NPO	1	705	4883654H01	Diode Silicon	1
C704	2111032A13	Capacitor 0.0022uF 10%50V X7R	1	801	4883654H01	Diode Silicon	1
C705	2111032A13	Capacitor 0.0022uF 10%50V X7R	1	802	4883654H01	Diode Silicon	1

PARTS LIST FOR COMMAND BOARD NOISE SQUELCH & "PL" GLN6984

Pos	Code No.	Description	Qt	Pos	Code No.	Description	Qt
CR:				Q720	4802081B30	Transistor M1B30	1
901	4883654H01	Diode Silicon	1	Q721	4802081B30	Transistor M1B30	1
J4	0980060K01	Conn D Submin 15 way	1	Q722	4802081B30	Transistor M1B30	1
J5	0980059K01	Conn D Submin 9 way	1	Q723	4880214G02	Transistor M4G02	1
JU:				Q801	4802081B30	Transistor M1B30	1
551	0602455B99	Jumper	1	Q901	4880182D22	Thyristor M2D22	1
552	0602455B99	Jumper	1	Q902	4802081B30	Transistor M1B30	1
601	0602455B99	Jumper	1	R401	0611077A76	Resistor 1200 5% 0.125W	1
602	0602455B99	Jumper	1	R402	0610621C18	Resistor 1740 1% 0.25W	1
701	0602455B99	Jumper	1	R403	0610621C28	Resistor 2210 1% 0.25W	1
702	0602455B99	Jumper	1	R404	0611077A98	Resistor 10k 5% 0.125W	1
703	0602455B99	Jumper	1	R405	0611077A70	Resistor 680 5% 0.125W	1
704	0602455B99	Jumper	1	R406	0611077A70	Resistor 680 5% 0.125W	1
705	0602455B99	Jumper	1	R407	1702280M31	Resistor 330 5% 0.5W	1
706	0602455B99	Jumper	1	R408	0611077A82	Resistor 2200 5% 0.125W	1
707	0602455B99	Jumper	1	R409	0611077A82	Resistor 2200 5% 0.125W	1
708	0602455B99	Jumper	1	R410	0611077A60	Resistor 270 5% 0.125W	1
711	0602455B99	Jumper	1	R411	0611077A74	Resistor 1000 5% 0.125W	1
802	0602455B99	Jumper	1	R412	0611077B11	Resistor 33k 5% 0.125W	1
803	0602455B99	Jumper	1	R413	0611077B03	Resistor 15k 5% 0.125W	1
804	0602455B99	Jumper	1	R414	0611077A26	Resistor 10 5% 0.125W	1
L401	2483961B02	Choke green 5 turns	1	R415	0611077A26	Resistor 10 5% 0.125W	1
L601	2482419M61	Coil 10mH	1	R416	0611077A98	Resistor 10k 5% 0.125W	1
L701	2483961B02	Choke green 5 turns	1	R451	0611077B01	Resistor 12k 5% 0.125W	1
L702	2483961B02	Choke green 5 turns	1	R452	0611077A90	Resistor 4700 5% 0.125W	1
L703	2411047C63	Choke 39uH	1	R453	1805500L08	Resistor 22k variable	1
P003	2880261H01	Connector 11 Contacts	1	R454	0611077A72	Resistor 820 5% 0.125W	1
P006	2880260H01	Connector 6 ways	1	R455	1805500L08	Resistor 22k variable	1
Q401	4800869619	Transistor M9619	1	R456	0611077A90	Resistor 4700 5% 0.125W	1
Q402	4802081B30	Transistor M1B30	1	R457	0611077A70	Resistor 680 5% 0.125W	1
Q403	4802081B44	Transistor M1B44	1	R458	0611077A82	Resistor 2200 5% 0.125W	1
Q404	4802081B31	Transistor M1B31	1	R459	0611077A70	Resistor 680 5% 0.125W	1
Q451	4800869619	Transistor M9619	1	R460	1702280M31	Resistor 330 5% 0.5W	1
Q452	4802081B30	Transistor M1B30	1	R461	0611077A76	Resistor 1200 5% 0.125W	1
Q453	4802081B30	Transistor M1B30	1	R462	0611077A62	Resistor 330 5% 0.125W	1
Q501	4802081B31	Transistor M1B31	1	R463	1805500L08	Resistor 22k variable	1
Q502	4802081B31	Transistor M1B31	1	R464	0611077A74	Resistor 1000 5% 0.125W	1
Q503	4802081B30	Transistor M1B30	1	R465	0611077A98	Resistor 10k 5% 0.125W	1
Q504	4802081B30	Transistor M1B30	1	R467	0611077B23	Resistor 100k 5% 0.125W	1
Q505	4802081B31	Transistor M1B31	1	R501	0611077A84	Resistor 2700 5% 0.125W	1
Q506	4800869619	Transistor M9619	1	R502	0611077B07	Resistor 22k 5% 0.125W	1
Q507	4800869618	Transistor M9618	1	R503	0611077B07	Resistor 22k 5% 0.125W	1
Q508	4802081B31	Transistor M1B31	1	R504	0611077A98	Resistor 10k 5% 0.125W	1
Q551	4802081B31	Transistor M1B31	1	R505	0611077A86	Resistor 3300 5% 0.125W	1
Q601	4802081B31	Transistor M1B31	1	R506	0611077A78	Resistor 1500 5% 0.125W	1
Q701	4802081B30	Transistor M1B30	1	R507	0611077A66	Resistor 470 5% 0.125W	1
Q702	4802081B30	Transistor M1B30	1	R508	0611077A98	Resistor 10k 5% 0.125W	1
Q703	4811043B09	Transistor M3B09	1	R509	0611077A72	Resistor 820 5% 0.125W	1
Q705	4802081B44	Transistor M1B44	1	R510	0611077A72	Resistor 820 5% 0.125W	1
Q707	4802081B30	Transistor M1B30	1	R511	0611077B07	Resistor 22k 5% 0.125W	1
Q708	4802081B30	Transistor M1B30	1	R512	0611077A46	Resistor 68 5% 0.125W	1
Q709	4802081B30	Transistor M1B30	1	R513	0611077A46	Resistor 68 5% 0.125W	1
Q710	4802081B30	Transistor M1B30	1	R514	0611077A66	Resistor 470 5% 0.125W	1
Q711	4802081B30	Transistor M1B30	1	R515	0611077A98	Resistor 10k 5% 0.125W	1
Q712	4802081B30	Transistor M1B30	1	R516	0611077A98	Resistor 10k 5% 0.125W	1
Q713	4802081B30	Transistor M1B30	1	R517	1702280M06	Resistor 2.7 5% 0.5W	1
Q714	4802081B31	Transistor M1B31	1	R518	1702280M06	Resistor 2.7 5% 0.5W	1
Q715	4802081B30	Transistor M1B30	1	R551	0611077A86	Resistor 3300 5% 0.125W	1
Q718	4802081B30	Transistor M1B30	1	R552	0611077B31	Resistor 220k 5% 0.125W	1

PARTS LIST FOR COMMAND BOARD NOISE SQUELCH & "PL" GLN6984

Pos	Code No.	Description	Qt	Pos	Code No.	Description	Qt
R554	0611077A80	Resistor 1800 5% 0.125W	1	R735	0611077B15	Resistor 47k 5% 0.125W	1
R555	0611077A60	Resistor 270 5% 0.125W	1	R736	0611077A98	Resistor 10k 5% 0.125W	1
R556	0611077B25	Resistor 120k 5% 0.125W	1	R737	0611077B15	Resistor 47k 5% 0.125W	1
R557	0611077B03	Resistor 15k 5% 0.125W	1	R738	0611077B15	Resistor 47k 5% 0.125W	1
R558	0611077A96	Resistor 8200 5% 0.125W	1	R739	0611077A98	Resistor 10k 5% 0.125W	1
R559	0611077B15	Resistor 47k 5% 0.125W	1	R740	0611077B15	Resistor 47k 5% 0.125W	1
R560	0611077A86	Resistor 3300 5% 0.125W	1	R741	0611077A90	Resistor 4700 5% 0.125W	1
R561	0611077A96	Resistor 8200 5% 0.125W	1	R742	0611077A98	Resistor 10k 5% 0.125W	1
R562	0611077A98	Resistor 10k 5% 0.125W	1	R743	0611077A98	Resistor 10k 5% 0.125W	1
R563	0611077A50	Resistor 100 5% 0.125W	1	R744	0611077B15	Resistor 47k 5% 0.125W	1
R564	0611077A98	Resistor 10k 5% 0.125W	1	R745	0611077A82	Resistor 2200 5% 0.125W	1
R565	0611077A76	Resistor 1200 5% 0.125W	1	R746	0611077A86	Resistor 3300 5% 0.125W	1
R566	0611077A66	Resistor 470 5% 0.125W	1	R747	0611077A98	Resistor 10k 5% 0.125W	1
R567	0611077A68	Resistor 560 5% 0.125W	1	R748	0611077A98	Resistor 10k 5% 0.125W	1
R601	0611077A50	Resistor 100 5% 0.125W	1	R749	0611077A98	Resistor 10k 5% 0.125W	1
R602	0611077A68	Resistor 560 5% 0.125W	1	R751	0611077A98	Resistor 10k 5% 0.125W	1
R604	0611077A98	Resistor 10k 5% 0.125W	1	R752	0611077A98	Resistor 10k 5% 0.125W	1
R605	0611077A98	Resistor 10k 5% 0.125W	1	R753	0611077A98	Resistor 10k 5% 0.125W	1
R606	0611077B09	Resistor 27k 5% 0.125W	1	R757	0611077B15	Resistor 47k 5% 0.125W	1
R607	0611077A90	Resistor 4700 5% 0.125W	1	R758	0611077A98	Resistor 10k 5% 0.125W	1
R608	0611077A98	Resistor 10k 5% 0.125W	1	R759	0611077A98	Resistor 10k 5% 0.125W	1
R609	0611077B42	Resistor 620k 5% 0.125W	1	R760	0611077B15	Resistor 47k 5% 0.125W	1
R610	0611077A94	Resistor 6800 5% 0.125W	1	R761	0611077A98	Resistor 10k 5% 0.125W	1
R611	0611077A90	Resistor 4700 5% 0.125W	1	R762	0611077A98	Resistor 10k 5% 0.125W	1
R612	0611077B03	Resistor 15k 5% 0.125W	1	R763	0611077B15	Resistor 47k 5% 0.125W	1
R613	0611077B03	Resistor 15k 5% 0.125W	1	R764	0611077A98	Resistor 10k 5% 0.125W	1
R614	0611077B11	Resistor 33k 5% 0.125W	1	R765	0611077B15	Resistor 47k 5% 0.125W	1
R615	0611077B23	Resistor 100k 5% 0.125W	1	R766	0611077A98	Resistor 10k 5% 0.125W	1
R616	0611077B23	Resistor 100k 5% 0.125W	1	R767	0611077A82	Resistor 2200 5% 0.125W	1
R617	0611077A50	Resistor 100 5% 0.125W	1	R768	0611077A98	Resistor 10k 5% 0.125W	1
R701	0611077A90	Resistor 4700 5% 0.125W	1	R769	0611077B15	Resistor 47k 5% 0.125W	1
R702	0611077B15	Resistor 47k 5% 0.125W	1	R770	0611077A86	Resistor 3300 5% 0.125W	1
R703	0611077B47	Resistor 1M 5% 0.125W	1	R771	0611077B15	Resistor 47k 5% 0.125W	1
R704	0611077A84	Resistor 2700 5% 0.125W	1	R772	0611077A98	Resistor 10k 5% 0.125W	1
R705	0611077B15	Resistor 47k 5% 0.125W	1	R774	0611077A90	Resistor 4700 5% 0.125W	1
R706	0611077A98	Resistor 10k 5% 0.125W	1	R775	0611077A90	Resistor 4700 5% 0.125W	1
R707	0611077A98	Resistor 10k 5% 0.125W	1	R776	0611077A90	Resistor 4700 5% 0.125W	1
R708	0611077A98	Resistor 10k 5% 0.125W	1	R777	0611077A90	Resistor 4700 5% 0.125W	1
R711	0611077B15	Resistor 47k 5% 0.125W	1	R778	0611077A98	Resistor 10k 5% 0.125W	1
R712	0611077A98	Resistor 10k 5% 0.125W	1	R779	0611077A98	Resistor 10k 5% 0.125W	1
R713	0611077A98	Resistor 10k 5% 0.125W	1	R801	0611077H18	Resistor 200k 1% 0.125W	1
R714	0611077B15	Resistor 47k 5% 0.125W	1	R802	0611077G88	Resistor 100k 1% 0.125W	1
R715	0611077A84	Resistor 2700 5% 0.125W	1	R803	0611077H18	Resistor 200k 1% 0.125W	1
R719	0611077B15	Resistor 47k 5% 0.125W	1	R804	0611077G88	Resistor 100k 1% 0.125W	1
R720	0611077B15	Resistor 47k 5% 0.125W	1	R805	0611077H18	Resistor 200k 1% 0.125W	1
R721	0611077A98	Resistor 10k 5% 0.125W	1	R806	0611077G88	Resistor 100k 1% 0.125W	1
R722	0611077B15	Resistor 47k 5% 0.125W	1	R807	0611077H18	Resistor 200k 1% 0.125W	1
R723	0611077A98	Resistor 10k 5% 0.125W	1	R808	0611077H18	Resistor 200k 1% 0.125W	1
R724	0611077B15	Resistor 47k 5% 0.125W	1	R809	0611077B23	Resistor 100k 5% 0.125W	1
R725	0611077A98	Resistor 10k 5% 0.125W	1	R810	0611077B23	Resistor 100k 5% 0.125W	1
R726	0611077B15	Resistor 47k 5% 0.125W	1	R811	0611077B23	Resistor 100k 5% 0.125W	1
R727	0611077B15	Resistor 47k 5% 0.125W	1	R821	0611077B23	Resistor 100k 5% 0.125W	1
R728	0611077B23	Resistor 100k 5% 0.125W	1	R822	0611077B18	Resistor 62k 5% 0.125W	1
R729	0611077B15	Resistor 47k 5% 0.125W	1	R823	0611077B18	Resistor 62k 5% 0.125W	1
R730	0611077A98	Resistor 10k 5% 0.125W	1	R824	0611077B18	Resistor 62k 5% 0.125W	1
R731	0611077A98	Resistor 10k 5% 0.125W	1	R825	0611077B18	Resistor 62k 5% 0.125W	1
R732	0611077A98	Resistor 10k 5% 0.125W	1	R826	0611077B18	Resistor 62k 5% 0.125W	1
R733	0611077A98	Resistor 10k 5% 0.125W	1	R827	0611077B15	Resistor 47k 5% 0.125W	1
R734	0611077B15	Resistor 47k 5% 0.125W	1	R828	0611077B23	Resistor 100k 5% 0.125W	1

PARTS LIST FOR COMMAND BOARD NOISE SQUELCH & "PL" GLN6984

Pos	Code No.	Description	Qt	Pos	Code No.	Description	Qt
R829	0611077A98	Resistor 10k 5% 0.125W	1				
R830	0611077B15	Resistor 47k 5% 0.125W	1				
R831	0611077A98	Resistor 10k 5% 0.125W	1				
R833	0611077B23	Resistor 100k 5% 0.125W	1				
R834	0611077B11	Resistor 33k 5% 0.125W	1				
R837	0611077A01	Resistor Jumper	1				
R901	0611077A98	Resistor 10k 5% 0.125W	1				
R902	0611077A98	Resistor 10k 5% 0.125W	1				
R903	0611077B31	Resistor 220k 5% 0.125W	1				
R904	0611077B09	Resistor 27k 5% 0.125W	1				
R905	0611077B23	Resistor 100k 5% 0.125W	1				
R906	0611077B15	Resistor 47k 5% 0.125W	1				
R907	0611077B13	Resistor 39k 5% 0.125W	1				
R908	0611077B09	Resistor 27k 5% 0.125W	1				
U401	5184621K85	Dual Op Amp MC4558	1				
U402	5102080B59	5V Regulator 1M2925T	1				
U551	5183629M06	Quad Op Amp M29M06	1				
U601	5183629M06	Quad Op Amp M29M06	1				
U701	5102455M16	uP with Firmware EZA Select 5	1				
U704	5184320A32	Driver M20A32	1				
U705	5184704M04	Serial Latch M27M42	1				
U801	5183629M06	Quad Op Amp M29M06	1				
VR:							
401	4883461E40	Diode Zener 5.1V	1				
651	4882256C11	Diode Zener 10V	1				
652	4882256C11	Diode Zener 10V	1				
653	4884805A25	Diode Zener 27V	1				
654	4884805A25	Diode Zener 27V	1				
655	4884805A25	Diode Zener 27V	1				
656	4884805A25	Diode Zener 27V	1				
657	4882256C11	Diode Zener 10V	1				
Y701	4802081B47	Crystal Quarz 4.9248MHz	1				
		NON REFERENCED ITEMS					
	0584899A01	Rivet	2				
	0902808R11	Socket DIL for U701	1				
	0902808R02	Socket DIL for U702	1				
	0902808R02	Socket DIL for U703	1				
	1480067K01	Insulator Connector for J4	1				
	1481392E02	Insulator Cover	1				
	7505295B01	Pad Crystal Base for Y701	1				
	8402693M02	Board Printed Circuit	1				
	2680212H01	Heatsink	1				

PARTS LIST FOR COMMAND BOARD SELECT 5 GLN6628

Pos	Code No.	Description	Qt	Pos	Code No.	Description	Qt
C401	2111032A21	Capacitor 0.01uF 10% 50V X7R	1	C705	2111032A13	Capacitor 0.0022uF 10% 50V X7R	1
C402	0811051A07	Capacitor 0.01uF 5% 63V	1	C706	2311048B19	Capacitor 47uF 20% 16V	1
C403	2311048B19	Capacitor 47uF 20% 16V	1	C707	2311048B05	Capacitor 1uF 20% 50V	1
C404	2111032A21	Capacitor 0.01uF 10% 50V X7R	1	C708	2111031A39	Capacitor 100pF 5% 50V NPO	1
C405	2311048B19	Capacitor 47uF 20% 16V	1	C709	2111031A39	Capacitor 100pF 5% 50V NPO	1
C406	0811051A15	Capacitor 0.22uF 5% 63V	1	C710	2311048B13	Capacitor 10uF 20% 16V	1
C407	2384538G29	Capacitor 47uF 20% 10V	1	C711	2111031A39	Capacitor 100pF 5% 50V NPO	1
C408	2311048B17	Capacitor 33uF 20% 25V	1	C712	2311013D55	Capacitor 4.7uF 20% 20V	1
C409	2111032A33	Capacitor 0.1uF 10% 50V X7R	1	C713	2111031A51	Capacitor 330pF 5% 50V NPO	1
C416	2111031A61	Capacitor 1000pF 5% 50V NPO	1	C714	2111031A51	Capacitor 330pF 5% 50V NPO	1
C451	2111032A27	Capacitor 0.033uF 10% 50V X7R	1	C715	2111031A51	Capacitor 330pF 5% 50V NPO	1
C452	2111031A39	Capacitor 100pF 5% 50V NPO	1	C716	2111031A51	Capacitor 330pF 5% 50V NPO	1
C453	2111031A39	Capacitor 100pF 5% 50V NPO	1	C717	2111031A51	Capacitor 330pF 5% 50V NPO	1
C454	2111032A21	Capacitor 0.01uF 10% 50V X7R	1	C718	2111031A51	Capacitor 330pF 5% 50V NPO	1
C455	0811051A15	Capacitor 0.22uF 5% 63V	1	C719	2111031A51	Capacitor 330pF 5% 50V NPO	1
C456	2311048B19	Capacitor 47uF 20% 16V	1	C720	2111031A51	Capacitor 330pF 5% 50V NPO	1
C457	2111031A39	Capacitor 100pF 5% 50V NPO	1	C721	2111031A51	Capacitor 330pF 5% 50V NPO	1
C458	2111031A65	Capacitor 1800pF 5% 50V NPO	1	C722	2111031A51	Capacitor 330pF 5% 50V NPO	1
C459	2111031A65	Capacitor 1800pF 5% 50V NPO	1	C723	2111031A51	Capacitor 330pF 5% 50V NPO	1
C501	0811051A13	Capacitor 0.1uF 5% 63V	1	C724	2111031A51	Capacitor 330pF 5% 50V NPO	1
C502	0811051A13	Capacitor 0.1uF 5% 63V	1	C725	2111031A51	Capacitor 330pF 5% 50V NPO	1
C503	2111031A39	Capacitor 100pF 5% 50V NPO	1	C726	2111031A51	Capacitor 330pF 5% 50V NPO	1
C504	2111031B13	Capacitor 10uF 20% 16V	1	C727	2111031A51	Capacitor 330pF 5% 50V NPO	1
C505	2111031A39	Capacitor 100pF 5% 50V NPO	1	C728	2111031A51	Capacitor 330pF 5% 50V NPO	1
C506	2111031A39	Capacitor 100pF 5% 50V NPO	1	C729	2111031A51	Capacitor 330pF 5% 50V NPO	1
C507	2111031B13	Capacitor 10uF 20% 16V	1	C730	2111031A51	Capacitor 330pF 5% 50V NPO	1
C508	0811051A15	Capacitor 0.22uF 5% 63V	1	C731	2111031A39	Capacitor 100pF 5% 50V NPO	1
C509	2111031B13	Capacitor 10uF 20% 16V	1	C732	2111032A21	Capacitor 0.01uF 10% 50V X7R	1
C510	2111031A39	Capacitor 100pF 5% 50V NPO	1	C733	2111031A19	Capacitor 15pF 5% 50V NPO	1
C511	2111031A39	Capacitor 100pF 5% 50V NPO	1	C734	2111031A51	Capacitor 330pF 5% 50V NPO	1
C512	2111031A51	Capacitor 330pF 5% 50V NPO	1	C801	0811051A06	Capacitor 0.0068uF 5% 63V	1
C513	2111031A39	Capacitor 100pF 5% 50V NPO	1	C802	0811044A34	Capacitor 0.018uF 5% 63V	1
C514	2302308M01	Capacitor 1000uF 20% 16V	1	C803	0811051A01	Capacitor 0.001uF 5% 63V	1
C551	2111031B13	Capacitor 10uF 20% 16V	1	C804	2111031A61	Capacitor 1000pF 5% 50V NPO	1
C552	2111031A37	Capacitor 82pF 5% 50V NPO	1	C805	2111031A45	Capacitor 180pF 5% 50V NPO	1
C553	2111031A13	Capacitor 0.1uF 5% 63V	1	C809	0811051A01	Capacitor 0.001uF 5% 63V	1
C554	2111031A13	Capacitor 0.1uF 5% 63V	1	C810	2111031A56	Capacitor 510pF 5% 50V NPO	1
C555	2111031A13	Capacitor 0.1uF 5% 63V	1	C811	0811051A13	Capacitor 0.1uF 5% 63V	1
C556	2311048B05	Capacitor 1uF 20% 50V	1	C812	2111032A21	Capacitor 0.01uF 10% 50V X7R	1
C557	0811051A09	Capacitor 0.022uF 5% 63V	1	C813	2111032A21	Capacitor 0.01uF 10% 50V X7R	1
C558	2111031A13	Capacitor 0.0022uF 10%50V X7R	1	C814	2111032A21	Capacitor 0.01uF 10% 50V X7R	1
C559	2111031A39	Capacitor 100pF 5% 50V NPO	1	C901	2111032A21	Capacitor 0.01uF 10% 50V X7R	1
C560	2111032A21	Capacitor 0.01uF 10% 50V X7R	1	C902	2311048B05	Capacitor 1uF 20% 50V	1
C561	0811051A12	Capacitor 0.068uF 5% 63V	1	C903	2111031A61	Capacitor 1000pF 5% 50V NPO	1
C562	2111031B13	Capacitor 10uF 20% 16V	1	C904	2111032A21	Capacitor 0.01uF 10% 50V X7R	1
C601	2311048B19	Capacitor 47uF 20% 16V	1	CR:			
C603	0811051A10	Capacitor 0.033uF 5% 63V	1	401	4883654H02	Diode Silicon	1
C604	0811051A17	Capacitor 0.47uF 5% 63V	1	402	4883654H01	Diode Silicon	1
C605	0811051A06	Capacitor 0.0068uF 5% 63V	1	403	4883654H01	Diode Silicon	1
C606	2111031B13	Capacitor 10uF 20% 16V	1	405	4883654H01	Diode Silicon	1
C607	2311048B05	Capacitor 1uF 20% 50V	1	451	4883654H01	Diode Silicon	1
C608	0811051A10	Capacitor 0.033uF 5% 63V	1	501	4883654H02	Diode Silicon	1
C609	0811051A01	Capacitor 0.001uF 5% 63V	1	502	4883654H02	Diode Silicon	1
C610	0811051A03	Capacitor 0.0022uF 5% 63V	1	551	4883654H01	Diode Silicon	1
C611	2111031A37	Capacitor 82pF 5% 50V NPO	1	601	4883654H01	Diode Silicon	1
C701	2111032A21	Capacitor 0.01uF 10% 50V X7R	1	702	4883654H01	Diode Silicon	1
C702	2111031A15	Capacitor 10pF 0.5% 50V NPO	1	703	4811034G15	Diode Germanium	1
C703	0811051A17	Capacitor 12pF 5% 50V NPO	1	704	4883654H01	Diode Silicon	1
C704	2111032A13	Capacitor 0.0022uF 10%50V X7R	1	705	4883654H01	Diode Silicon	1

PARTS LIST FOR COMMAND BOARD SELECT 5 GLN6628

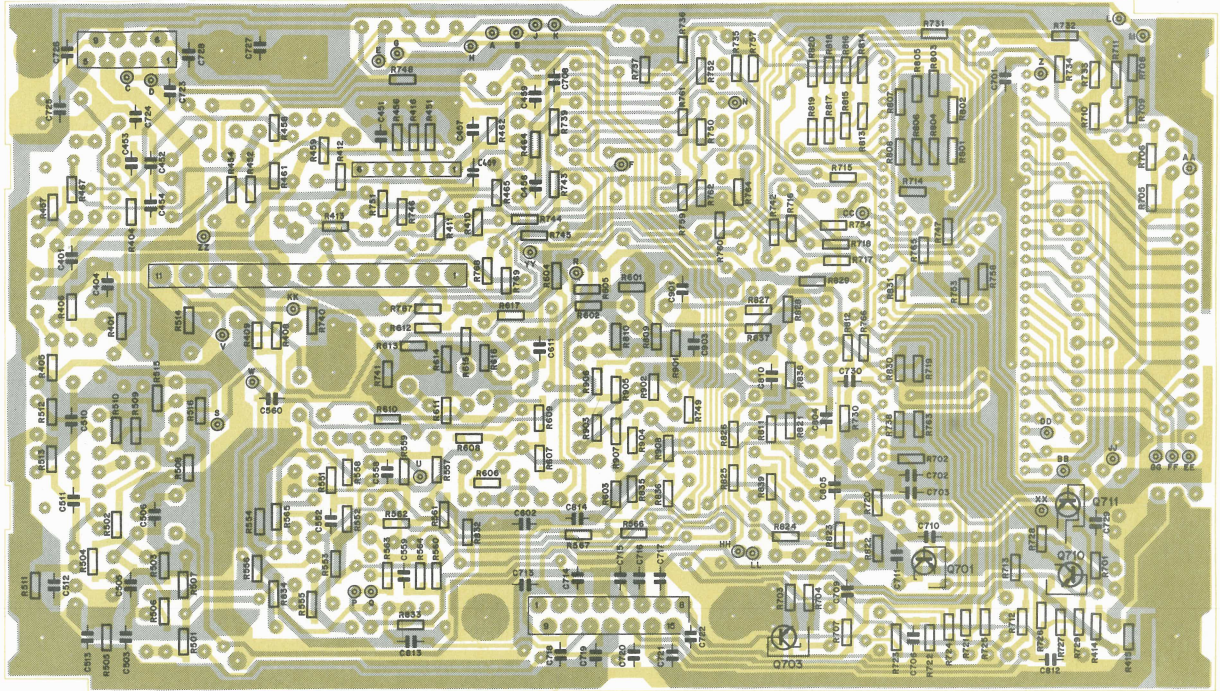
Pos	Code No.	Description	Qt	Pos	Code No.	Description	Qt
CR:				Q714	4802081B31	Transistor M1B31	1
801	4883654H01	Diode Silicon	1	Q715	4802081B30	Transistor M1B30	1
802	4883654H01	Diode Silicon	1	Q716	4802081B31	Transistor M1B31	1
901	4883654H01	Diode Silicon	1	Q717	4811043B09	Transistor M3B09	1
J4	0980060K01	Conn D Submin 15 way	1	Q718	4802081B30	Transistor M1B30	1
J5	0980059K01	Conn D Submin 9 way	1	Q720	4802081B30	Transistor M1B30	1
JU:				Q721	4802081B30	Transistor M1B30	1
551	0602369M84	Jumper	1	Q722	4802081B30	Transistor M1B30	1
552	0602369M84	Jumper	1	Q723	4880214G02	Transistor M4G02	1
601	0602369M84	Jumper	1	Q801	4802081B30	Transistor M1B30	1
602	0602369M84	Jumper	1	Q901	4880182D22	Thyristor M2D22	1
701	0602369M84	Jumper	1	Q902	4802081B30	Transistor M1B30	1
702	0602369M84	Jumper	1	R401	0611077A76	Resistor 1200 5% 0.125W	1
703	0602369M84	Jumper	1	R402	0610621C18	Resistor 1740 1% 0.25W	1
704	0602369M84	Jumper	1	R403	0610621C28	Resistor 2210 1% 0.25W	1
708	0602369M84	Jumper	1	R404	0611077A98	Resistor 10k 5% 0.125W	1
711	0602369M84	Jumper	1	R405	0611077A70	Resistor 680 5% 0.125W	1
801	0602369M84	Jumper	1	R406	0611077A70	Resistor 680 5% 0.125W	1
803	0602369M84	Jumper	1	R407	1702280M31	Resistor 330 5% 0.5W	1
804	0602369M84	Jumper	1	R408	0611077A82	Resistor 2200 5% 0.125W	1
805	0602369M84	Jumper	1	R409	0611077A82	Resistor 2200 5% 0.125W	1
L401	2483961B02	Choke green 5 turns	1	R410	0611077A60	Resistor 270 5% 0.125W	1
L601	2402419M61	Coil 10mH	1	R411	0611077A74	Resistor 1000 5% 0.125W	1
L701	2483961B02	Choke green 5 turns	1	R412	0611077B11	Resistor 33k 5% 0.125W	1
L702	2483961B02	Choke green 5 turns	1	R413	0611077B03	Resistor 15k 5% 0.125W	1
L703	2411047C63	Choke 39uH	1	R414	0611077A26	Resistor 10 5% 0.125W	1
P003	2880261H01	Connector 11 contacts	1	R415	0611077A26	Resistor 10 5% 0.125W	1
P006	2880261H01	Connector 6 way	1	R416	0611077A98	Resistor 1k 5% 0.125W	1
Q401	4800869619	Transistor M9619	1	R451	0611077B01	Resistor 12k 5% 0.125W	1
Q402	4802081B30	Transistor M1B30	1	R452	0611077A90	Resistor 4700 5% 0.125W	1
Q403	4802081B44	Transistor M1B44	1	R453	1805500L08	Resistor 22k variable	1
Q404	4802081B31	Transistor M1B31	1	R454	0611077A72	Resistor 820 5% 0.125W	1
Q451	4800869619	Transistor M9619	1	R455	1805500L08	Resistor 22k variable	1
Q452	4802081B30	Transistor M1B30	1	R456	0611077A90	Resistor 4700 5% 0.125W	1
Q453	4802081B30	Transistor M1B30	1	R457	0611077A70	Resistor 680 5% 0.125W	1
Q501	4802081B31	Transistor M1B31	1	R458	0611077A82	Resistor 2200 5% 0.125W	1
Q502	4802081B31	Transistor M1B31	1	R459	0611077A70	Resistor 680 5% 0.125W	1
Q503	4802081B30	Transistor M1B30	1	R460	1702280M31	Resistor 330 5% 0.5W	1
Q504	4802081B30	Transistor M1B30	1	R461	0611077A76	Resistor 1200 5% 0.125W	1
Q505	4802081B31	Transistor M1B31	1	R462	0611077A62	Resistor 330 5% 0.125W	1
Q506	4800869619	Transistor M9619	1	R463	1805500L08	Resistor 22k variable	1
Q507	4800869618	Transistor M9618	1	R464	0611077A74	Resistor 1000 5% 0.125W	1
Q508	4802081B31	Transistor M1B31	1	R465	0611077A98	Resistor 10k 5% 0.125W	1
Q551	4802081B31	Transistor M1B31	1	R467	0611077B23	Resistor 100k 5% 0.125W	1
Q601	4802081B31	Transistor M1B31	1	R501	0611077A84	Resistor 2700 5% 0.125W	1
Q701	4802081B30	Transistor M1B30	1	R502	0611077B07	Resistor 22k 5% 0.125W	1
Q702	4802081B30	Transistor M1B30	1	R503	0611077B07	Resistor 22k 5% 0.125W	1
Q703	4811043B09	Transistor M3B09	1	R504	0611077A98	Resistor 10k 5% 0.125W	1
Q704	4802081B30	Transistor M1B30	1	R505	0611077A86	Resistor 3300 5% 0.125W	1
Q705	4802081B44	Transistor M1B44	1	R506	0611077A78	Resistor 1500 5% 0.125W	1
Q706	4802081B30	Transistor M1B30	1	R507	0611077A66	Resistor 470 5% 0.125W	1
Q707	4802081B30	Transistor M1B30	1	R508	0611077A98	Resistor 10k 5% 0.125W	1
Q708	4802081B30	Transistor M1B30	1	R509	0611077A72	Resistor 820 5% 0.125W	1
Q709	4802081B30	Transistor M1B30	1	R510	0611077A72	Resistor 820 5% 0.125W	1
Q710	4802081B30	Transistor M1B30	1	R511	0611077B07	Resistor 22k 5% 0.125W	1
Q711	4802081B30	Transistor M1B30	1	R512	0611077A46	Resistor 68 5% 0.125W	1
Q712	4802081B30	Transistor M1B30	1	R513	0611077A46	Resistor 68 5% 0.125W	1
Q713	4802081B30	Transistor M1B30	1	R514	0611077A66	Resistor 470 5% 0.125W	1
				R515	0611077A98	Resistor 10k 5% 0.125W	1

PARTS LIST FOR COMMAND BOARD SELECT 5 GLN6628

Pos	Code No.	Description	Qt	Pos	Code No.	Description	Qt
R516	0611077A98	Resistor 10k 5% 0.125W	1	R724	0611077B15	Resistor 47k 5% 0.125W	1
R517	1702280M06	Resistor 2.7 5% 0.5W	1	R725	0611077A98	Resistor 10k 5% 0.125W	1
R518	1702280M06	Resistor 2.7 5% 0.5W	1	R726	0611077B15	Resistor 47k 5% 0.125W	1
R551	0611077A86	Resistor 3300 5% 0.125W	1	R727	0611077B15	Resistor 47k 5% 0.125W	1
R552	0611077B31	Resistor 220k 5% 0.125W	1	R728	0611077B23	Resistor 100k 5% 0.125W	1
R554	0611077A80	Resistor 1800 5% 0.125W	1	R729	0611077B15	Resistor 47k 5% 0.125W	1
R555	0611077A60	Resistor 270 5% 0.125W	1	R730	0611077A98	Resistor 10k 5% 0.125W	1
R556	0611077B25	Resistor 120k 5% 0.125W	1	R731	0611077A98	Resistor 10k 5% 0.125W	1
R557	0611077B03	Resistor 15k 5% 0.125W	1	R732	0611077A98	Resistor 10k 5% 0.125W	1
R558	0611077A96	Resistor 8200 5% 0.125W	1	R733	0611077A98	Resistor 10k 5% 0.125W	1
R559	0611077B15	Resistor 47k 5% 0.125W	1	R734	0611077B15	Resistor 47k 5% 0.125W	1
R560	0611077A86	Resistor 3300 5% 0.125W	1	R735	0611077B15	Resistor 47k 5% 0.125W	1
R561	0611077A96	Resistor 8200 5% 0.125W	1	R736	0611077A98	Resistor 10k 5% 0.125W	1
R562	0611077A98	Resistor 10k 5% 0.125W	1	R737	0611077B15	Resistor 47k 5% 0.125W	1
R563	0611077A50	Resistor 100 5% 0.125W	1	R738	0611077B15	Resistor 47k 5% 0.125W	1
R564	0611077A98	Resistor 10k 5% 0.125W	1	R739	0611077A98	Resistor 10k 5% 0.125W	1
R565	0611077A76	Resistor 1200 5% 0.125W	1	R740	0611077B15	Resistor 47k 5% 0.125W	1
R566	0611077A66	Resistor 470 5% 0.125W	1	R741	0611077A90	Resistor 4700 5% 0.125W	1
R567	0611077A68	Resistor 560 5% 0.125W	1	R742	0611077A98	Resistor 10k 5% 0.125W	1
R601	0611077A50	Resistor 100 5% 0.125W	1	R743	0611077A98	Resistor 10k 5% 0.125W	1
R602	0611077A68	Resistor 560 5% 0.125W	1	R744	0611077B15	Resistor 47k 5% 0.125W	1
R603	0611077B25	Resistor 120k 5% 0.125W	1	R745	0611077A82	Resistor 2200 5% 0.125W	1
R604	0611077A98	Resistor 10k 5% 0.125W	1	R746	0611077A86	Resistor 3300 5% 0.125W	1
R605	0611077A98	Resistor 10k 5% 0.125W	1	R747	0611077A98	Resistor 10k 5% 0.125W	1
R606	0611077B09	Resistor 27k 5% 0.125W	1	R748	0611077A98	Resistor 10k 5% 0.125W	1
R607	0611077A90	Resistor 4700 5% 0.125W	1	R749	0611077A98	Resistor 10k 5% 0.125W	1
R608	0611077A98	Resistor 10k 5% 0.125W	1	R751	0611077A98	Resistor 10k 5% 0.125W	1
R609	0611077B42	Resistor 620k 5% 0.125W	1	R752	0611077A98	Resistor 10k 5% 0.125W	1
R610	0611077A94	Resistor 6800 5% 0.125W	1	R753	0611077A98	Resistor 10k 5% 0.125W	1
R611	0611077A90	Resistor 4700 5% 0.125W	1	R754	0611077A98	Resistor 10k 5% 0.125W	1
R612	0611077B03	Resistor 15k 5% 0.125W	1	R755	0611077A66	Resistor 470 5% 0.125W	1
R613	0611077B03	Resistor 15k 5% 0.125W	1	R756	0611077A98	Resistor 10k 5% 0.125W	1
R614	0611077B11	Resistor 33k 5% 0.125W	1	R757	0611077B15	Resistor 47k 5% 0.125W	1
R615	0611077B23	Resistor 100k 5% 0.125W	1	R758	0611077A98	Resistor 10k 5% 0.125W	1
R616	0611077B23	Resistor 100k 5% 0.125W	1	R759	0611077A98	Resistor 10k 5% 0.125W	1
R617	0611077A50	Resistor 100 5% 0.125W	1	R760	0611077B15	Resistor 47k 5% 0.125W	1
R701	0611077A90	Resistor 4700 5% 0.125W	1	R761	0611077A98	Resistor 10k 5% 0.125W	1
R702	0611077B15	Resistor 47k 5% 0.125W	1	R762	0611077A98	Resistor 10k 5% 0.125W	1
R703	0611077B47	Resistor 1M 5% 0.125W	1	R763	0611077B15	Resistor 47k 5% 0.125W	1
R704	0611077A84	Resistor 2700 5% 0.125W	1	R764	0611077A98	Resistor 10k 5% 0.125W	1
R705	0611077B15	Resistor 47k 5% 0.125W	1	R765	0611077B15	Resistor 47k 5% 0.125W	1
R706	0611077A98	Resistor 10k 5% 0.125W	1	R766	0611077A98	Resistor 10k 5% 0.125W	1
R707	0611077A98	Resistor 10k 5% 0.125W	1	R767	0611077A82	Resistor 2200 5% 0.125W	1
R708	0611077A98	Resistor 10k 5% 0.125W	1	R768	0611077A98	Resistor 10k 5% 0.125W	1
R709	0611077A98	Resistor 10k 5% 0.125W	1	R769	0611077B15	Resistor 47k 5% 0.125W	1
R710	0611077B15	Resistor 47k 5% 0.125W	1	R770	0611077A86	Resistor 3300 5% 0.125W	1
R711	0611077B15	Resistor 47k 5% 0.125W	1	R771	0611077B15	Resistor 47k 5% 0.125W	1
R712	0611077A98	Resistor 10k 5% 0.125W	1	R772	0611077A98	Resistor 10k 5% 0.125W	1
R713	0611077A98	Resistor 10k 5% 0.125W	1	R773	0611077B15	Resistor 47k 5% 0.125W	1
R714	0611077B15	Resistor 47k 5% 0.125W	1	R774	0611077A90	Resistor 4700 5% 0.125W	1
R715	0611077A84	Resistor 2700 5% 0.125W	1	R775	0611077A90	Resistor 4700 5% 0.125W	1
R716	0611077B15	Resistor 47k 5% 0.125W	1	R776	0611077A90	Resistor 4700 5% 0.125W	1
R717	0611077B15	Resistor 47k 5% 0.125W	1	R777	0611077A90	Resistor 4700 5% 0.125W	1
R718	0611077B15	Resistor 47k 5% 0.125W	1	R779	0611077A98	Resistor 10k 5% 0.125W	1
R719	0611077B15	Resistor 47k 5% 0.125W	1	R801	0611077H18	Resistor 200k 1% 0.125W	1
R720	0611077B15	Resistor 47k 5% 0.125W	1	R802	0611077G88	Resistor 100k 1% 0.125W	1
R721	0611077A98	Resistor 10k 5% 0.125W	1	R803	0611077H18	Resistor 200k 1% 0.125W	1
R722	0611077B15	Resistor 47k 5% 0.125W	1	R804	0611077G88	Resistor 100k 1% 0.125W	1
R723	0611077A98	Resistor 10k 5% 0.125W	1	R805	0611077H18	Resistor 200k 1% 0.125W	1

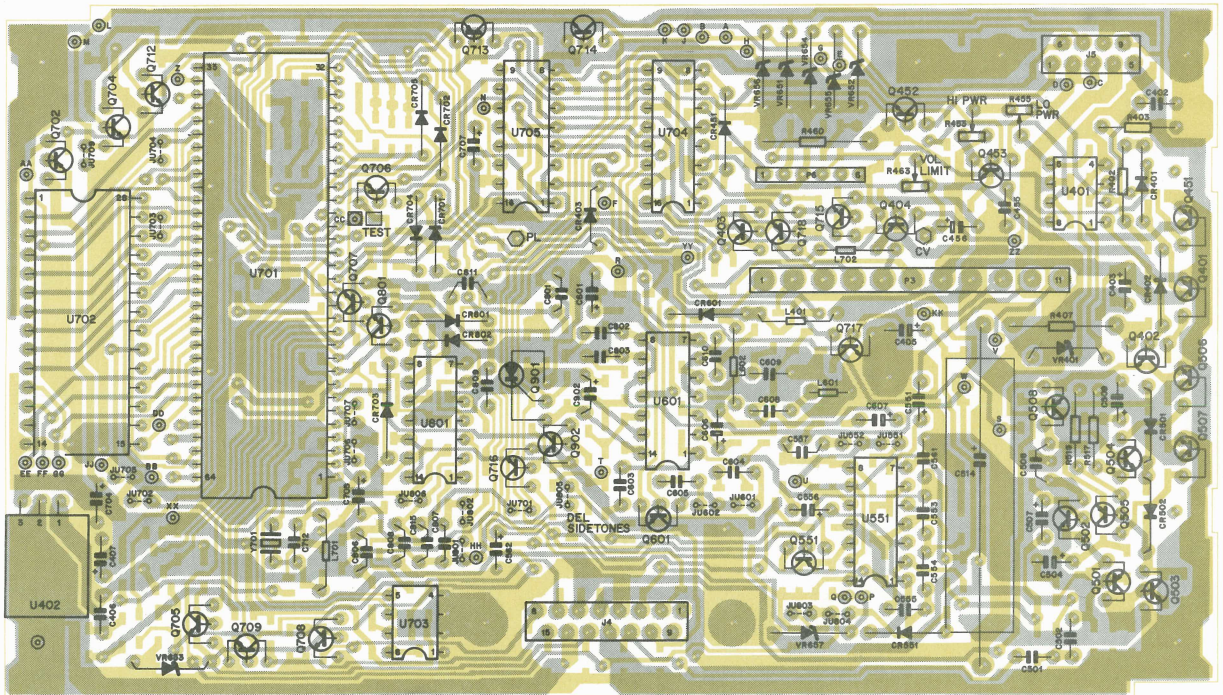
PARTS LIST FOR COMMAND BOARD SELECT 5 GLN6628

Pos	Code No.	Description	Qt	Pos	Code No.	Description	Qt
R806	0611077G88	Resistor 100k 1% 0.125W	1	657	4882256C11	Diode Zener 10V	1
R807	0611077H18	Resistor 200k 1% 0.125W	1	Y701	4802081B47	Crystal Quarz 4.9248 MHz	1
R808	0611077H18	Resistor 200k 1% 0.125W	1				
R809	0611077B23	Resistor 100k 5% 0.125W	1			NON REFERENCED ITEMS	
R810	0611077B23	Resistor 100k 5% 0.125W	1	0584899A01		Rivet	12
R811	0611077H18	Resistor 200k 1% 0.125W	1	0982808R11		Socket DIL for U701	1
R812	0611077G88	Resistor 100k 1% 0.125W	1	0982808R02		Socket DIL for U703	1
R813	0611077H18	Resistor 200k 1% 0.125W	1	0982808R02		Socket DIL for U702	1
R814	0611077G88	Resistor 100k 1% 0.125W	1	1480067K01		Insulator Connector for J4	1
R815	0611077H18	Resistor 200k 1% 0.125W	1	7505295B01		Pad Crystal Base for Y701	1
R816	0611077G88	Resistor 100k 1% 0.125W	1	8402693M02		Board Printed Circuit	1
R817	0611077H18	Resistor 200k 1% 0.125W	1	2680212H01		Heatsink	1
R818	0611077G88	Resistor 100k 1% 0.125W	1				
R819	0611077H18	Resistor 200k 1% 0.125W	1				
R820	0611077H18	Resistor 200k 1% 0.125W	1			** Part type and usage depends on radio type and options.	
R821	0611077B23	Resistor 100k 5% 0.125W	1				
R822	0611077B18	Resistor 62k 5% 0.125W	1				
R823	0611077B18	Resistor 62k 5% 0.125W	1				
R824	0611077B18	Resistor 62k 5% 0.125W	1				
R825	0611077B20	Resistor 75k 5% 0.125W	1				
R826	0611077B20	Resistor 75k 5% 0.125W	1				
R827	0611077B15	Resistor 47k 5% 0.125W	1				
R828	0611077B23	Resistor 100k 5% 0.125W	1				
R829	0611077A98	Resistor 10k 5% 0.125W	1				
R830	0611077B15	Resistor 47k 5% 0.125W	1				
R831	0611077A98	Resistor 10k 5% 0.125W	1				
R832	0611077B21	Resistor 82k 5% 0.125W	1				
R833	0611077B23	Resistor 100k 5% 0.125W	1				
R834	0611077B11	Resistor 33k 5% 0.125W	1				
R835	0611077B19	Resistor 68k 5% 0.125W	1				
R837	0611077A76	Resistor 1200 5% 0.125W	1				
R838	0611077B13	Resistor 39k 5% 0.125W	1				
R901	0611077A98	Resistor 10k 5% 0.125W	1				
R902	0611077A98	Resistor 10k 5% 0.125W	1				
R903	0611077B31	Resistor 220k 5% 0.125W	1				
R904	0611077B09	Resistor 27k 5% 0.125W	1				
R905	0611077B23	Resistor 100k 5% 0.125W	1				
R906	0611077B15	Resistor 47k 5% 0.125W	1				
R907	0611077B13	Resistor 39k 5% 0.125W	1				
R908	0611077B09	Resistor 27k 5% 0.125W	1				
U401	5184621K85	Dual Op Amp MC4558	1				
U402	5102080B59	5V Regulator LM2925T	1				
U551	5183629M06	Quad Op Amp M29M06	1				
U601	5183222M03	Quad Op Amp 4136	1				
U701	5102455M22	uP with Firmware EZA Select 5	1				
U702		Serial EEPROM **					
U703		Serial EEPROM **					
U704	5184320A32	Driver M20A32	1				
U705	5184704M04	Shift Register 14094	1				
U801	5183222M03	Quad Op Amp 4136	1				
VR:							
401	4883461E40	Diode Zener 5.1V	1				
651	4882256C11	Diode Zener 10V	1				
652	4882256C11	Diode Zener 10V	1				
653	4884805A25	Diode Zener 27V	1				
654	4884805A25	Diode Zener 27V	1				
655	4884805A25	Diode Zener 27V	1				
656	4884805A25	Diode Zener 27V	1				



SHOWN FROM SOLDER SIDE

COMPONENT SIDE ● 60W-1537-0
 SOLDER SIDE ● 60W-1538-0
 OVERLAY — 60W-1540-A

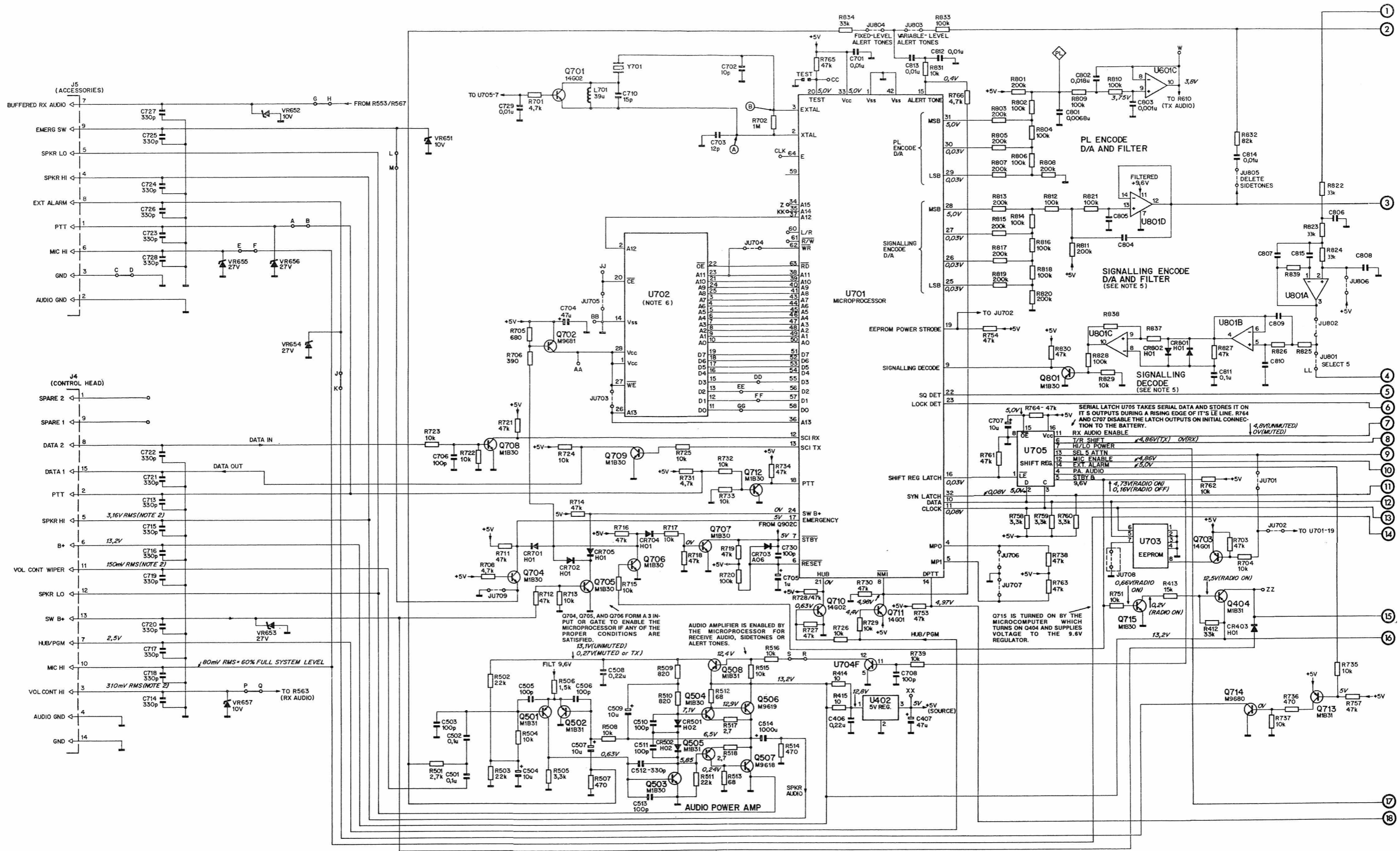


SHOWN FROM COMPONENT SIDE

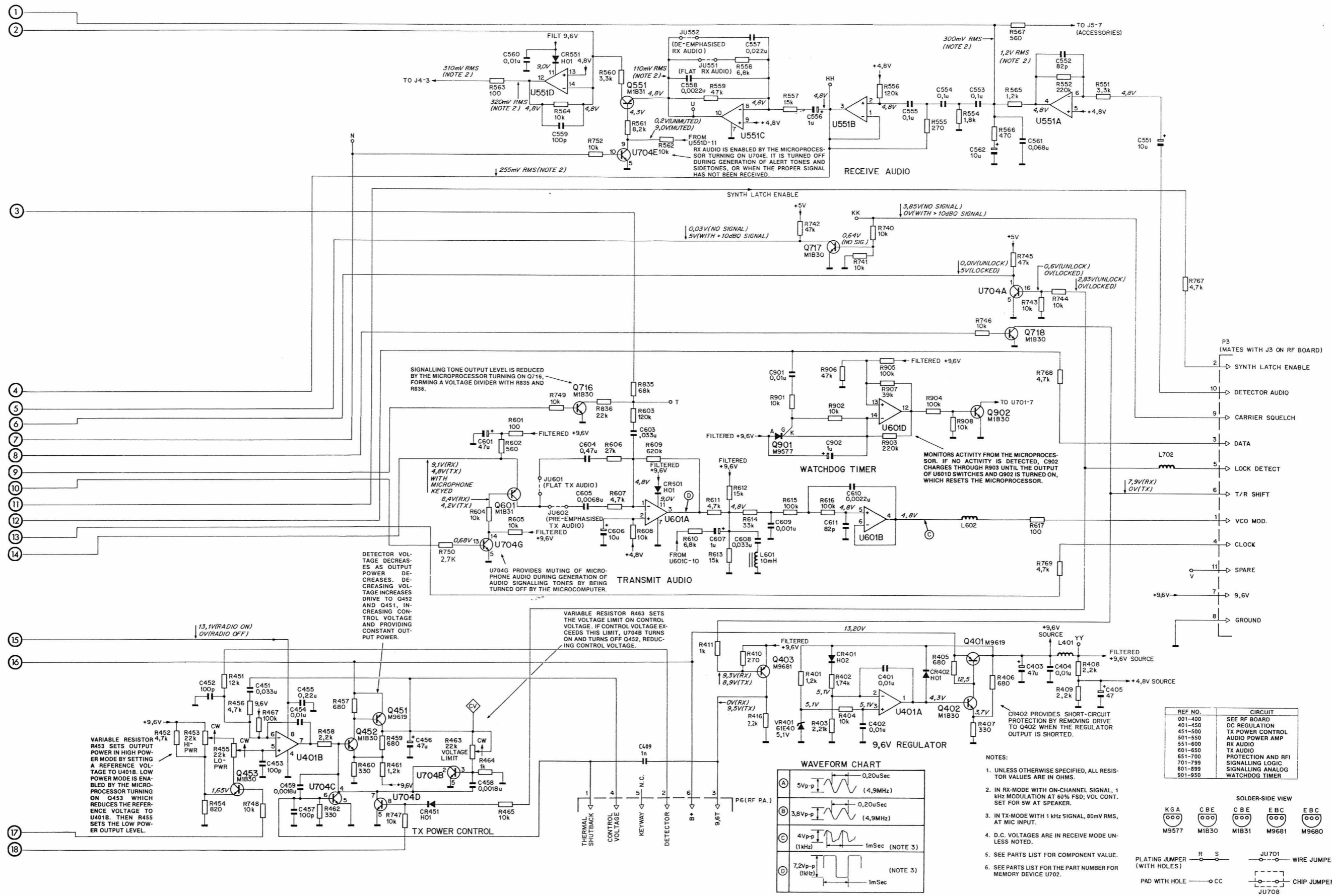
COMPONENT SIDE ● 60W-1537-0
 SOLDER SIDE ● 60W-1538-0
 OVERLAY — 60W-1539-0

**GLN6627 COMMAND BOARD
 (HIGH TIER - SELECT5)
 COMPONENT LAYOUT**

D405.151



GLN6627 COMMAND BOARD
 (HIGH TIER - SELECT 5)
 SH.1 OF 2 D405.150



**GLN6627 COMMAND BOARD
(HIGH TIER - SELECT 5)**

PARTS LIST FOR COMMAND BOARD GLN6627

Pos	Code No.	Description	Qt	Pos	Code No.	Description	Qt
C401	2111032A21	Capacitor 0.01uF 10% 50V Chip	1	C706	2111031A39	Capacitor 100pF 5% 50V Chip	1
C402	0811051A07	Capacitor 0.01uF 5% 63V	1	C707	2311048B13	Capacitor 10uF 20% 16V	1
C403	2311048B19	Capacitor 47uF 20% 16V	1	C708	2111031A39	Capacitor 100pF 5% 50V Chip	1
C404	2111032A21	Capacitor 0.01uF 10% 50V Chip	1	C710	2311048B13	Capacitor 10uF 20% 16V	1
C405	2311048B19	Capacitor 47uF 20% 16V	1	C713	2111031A51	Capacitor 330pF 5% 50V Chip	1
C406	0811051A15	Capacitor 0.22uF 5% 63V	1	C714	2111031A51	Capacitor 330pF 5% 50V Chip	1
C407	2384538G29	Capacitor 47uF 20% 10V	1	C715	2111031A51	Capacitor 330pF 5% 50V Chip	1
C409	2111031A61	Capacitor 1nF 20% 10V	1	C716	2111031A51	Capacitor 330pF 5% 50V Chip	1
C451	2111032A27	Capacitor 0.033uF 10% 50V Chip	1	C717	2111031A51	Capacitor 330pF 5% 50V Chip	1
C452	2111031A39	Capacitor 100pF 5% 50V Chip	1	C718	2111031A51	Capacitor 330pF 5% 50V Chip	1
C453	2111031A39	Capacitor 100pF 5% 50V Chip	1	C719	2111031A51	Capacitor 330pF 5% 50V Chip	1
C454	2111032A21	Capacitor 0.01uF 10% 50V Chip	1	C720	2111031A51	Capacitor 330pF 5% 50V Chip	1
C455	0811051A15	Capacitor 0.22uF 5% 63V	1	C721	2111031A51	Capacitor 330pF 5% 50V Chip	1
C456	2311048B19	Capacitor 47uF 20% 16V	1	C722	2111031A51	Capacitor 330pF 5% 50V Chip	1
C457	2111031A39	Capacitor 100pF 5% 50V Chip	1	C723	2111031A51	Capacitor 330pF 5% 50V Chip	1
C458	2111031A65	Capacitor 1800pF 5% 50V Chip	1	C724	2111031A51	Capacitor 330pF 5% 50V Chip	1
C459	2111031A65	Capacitor 1800pF 5% 50V Chip	1	C725	2111031A51	Capacitor 330pF 5% 50V Chip	1
C501	0811051A13	Capacitor 0.1uF 5% 63V	1	C726	2111031A51	Capacitor 330pF 5% 50V Chip	1
C502	0811051A13	Capacitor 0.1uF 5% 63V	1	C727	2111031A51	Capacitor 330pF 5% 50V Chip	1
C503	2111031A39	Capacitor 100pF 5% 50V Chip	1	C728	2111031A51	Capacitor 330pF 5% 50V Chip	1
C504	2311048B13	Capacitor 10uF 20% 16V	1	C729	2111032A21	Capacitor 0.01uF 10% 50V Chip	1
C505	2111031A39	Capacitor 100pF 5% 50V Chip	1	C730	2111031A39	Capacitor 100pF 5% 50V Chip	1
C506	2111031A39	Capacitor 100pF 5% 50V Chip	1	C801	0811051A06	Capacitor 6800pF 5% 63V	1
C507	2311048B13	Capacitor 10uF 20% 16V	1	C802	0811044A34	Capacitor 0.018uF 5% 63V	1
C508	0811051A15	Capacitor 0.22uF 5% 63V	1	C803	0811051A01	Capacitor 1000pF 5% 63V	1
C509	2311048B13	Capacitor 10uF 20% 16V	1	C804	2111031A61	Capacitor 1000pF 5% 50V Chip	1
C510	2111031A39	Capacitor 100pF 5% 50V Chip	1	C805	2111031A45	Capacitor 180pF 5% 50V Chip	1
C511	2111031A39	Capacitor 100pF 5% 50V Chip	1	C809	0811051A01	Capacitor 1000pF 5% 63V	1
C512	2111031A51	Capacitor 330pF 5% 50V Chip	1	C810	2111032A56	Capacitor 510pF 10% 50V Chip	1
C513	2111031A39	Capacitor 100pF 5% 50V Chip	1	C811	0811051A13	Capacitor 0.1uF 5% 63V	1
C514	2302308M01	Capacitor 1000uF 20% 16V	1	C812	2111032A21	Capacitor 0.01uF 10% 50V Chip	1
C551	2311048B13	Capacitor 10uF 20% 16V	1	C813	2111032A21	Capacitor 0.01uF 10% 50V Chip	1
C552	2111031A37	Capacitor 82pF 5% 50V Chip	1	C814	2111032A21	Capacitor 0.01uF 10% 50V Chip	1
C553	0811051A13	Capacitor 0.1uF 5% 63V	1	C901	2111032A21	Capacitor 0.01uF 10% 50V Chip	1
C554	0811051A13	Capacitor 0.1uF 5% 63V	1	C902	2311048B05	Capacitor 1uF 20% 50V	1
C555	0811051A13	Capacitor 0.1uF 5% 63V	1	CR:			
C556	2311048B05	Capacitor 1uF 20% 50V	1	401	4883654H01	Diode Silicon	1
C557	0811051A09	Capacitor 0.022uF 5% 63V	1	402	4883654H01	Diode Silicon	1
C558	2111032A13	Capacitor 2200pF 10% 50V Chip	1	403	4883654H01	Diode Silicon	1
C559	2111031A39	Capacitor 100pF 5% 50V Chip	1	451	4883654H01	Diode Silicon	1
C560	2111032A21	Capacitor 0.01uF 10% 50V Chip	1	501	4883654H02	Diode Silicon	1
C561	0811051A12	Capacitor 0.068uF 5% 63V	1	502	4883654H02	Diode Silicon	1
C562	2311048B13	Capacitor 10uF 20% 16V	1	551	4883654H01	Diode Silicon	1
C601	2311048B19	Capacitor 47uF 20% 16V	1	601	4883654H01	Diode Silicon	1
C602	2111031A39	Capacitor 100pF 5% 50V Chip	1	701	4883654H01	Diode Silicon	1
C603	0811051A10	Capacitor 0.033uF 5% 63V	1	702	4883654H01	Diode Silicon	1
C604	0811051A17	Capacitor 0.47uF 5% 63V	1	703	4882178A06	Diode Germanium	1
C605	0811051A06	Capacitor 6800pF 5% 63V	1	704	4883654H01	Diode Silicon	1
C606	2311048B13	Capacitor 10uF 20% 16V	1	705	4883654H01	Diode Silicon	1
C607	2311048B05	Capacitor 1uF 20% 50V	1	801	4883654H01	Diode Silicon	1
C608	0811051A10	Capacitor 0.033uF 5% 63V	1	802	4883654H01	Diode Silicon	1
C609	0811051A01	Capacitor 1000pF 5% 63V	1	J4	0980059K01	Conn D Submin 9 way	1
C610	0811051A03	Capacitor 2200pF 5% 63V	1	J5	0980060K01	Conn D Submin 15 way	1
C611	2111031A37	Capacitor 82pF 5% 50V Chip	1	JU:			
C701	2111032A21	Capacitor 0.01uF 10% 50V Chip	1	552	0602369M84	Resistor Jumper Chip	1
C702	2111031A15	Capacitor 10pF 0.5pF 50V Chip	1	602	0602369M84	Resistor Jumper Chip	1
C703	2111031A17	Capacitor 12pF 5% 50V Chip	1	701	0602369M84	Resistor Jumper Chip	1
C704	2311048B19	Capacitor 47uF 20% 16V	1	702	0602369M84	Resistor Jumper Chip	1
C705	2311048B05	Capacitor 1uF 20% 50V	1	703	0602369M84	Resistor Jumper Chip	1

PARTS LIST FOR COMMAND BOARD GLN6627

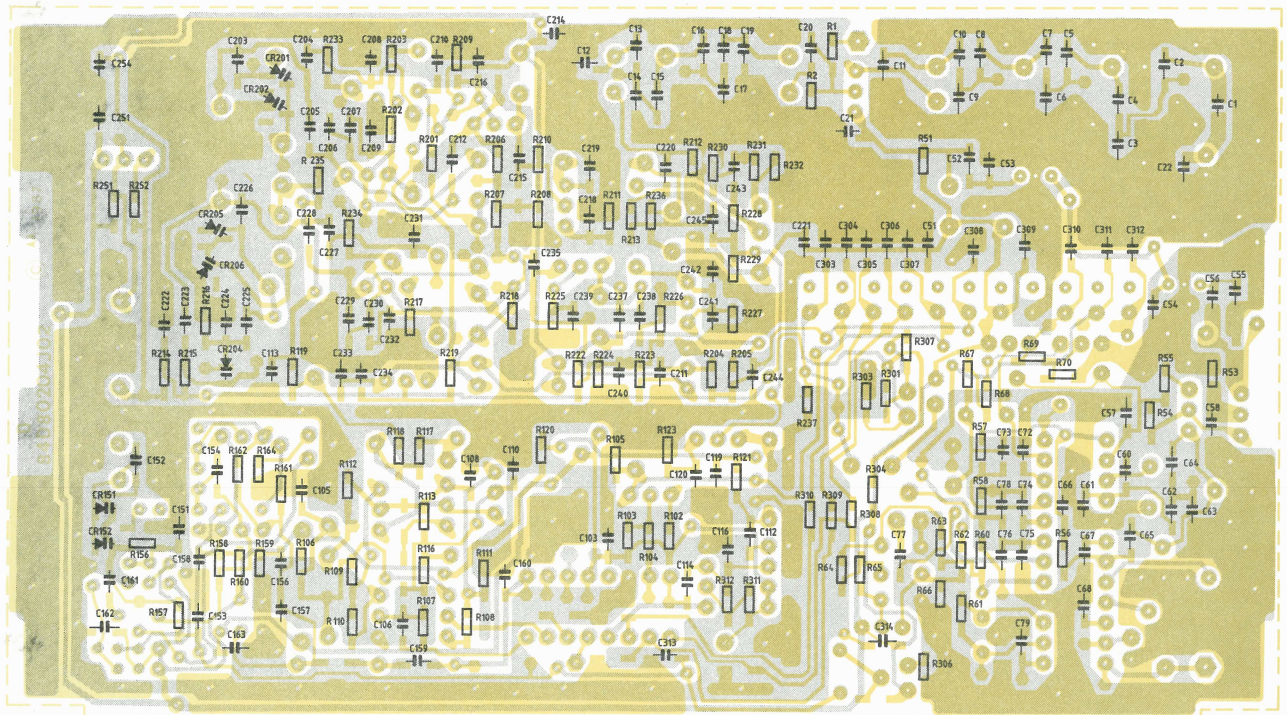
Pos	Code No.	Description	Qt	Pos	Code No.	Description	Qt
704	0602369M84	Resistor Jumper Chip	1	R412	0611077B11	Resistor 33k 5% 0.125W Chip	1
707	0602369M84	Resistor Jumper Chip	1	R413	0611077B03	Resistor 15k 5% 0.125W Chip	1
802	0602369M84	Resistor Jumper Chip	1	R414	0611077A26	Resistor 10 5% 0.125W Chip	1
803	0602369M84	Resistor Jumper Chip	1	R415	0611077A26	Resistor 10 5% 0.125W Chip	1
L401	2483961B02	Choke green 5 Turns	1	R416	0611077A82	Resistor 2.2k 5% 0.125W Chip	1
L601	2402419M61	Coil 10mH	1	R451	0611077B01	Resistor 12k 5% 0.125W Chip	1
L701	2483961B02	Choke green 5 Turns	1	R452	0611077A90	Resistor 4.7k 5% 0.125W Chip	1
L702	2483961B02	Choke green 5 Turns	1	R453	1805500L08	Resistor 22k variable	1
P3	2880261H01	Connector 11 way	1	R454	0611077A72	Resistor 820 5% 0.125W Chip	1
P6	2880260H01	Connector 6 way	1	R455	1805500L08	Resistor 22k variable	1
Q401	4800869619	Transistor M9619	1	R456	0611077A90	Resistor 4.7k 5% 0.125W Chip	1
Q402	4802081B30	Transistor M1B30	1	R457	0611077A70	Resistor 680 5% 0.125W Chip	1
Q403	4800869681	Transistor M9681	1	R458	0611077A82	Resistor 2.2k 5% 0.125W Chip	1
Q404	4802081B31	Transistor M1B31	1	R459	0611077A70	Resistor 680 5% 0.125W Chip	1
Q451	4800869619	Transistor M9619	1	R460	1702280M31	Resistor 330 5% 0.5W	1
Q452	4802081B30	Transistor M1B30	1	R461	0611077A76	Resistor 1.2k 5% 0.125W Chip	1
Q453	4802081B30	Transistor M1B30	1	R462	0611077A62	Resistor 330 5% 0.125W Chip	1
Q501	4802081B31	Transistor M1B31	1	R463	1805500L08	Resistor 22k variable	1
Q502	4802081B31	Transistor M1B31	1	R464	0611077A74	Resistor 1k 5% 0.125W Chip	1
Q503	4802081B30	Transistor M1B30	1	R465	0611077A98	Resistor 10k 5% 0.125W Chip	1
Q504	4802081B30	Transistor M1B30	1	R467	0611077B23	Resistor 100k 5% 0.125W Chip	1
Q505	4802081B31	Transistor M1B31	1	R501	0611077A86	Resistor 3.3k 5% 0.125W Chip	1
Q506	4800869619	Transistor M9619	1	R502	0611077B07	Resistor 22k 5% 0.125W Chip	1
Q507	4800869618	Transistor M9618	1	R503	0611077B07	Resistor 22k 5% 0.125W Chip	1
Q508	4802081B31	Transistor M1B31	1	R504	0611077B01	Resistor 12k 5% 0.125W Chip	1
Q551	4802081B31	Transistor M1B31	1	R505	0611077A86	Resistor 3.3k 5% 0.125W Chip	1
Q601	4802081B31	Transistor M1B31	1	R506	0611077A78	Resistor 1.5k 5% 0.125W Chip	1
Q701	4880214G02	Transistor M14G02	1	R507	0611077A66	Resistor 470 5% 0.125W Chip	1
Q702	4800869681	Transistor M9681	1	R508	0611077A98	Resistor 10k 5% 0.125W Chip	1
Q703	4880214G01	Transistor M14G01	1	R509	0611077A72	Resistor 820 5% 0.125W Chip	1
Q704	4802081B30	Transistor M1B30	1	R510	0611077A72	Resistor 820 5% 0.125W Chip	1
Q705	4802081B30	Transistor M1B30	1	R511	0611077B07	Resistor 22k 5% 0.125W Chip	1
Q706	4802081B30	Transistor M1B30	1	R512	0611077A46	Resistor 68 5% 0.125W Chip	1
Q707	4802081B30	Transistor M1B30	1	R513	0611077A46	Resistor 68 5% 0.125W Chip	1
Q708	4802081B30	Transistor M1B30	1	R514	0611077A66	Resistor 470 5% 0.125W Chip	1
Q709	4802081B30	Transistor M1B30	1	R515	0611077A98	Resistor 10k 5% 0.125W Chip	1
Q710	4880214G02	Transistor M14G02	1	R516	0611077A98	Resistor 10k 5% 0.125W Chip	1
Q711	4880214G01	Transistor M14G01	1	R517	1702280M06	Resistor 2.7 5% 0.5W	1
Q712	4802081B30	Transistor M1B30	1	R518	1702280M06	Resistor 2.7 5% 0.5W	1
Q713	4802081B31	Transistor M1B31	1	R551	0611077A86	Resistor 3.3k 5% 0.125W Chip	1
Q714	4800869680	Transistor M9680	1	R552	0611077B31	Resistor 220k 5% 0.125W Chip	1
Q715	4802081B30	Transistor M1B30	1	R554	0611077A80	Resistor 1.8k 5% 0.125W Chip	1
Q716	4802081B30	Transistor M1B30	1	R555	0611077A60	Resistor 270 5% 0.125W Chip	1
Q717	4802081B30	Transistor M1B30	1	R556	0611077B25	Resistor 120k 5% 0.125W Chip	1
Q718	4802081B30	Transistor M1B30	1	R557	0611077B03	Resistor 15k 5% 0.125W Chip	1
Q801	4802081B30	Transistor M1B30	1	R558	0611077A94	Resistor 6.8k 5% 0.125W Chip	1
Q901	4800869577	Transistor M9577	1	R559	0611077B15	Resistor 47k 5% 0.125W Chip	1
Q902	4802081B30	Transistor M1B30	1	R560	0611077A86	Resistor 3.3k 5% 0.125W Chip	1
R401	0611077A76	Resistor 1.2k 5% 0.125W Chip	1	R561	0611077A96	Resistor 8.2k 5% 0.125W Chip	1
R402	0610621C18	Resistor 1740 1% 0.25W	1	R562	0611077A98	Resistor 10k 5% 0.125W Chip	1
R403	0610621C28	Resistor 2210 1% 0.25W	1	R563	0611077A50	Resistor 100 5% 0.125W Chip	1
R404	0611077A98	Resistor 10k 5% 0.125W Chip	1	R564	0611077A98	Resistor 10k 5% 0.125W Chip	1
R405	0611077A70	Resistor 680 5% 0.125W Chip	1	R565	0611077A76	Resistor 1.2k 5% 0.125W Chip	1
R406	0611077A70	Resistor 680 5% 0.125W Chip	1	R566	0611077A66	Resistor 470 5% 0.125W Chip	1
R407	1702280M31	Resistor 330 5% 0.5W	1	R567	0611077A68	Resistor 560 5% 0.125W Chip	1
R408	0611077A82	Resistor 2.2k 5% 0.125W Chip	1	R601	0611077A50	Resistor 100 5% 0.125W Chip	1
R409	0611077A82	Resistor 2.2k 5% 0.125W Chip	1	R602	0611077A68	Resistor 560 5% 0.125W Chip	1
R410	0611077A60	Resistor 270 5% 0.125W Chip	1	R603	0611077B25	Resistor 120k 5% 0.125W Chip	1
R411	0611077A74	Resistor 1k 5% 0.125W Chip	1	R604	0611077A98	Resistor 10k 5% 0.125W Chip	1

PARTS LIST FOR COMMAND BOARD GLN6627

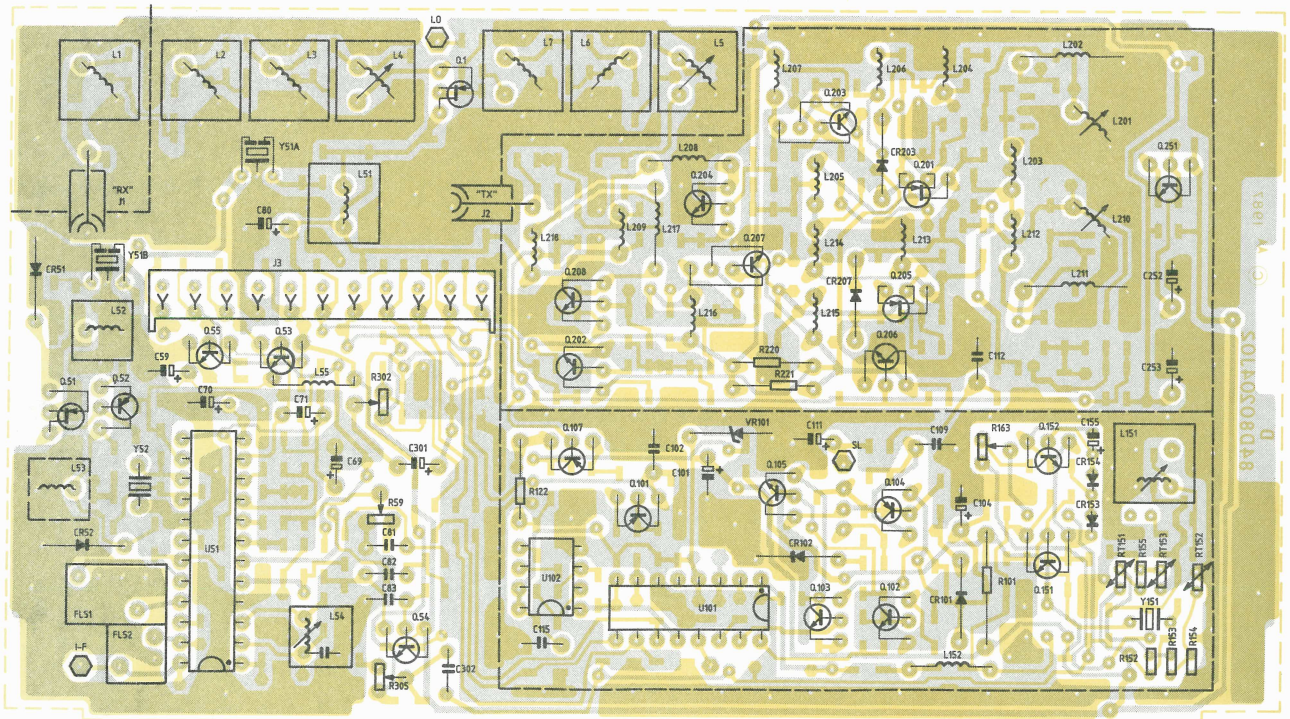
Pos	Code No.	Description	Qt	Pos	Code No.	Description	Qt
R605	0611077A98	Resistor 10k 5% 0.125W Chip	1	R750	0611077A98	Resistor 10k 5% 0.125W Chip	1
R606	0611077B09	Resistor 27k 5% 0.125W Chip	1	R751	0611077A98	Resistor 10k 5% 0.125W Chip	1
R607	0611077A90	Resistor 4.7k 5% 0.125W Chip	1	R752	0611077A98	Resistor 10k 5% 0.125W Chip	1
R608	0611077A98	Resistor 10k 5% 0.125W Chip	1	R753	0611077B15	Resistor 47k 5% 0.125W Chip	1
R609	0611077B42	Resistor 620k 5% 0.125W Chip	1	R754	0611077B15	Resistor 47k 5% 0.125W Chip	1
R610	0611077A94	Resistor 6.8k 5% 0.125W Chip	1	R757	0611077B15	Resistor 47k 5% 0.125W Chip	1
R611	0611077A90	Resistor 4.7k 5% 0.125W Chip	1	R758	0611077A86	Resistor 3.3k 5% 0.125W Chip	1
R612	0611077B03	Resistor 15k 5% 0.125W Chip	1	R759	0611077A86	Resistor 3.3k 5% 0.125W Chip	1
R613	0611077B03	Resistor 15k 5% 0.125W Chip	1	R760	0611077A86	Resistor 3.3k 5% 0.125W Chip	1
R614	0611077B11	Resistor 33k 5% 0.125W Chip	1	R761	0611077B15	Resistor 47k 5% 0.125W Chip	1
R615	0611077B23	Resistor 100k 5% 0.125W Chip	1	R762	0611077A98	Resistor 10k 5% 0.125W Chip	1
R616	0611077B23	Resistor 100k 5% 0.125W Chip	1	R763	0611077A90	Resistor 4.7k 5% 0.125W Chip	1
R617	0611077A50	Resistor 100 5% 0.125W Chip	1	R764	0611077A90	Resistor 4.7k 5% 0.125W Chip	1
R701	0611077A90	Resistor 4.7k 5% 0.125W Chip	1	R765	0611077A90	Resistor 4.7k 5% 0.125W Chip	1
R702	0611077B47	Resistor 1M 5% 0.125W Chip	1	R766	0611077A90	Resistor 4.7k 5% 0.125W Chip	1
R703	0611077B15	Resistor 47k 5% 0.125W Chip	1	R767	0611077A90	Resistor 4.7k 5% 0.125W Chip	1
R704	0611077A98	Resistor 10k 5% 0.125W Chip	1	R768	0611077A90	Resistor 4.7k 5% 0.125W Chip	1
R705	0611077A70	Resistor 680 5% 0.125W Chip	1	R769	0611077A90	Resistor 4.7k 5% 0.125W Chip	1
R706	0611077A64	Resistor 390 5% 0.125W Chip	1	R801	0611077H18	Resistor 200k 1% 0.125W Chip	1
R708	0611077A90	Resistor 4.7k 5% 0.125W Chip	1	R802	0611077G88	Resistor 100k 1% 0.125W Chip	1
R711	0611077B15	Resistor 47k 5% 0.125W Chip	1	R803	0611077H18	Resistor 200k 1% 0.125W Chip	1
R712	0611077B15	Resistor 47k 5% 0.125W Chip	1	R804	0611077G88	Resistor 100k 1% 0.125W Chip	1
R713	0611077A98	Resistor 10k 5% 0.125W Chip	1	R805	0611077H18	Resistor 200k 1% 0.125W Chip	1
R714	0611077B15	Resistor 47k 5% 0.125W Chip	1	R806	0611077G88	Resistor 100k 1% 0.125W Chip	1
R715	0611077A98	Resistor 10k 5% 0.125W Chip	1	R807	0611077H18	Resistor 200k 1% 0.125W Chip	1
R716	0611077B15	Resistor 47k 5% 0.125W Chip	1	R808	0611077H18	Resistor 200k 1% 0.125W Chip	1
R717	0611077B15	Resistor 47k 5% 0.125W Chip	1	R809	0611077B23	Resistor 100k 1% 0.125W Chip	1
R718	0611077B15	Resistor 47k 5% 0.125W Chip	1	R810	0611077B23	Resistor 100k 1% 0.125W Chip	1
R719	0611077B15	Resistor 47k 5% 0.125W Chip	1	R811	0611077H18	Resistor 200k 1% 0.125W Chip	1
R720	0611077B23	Resistor 100k 5% 0.125W Chip	1	R812	0611077G88	Resistor 100k 1% 0.125W Chip	1
R721	0611077B15	Resistor 47k 5% 0.125W Chip	1	R813	0611077H18	Resistor 200k 1% 0.125W Chip	1
R722	0611077A98	Resistor 10k 5% 0.125W Chip	1	R814	0611077G88	Resistor 100k 1% 0.125W Chip	1
R723	0611077A98	Resistor 10k 5% 0.125W Chip	1	R815	0611077H18	Resistor 200k 1% 0.125W Chip	1
R724	0611077A98	Resistor 10k 5% 0.125W Chip	1	R816	0611077G88	Resistor 100k 1% 0.125W Chip	1
R725	0611077A98	Resistor 10k 5% 0.125W Chip	1	R817	0611077H18	Resistor 200k 1% 0.125W Chip	1
R726	0611077A98	Resistor 10k 5% 0.125W Chip	1	R818	0611077G88	Resistor 100k 1% 0.125W Chip	1
R727	0611077B15	Resistor 47k 5% 0.125W Chip	1	R819	0611077H18	Resistor 200k 1% 0.125W Chip	1
R728	0611077B15	Resistor 47k 5% 0.125W Chip	1	R820	0611077H18	Resistor 200k 1% 0.125W Chip	1
R729	0611077A98	Resistor 10k 5% 0.125W Chip	1	R821	0611077B23	Resistor 100k 1% 0.125W Chip	1
R730	0611077B15	Resistor 47k 5% 0.125W Chip	1	R826	0611077B20	Resistor 75k 1% 0.125W Chip	1
R731	0611077A90	Resistor 4.7k 5% 0.125W Chip	1	R827	0611077B15	Resistor 47k 5% 0.125W Chip	1
R732	0611077A98	Resistor 10k 5% 0.125W Chip	1	R828	0611077B23	Resistor 100k 5% 0.125W Chip	1
R733	0611077A98	Resistor 10k 5% 0.125W Chip	1	R829	0611077A98	Resistor 10k 5% 0.125W Chip	1
R734	0611077B15	Resistor 47k 5% 0.125W Chip	1	R830	0611077B15	Resistor 47k 5% 0.125W Chip	1
R735	0611077A98	Resistor 10k 5% 0.125W Chip	1	R831	0611077A98	Resistor 10k 5% 0.125W Chip	1
R736	0611077A66	Resistor 470 5% 0.125W Chip	1	R832	0611077B21	Resistor 82k 5% 0.125W Chip	1
R737	0611077A98	Resistor 10k 5% 0.125W Chip	1	R833	0611077B23	Resistor 100k 5% 0.125W Chip	1
R738	0611077B15	Resistor 47k 5% 0.125W Chip	1	R834	0611077B11	Resistor 33k 5% 0.125W Chip	1
R739	0611077A98	Resistor 10k 5% 0.125W Chip	1	R835	0611077B19	Resistor 68k 5% 0.125W Chip	1
R740	0611077A98	Resistor 10k 5% 0.125W Chip	1	R836	0611077B07	Resistor 22k 5% 0.125W Chip	1
R741	0611077A98	Resistor 10k 5% 0.125W Chip	1	R837	0611077A76	Resistor 1.2k 5% 0.125W Chip	1
R742	0611077B15	Resistor 47k 5% 0.125W Chip	1	R838	0611077B13	Resistor 39k 5% 0.125W Chip	1
R743	0611077A98	Resistor 10k 5% 0.125W Chip	1	R839	0611077A01	Resistor Jumper Chip	1
R744	0611077A98	Resistor 10k 5% 0.125W Chip	1	R901	0611077A98	Resistor 10k 5% 0.125W Chip	1
R745	0611077B15	Resistor 47k 5% 0.125W Chip	1	R902	0611077A98	Resistor 10k 5% 0.125W Chip	1
R746	0611077A98	Resistor 10k 5% 0.125W Chip	1	R903	0611077B31	Resistor 220k 5% 0.125W Chip	1
R747	0611077A98	Resistor 10k 5% 0.125W Chip	1	R904	0611077B23	Resistor 100k 5% 0.125W Chip	1
R748	0611077A98	Resistor 10k 5% 0.125W Chip	1	R905	0611077B23	Resistor 100k 5% 0.125W Chip	1
R749	0611077A98	Resistor 10k 5% 0.125W Chip	1	R906	0611077B15	Resistor 47k 5% 0.125W Chip	1

PARTS LIST FOR COMMAND BOARD GLN6627

Pos	Code No.	Description	Qt	Pos	Code No.	Description	Qt
R907	0611077B13	Resistor 39k 5% 0.125W Chip	1				
R908	0611077A98	Resistor 10k 5% 0.125W Chip	1				
U401	5184621K85	Dual Op Amp MC4558	1				
U402	5180068C06	5V Regulator 14705CV	1				
U551	5183629M06	Quad Op Amp M29M06	1				
U601	5183629M06	Quad Op Amp M29M06	1				
U701	5180290J04	Microprocessor 1.5MHz	1				
U702	5197021B01	UVEPROM G1N6895A	1				
U703	5197014B06	EEPROM Specify Model & Serial #	1				
U704	5184704M04	Driver M20A32	1				
U705	5183627M42	Serial Latch M27M42	1				
U801	5183629M06	Quad Op Amp M29M06	1				
VR:							
401	4883461E40	Diode Zener 5.1V	1				
651	4882256C11	Diode Zener 10V	1				
652	4882256C11	Diode Zener 10V	1				
653	4882256C20	Diode Zener 27V	1				
654	4882256C20	Diode Zener 27V	1				
655	4882256C20	Diode Zener 27V	1				
656	4882256C20	Diode Zener 27V	1				
657	4882256C11	Diode Zener 10V	1				
Y701	4802081B47	Quartz 4.9248MHz	1				
		NON REFERENCED ITEMS					
	0102712B01	Assy Audio/Regulator/Heatsink	1				
	0380269H01	Screw M2.5x6	4				
	0982808R11	Socket DIL for U701	1				
	0982808R02	Socket DIL for U702	1				
	0982808R02	Socket DIL for U703	1				
	1480066K01	Insulator Audio/Regulator	1				
	1480067K01	Insulator Connector	1				
	2680212H01	Heatsink	1				
	4380091K01	Spacer	1				
	7505295B01	Pad Crystal Base for Y701	1				



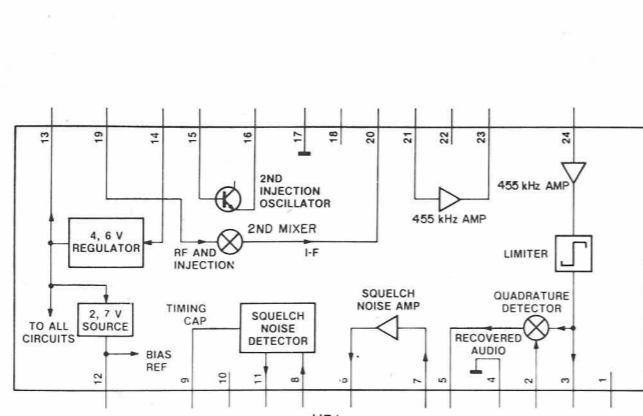
SHOWN FROM SOLDER SIDE



SHOWN FROM COMPONENT SIDE

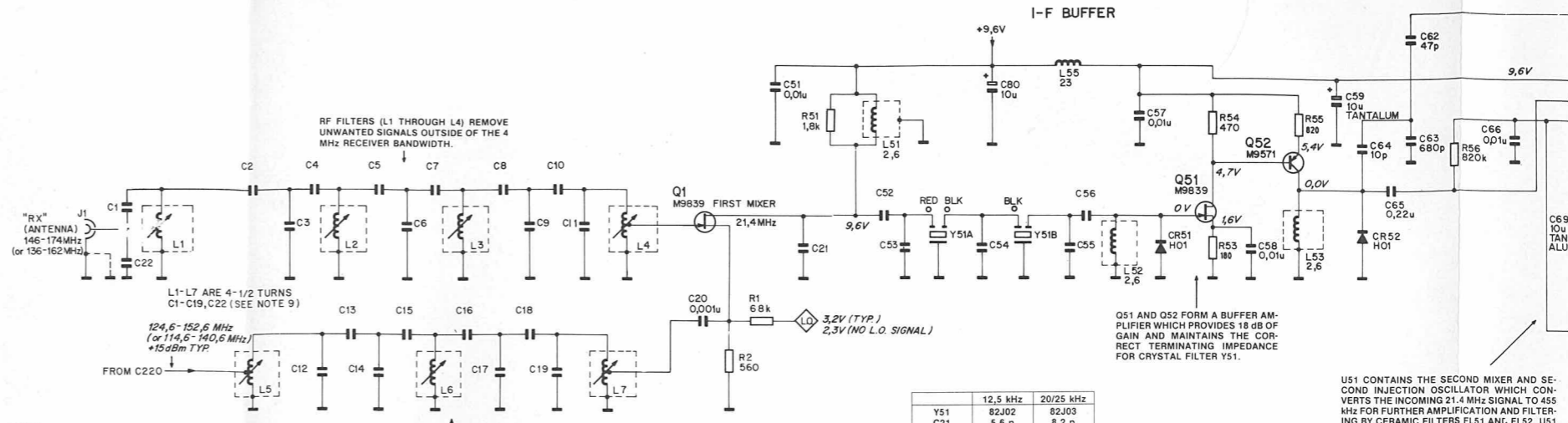
VHF
 GLD6165/GLD6166 RF BOARD 25 kHz CHANNEL SPACING
 GLD6169/GLD6170 RF BOARD 12.5 kHz CHANNEL SPACING
 COMPONENT LAYOUT

D405.147/2



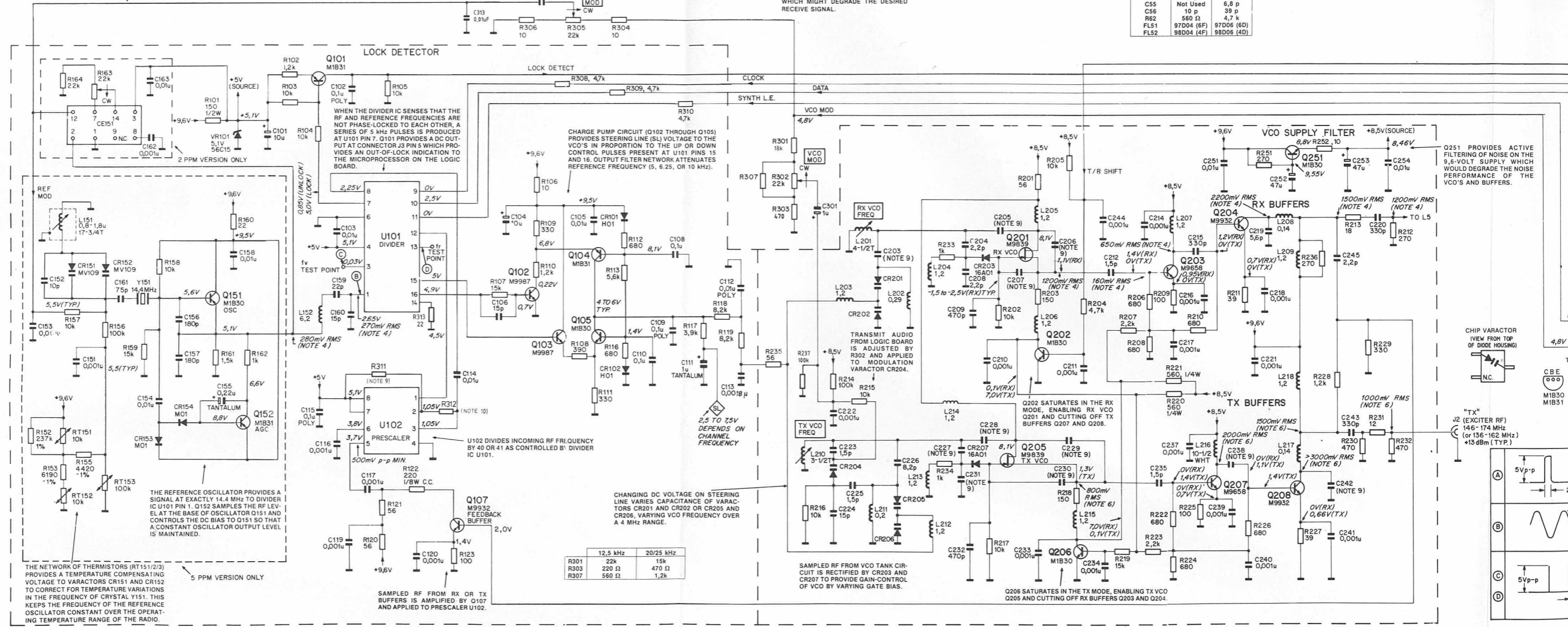
INTERNAL BLOCK DIAGRAM

TRANSMIT AUDIO MODULATES REFERENCE OSCILLATOR FREQUENCY TO PREVENT THE SYNTHESIZER LOOP FROM CANCELLING LOW-FREQUENCY MODULATION APPLIED TO THE VCO.



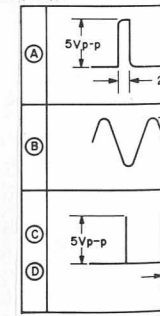
	12.5 kHz	20/25 kHz
Y51	82J02	82J03
C21	5.6 p	8.2 p
C52	68 p	100 p
C53	15 p	12 p
C54	15 p	7.5 p
C55	Not Used	6.8 p
C56	10 p	39 p
R82	560 Ω	4.7 k
FL51	97D04 (6F)	97D06 (6D)
FL52	98D04 (4F)	98D06 (4D)

U51 CONTAINS THE SECOND MIXER AND SECOND INJECTION OSCILLATOR WHICH CONVERTS THE INCOMING 21.4 MHz SIGNAL TO 455 kHz FOR FURTHER AMPLIFICATION AND FILTERING BY CERAMIC FILTERS FL51 AND FL52. U51 ALSO INCLUDES A QUADRATURE DETECTOR AND A DUAL TIME-CONSTANT CARRIER-SQUELCH CIRCUIT.



THE NETWORK OF THERMISTORS (RT151/2/3) PROVIDES A TEMPERATURE COMPENSATING VOLTAGE TO VARACTORS CR151 AND CR152 TO CORRECT FOR TEMPERATURE VARIATIONS IN THE FREQUENCY OF CRYSTAL Y151. THIS KEEPS THE FREQUENCY OF THE REFERENCE OSCILLATOR CONSTANT OVER THE OPERATING TEMPERATURE RANGE OF THE RADIO.

	12.5 kHz	20/25 kHz
R301	22k	15k
R303	220 Ω	470 Ω
R307	560 Ω	1.2k



PARTS LIST FOR RF BOARD 25 kHz GLD6165A L /GLD6166A H VHF

Pos	Code No.	Description	Qt	Pos	Code No.	Description	Qt
		COMPONENTS REVISED SINCE LAST EDITION ARE MARKED *		C063	2113740869	Cap. 680pF 5% 50V	1
		-----	---	C064	2113740825	Cap. 10 0.5pF 5% 50V	1
		GLD6165 L (136-162 MHz)		C065	2111032B15	Cap. 0.22uF +80-20% 50V	1
		GLD6166 H (146-174 MHz)		C066	2113740845	Cap. 0.01uF 10% 50V	1
C001	2113740821	Cap. 6.8 0.5pF 5% 50V	* 1	C067	2111032B15	Cap. 0.22uF +80-20% 50V	1
C002	2111031A10	Cap. 5.6 0.5pF 5% 50V	H * 1	C068	2111032B15	Cap. 0.22uF +80-20% 50V	1
C002	2113740821	Cap. 6.8 0.5pF 5% 50V	L 1	C069	2311054G08	Cap. 10uF 20% 25V	* 1
C003	2113740841	Cap. 47pF 5% 50V	H 1	C070	2311048B13	Cap. 10uF 20% 16V	1
C003	2111031A33	Cap. 55pF 5% 50V	L 1	C071	2311048B06	Cap. 2.2uF 20% 50V	1
C004	2111031A10	Cap. 5.6 0.5pF 5% 50V	H 1	C072	2113740857	Cap. 0.33uF +80-20% 50V	* 1
C004	2113740821	Cap. 6.8 0.5pF 5% 50V	L 1	C073	2111032B15	Cap. 0.22uF +80-20% 50V	1
C005	2111031A10	Cap. 5.6 0.5pF 5% 50V	H 1	C074	2111032B15	Cap. 0.22uF +80-20% 50V	1
C005	2113740821	Cap. 6.8 0.5pF 5% 50V	L 1	C075	2111032A13	Cap. 0.0022uF 10% 50V	1
C006	2113740843	Cap. 56pF 5% 50V	H * 1	C076	2111032B15	Cap. 0.22uF +80-20% 50V	1
C006	2113740847	Cap. 82pF 5% 50V	L 1	C077	2111032B15	Cap. 0.22uF +80-20% 50V	1
C007	2111031A10	Cap. 5.6 0.5pF 5% 50V	H 1	C078	2111032A13	Cap. 0.0022uF 10% 50V	1
C007	2113740821	Cap. 6.8 0.5pF 5% 50V	L 1	C079	2111032B15	Cap. 0.22uF +80-20% 50V	1
C008	2111031A10	Cap. 5.6 0.5pF 5% 50V	H 1	C080	2311048B13	Cap. 10uF 20% 16V	1
C008	2113740821	Cap. 6.8 0.5pF 5% 50V	L 1	C081	0811051A05	Cap. 0.0047uF 5% 63V	1
C009	2113740841	Cap. 47pF 5% 50V	H 1	C082	0811044A34	Cap. 0.018uF 5% 63V	1
C009	2113740843	Cap. 56pF 5% 50V	L 1	C083	0811051A01	Cap. 0.001uF 5% 63V	1
C010	2111031A10	Cap. 5.6 0.5pF 5% 50V	H 1	C101	2311048B13	Cap. 10uF 20% 16V	1
C010	2113740821	Cap. 6.8 0.5pF 5% 50V	L 1	C102	0811051A13	Cap. 0.1uF 5% 63V	1
C011	2113740805	Cap. 1.5 0.25pF 5% 50V (GLD6165 only)	L 1	C103	2111032A21	Cap. 0.01uF 10% 50V	1
C012	2113740821	Cap. 6.8 0.5pF 5% 50V	H 1	C104	2311047B13	Cap. 10uF 20% 16V	1
C012	2113740824	Cap. 9.1 0.5pF 5% 50V	L 1	C105	2113740845	Cap. 0.01uF 10% 50V	1
C013	2113740821	Cap. 6.8 0.5pF 5% 50V	H 1	C106	2113740829	Cap. 15pF 5% 50V	1
C013	2113740823	Cap. 8.2 0.5pF 5% 50V	L 1	C108	2113741869	Cap. 0.1uF+80-20% 50V	1
C014	2113740843	Cap. 56pF 5% 50V	H * 1	C109	0811051A13	Cap. 0.1uF 5% 63V	1
C014	2113740847	Cap. 82pF 5% 50V	L 1	C110	2113741869	Cap. 0.1uF+80-20% 50V	1
C015	2111031A12	Cap. 7.5 0.5pF 5% 50V	H 1	C111	2311013D01	Cap. 1uF 10% 20V	* 1
C015	2113740824	Cap. 9.1 0.5pF 5% 50V	L 1	C112	0811051A07	Cap. 0.1uF 5% 63V	1
C016	2111031A12	Cap. 7.5 0.5pF 5% 50V	H 1	C113	2113740878	Cap. 0.0056uF 10% 50V	1
C016	2113740824	Cap. 9.1 0.5pF 5% 50V	L 1	C114	2113740845	Cap. 0.01uF 10% 50V	1
C017	2113740843	Cap. 56pF 5% 50V	H * 1	C115	0811051A13	Cap. 0.1uF 63% 50V	1
C017	2113740847	Cap. 82pF 5% 50V	L 1	C116	2113741821	Cap. 0.001uF 10% 50V	1
C018	2113740821	Cap. 6.8 0.5pF 5% 50V	H 1	C117	2113741821	Cap. 0.001uF 10% 50V	1
C018	2113740823	Cap. 8.2 0.5pF 5% 50V	L 1	C119	2113741821	Cap. 0.001uF 10% 50V	1
C019	2113740821	Cap. 6.8 0.5pF 5% 50V	H 1	C120	2113741821	Cap. 0.001uF 10% 50V	1
C019	2113740823	Cap. 8.2 0.5pF 5% 50V	L 1	C151	2113741821	Cap. 0.001uF 10% 50V	1
C020	2111032A09	Cap. 0.001uF 10% 50V	1	C152	2113740825	Cap. 10 0.5pF 5% 50V	* 1
C021	2113740823	Cap. 8.2 0.5pF 5% 50V	1	C153	2113741821	Cap. 0.001uF 10% 50V	1
C021	2113740833	Cap. 22pF 5% 50V	L 1	C154	2113741845	Cap. 0.01uF 10% 50V	1
C022	2111031A22	Cap. 20pF 5% 50V	H 1	C155	2302057B09	Cap. 0.22uF 20% 35V	1
C022	2113740833	Cap. 22pF 5% 50V	L 1	C156	2113741855	Cap. 180pF 5% 50V	1
C051	2113740845	Cap. 0.01uF 10% 50V	1	C157	2113741855	Cap. 180pF 5% 50V	1
C052	2113740849	Cap. 100pF 5% 50V	1	C158	2113740845	Cap. 0.01uF 10% 50V	1
C053	2113740827	Cap. 12pF 5% 50V	1	C159	2113740833	Cap. 22pF 5% 50V	1
C054	2113740822	Cap. 7.5 0.5pF 5% 50V	1	C160	2113740829	Cap. 15pF 5% 50V	* 1
C055	2113740821	Cap. 6.8 0.5pF 5% 50V	1	C161	2113740846	Cap. 75pF 5% 50V	1
C056	2113740839	Cap. 39pF 5% 50V	1	C203	2113740821	Cap. 6.8 0.5pF 5% 50V	H 1
C057	2113740845	Cap. 0.01uF 10% 50V	1	C203	2113740823	Cap. 8.2 0.5pF 5% 50V	L 1
C058	2113740845	Cap. 0.01uF 10% 50V	1	C204	2113740809	Cap. 2.2 0.25pF 5% 50V	1
C059	2311054G08	Cap. 10uF 20% 25V	* 1	C205	2113740827	Cap. 12pF 5% 50V	H 1
C060	2113740841	Cap. 47pF 5% 50V	1	C205	2113741832	Cap. 20pF 5% 50V	L 1
C061	2113740833	Cap. 22pF 5% 50V	1	C206	2113740825	Cap. 10 0.5pF 5% 50V	H 1
C062	2113740841	Cap. 47pF 5% 50V	1	C206	2111031A21	Cap. 18pF 5% 50V	L 1
				C207	2113740825	Cap. 10 0.5pF 5% 50V	H 1
				C207	2113741831	Cap. 18pF 5% 50V	L 1

PARTS LIST FOR RF BOARD 25 kHz GLD6165A L /GLD6166A H VHF

Pos	Code No.	Description	Qt	Pos	Code No.	Description	Qt
C209	2113741B13	Cap. 470 10% 50V	1	CR:			
C210	2113741B21	Cap. 0.001uF 10% 50V	1	51	4882190H54	Diode silicon	1
C211	2113741B21	Cap. 0.001uF 10% 50V	1	52	4882190H54	Diode silicon	1
C212	2113740B05	Cap. 1.5 0.25pF 5% 50V	1	101	4882190H54	Diode silicon	1
C214	2113741B21	Cap. 0.001uF 10% 50V	1	102	4882190H54	Diode silicon	1
C215	2113740B61	Cap. 330pF 5% 50V	L 1	151	4882190H54	Diode silicon varactor	1
C216	2113741B21	Cap. 0.001uF 10% 50V	1	152	4882190H54	Diode silicon varactor	1
C217	2113741B21	Cap. 0.001uF 10% 50V	1	153	4884399M01	Diode silicon	1
C218	2113741B21	Cap. 0.001uF 10% 50V	1	154	4884399M01	Diode silicon	1
C219	2113740B19	Cap. 5.6 0.5pF 5% 50V	1	201	4882190H54	Diode silicon varactor	1
C220	2113740B61	Cap. 330pF 5% 50V	1	202	4882190H54	Diode silicon varactor	1
C221	2113741B21	Cap. 0.001uF 10% 50V	1	203	4811034G25	Diode hot carrier	1
C222	2113741B21	Cap. 0.001uF 10% 50V	1	204	4882190H54	Diode silicon varactor	1
C223	2113740B05	Cap. 1.5 0.25pF 5% 50V	1	205	4882190H54	Diode silicon varactor	1
C224	2113740B29	Cap. 15pF 5% 50V	1	206	4882190H54	Diode silicon varactor	1
C225	2113740B05	Cap. 1.5 0.25pF 5% 50V	1	207	4811034G25	Diode hot carrier	1
C226	2113740B23	Cap. 8.2 0.5pF 5% 50V	1	FL51	9180097D06	Filter 455 kHz 6D	1
C227	2113740B09	Cap. 2.2 0.25pF 5% 50V	L 1	FL52	9180098D06	Filter 455 kHz 4D	1
C228	2113740B23	Cap. 8.2 0.5pF 5% 50V	H 1	J001	0980168K01	Connector coaxial	1
C228	2113740B27	Cap. 12pF 5% 50V	L 1	J002	0980168K01	Connector coaxial	1
C229	2113741B21	Cap. 8.2 0.5pF 5% 50V	H 1	J003	0980179H01	Connector 11-pin socket	1
C229	2113741B31	Cap. 18pF 5% 50V	L 1	L001	2480079J01	Coil 4.5 turns	1
C230	2113740B23	Cap. 8.2 0.5pF 5% 50V	H 1	L002	2480079J01	Coil 4.5 turns	1
C230	2113741B31	Cap. 18pF 5% 50V	L 1	L003	2480079J01	Coil 4.5 turns	1
C231	2113740B05	Cap. 1.5 0.25pF 5% 50V	H 1	L004	2480079J10	Coil 4.5 turns	1
C231	2113740B09	Cap. 2.2 0.25pF 5% 50V	L 1	L005	2480079J02	Coil 4.5 turns	1
C232	2113741B13	Cap. 470 10% 50V	1	L006	2480079J09	Coil 4.5 turns	1
C233	2113741B21	Cap. 0.001uF 10% 50V	1	L007	2480079J02	Coil 4.5 turns tap 7/8 turns	1
C234	2113741B21	Cap. 0.001uF 10% 50V	1	L051	2482835G03	Coil 2.6uH red-blue-gold	1
C235	2113740B05	Cap. 1.5 0.25pF 5% 50V	1	L052	2482835G03	Coil 2.6uH red-blue-gold	1
C237	2113741B21	Cap. 0.001uF 10% 50V	1	L053	2482835G03	Coil 2.6uH red-blue-gold	1
C238	2113740B22	Cap. 7.5 0.5pF 5% 50V	H 1	L054	2480000E01	Quad Coil detector with Cap.	1
C238	2113740B23	Cap. 8.2 0.5pF 5% 50V	L 1	L055	2402130M09	Coil 22uH red	1
C239	2113741B21	Cap. 0.001uF 10% 50V	1	L151	2480299D01	Coil 17.75 turns orange	1
C240	2113741B21	Cap. 0.001uF 10% 50V	1	L152	2482723H37	Coil 6.2uH blue	1
C241	2113741B21	Cap. 0.001uF 10% 50V	1	L201	2480164J01	Coil 4.5 turns	1
C242	2113740B09	Cap. 2.2 0.25pF 5% 50V	H 1	L202	2482723H40	Coil 0.29H yellow	1
C242	2113740B15	Cap. 3.9 0.25pF 5% 50V	L 1	L203	2402419M14	Coil 1.2uH	1
C243	2113740B61	Cap. 330pF 5% 50V	1	L204	2402419M14	Coil 1.2uH	1
C244	2113741B21	Cap. 0.001uF 10% 50V	1	L205	2402419M14	Coil 1.2uH	1
C245	2113740B09	Cap. 2.2 0.25pF 5% 50V	1	L206	2402419M14	Coil 1.2uH	1
C251	2113740B45	Cap. 0.01uF 10% 50V	1	L207	2402419M14	Coil 1.2uH	1
C252	2311048819	Cap. 0.47uF 20% 16V	1	L208	2482723H41	Coil 0.14uH yellow-brown	1
C253	2311048819	Cap. 0.47uF 20% 16V	1	L209	2480044F04	Coil 41.2uH	1
C254	2113740B45	Cap. 0.01uF 10% 50V	1	L210	2480164J02	Coil 3.5 turns	1
C301	2311048805	Cap. 1uF 20% 50V	1	L211	2482723H46	Coil 0.2uH blue-green	1
C302	0811051A17	Cap. 0.47uF 5% 67V	1	L212	2402419M14	Coil 1.2uH	1
C303	2113740B49	Cap. 100pF 5% 50V	1	L213	2402419M14	Coil 1.2uH	1
C304	2113740B49	Cap. 100pF 5% 50V	1	L214	2402419M14	Coil 1.2uH	1
C305	2113740B49	Cap. 100pF 5% 50V	1	L215	2402419M14	Coil 1.2uH	1
C306	2113740B49	Cap. 100pF 5% 50V	1	L216	2411030B15	Coil 10.5 turns white	1
C307	2113740B49	Cap. 100pF 5% 50V	1	L217	2482723H41	Coil 0.14uH yellow-brown	1
C308	2113740B49	Cap. 100pF 5% 50V	1	L218	2402419M14	Coil 1.2uH	1
C309	2113740B49	Cap. 100pF 5% 50V	1	Q001	4811043C12	Tstr. FET M3C12	✱ 1
C310	2113740B49	Cap. 100pF 5% 50V	1	Q005	4811043C12	Tstr. FET M3C12	✱ 1
C311	2113740B49	Cap. 100pF 5% 50V	1	Q051	4811043C12	Tstr. FET M3C12	✱ 1
C312	2113740B49	Cap. 100pF 5% 50V	1	Q052	4811043C03	Tstr. M3C03	✱ 1
C313	2113740B45	Cap. 0.01pF 10% 50V	✱ 1	Q053	4802081B30	Tstr. M1B30	1

PARTS LIST FOR RF BOARD 25 KHz GLD6165A L /GLD6166A H VHF

Pos	Code No.	Description	Qt	Pos	Code No.	Description	Qt
Q054	4802081B30	Tstr. M1B30	1	R122	0602369M29	Res. 220 5% 0.125W chip	1
Q055	4802081B30	Tstr. M1B30	1	R123	0611077A50	Res. 100 5% 0.125W chip	1
Q101	4802081B31	Tstr. M1B30	1	R152	0610621E25	Res. 237k 1% 0.25W	1
Q102	4802081B31	Tstr. M1B31	1	R153	0610621C71	Res. 6.19k 1% 0.25W	1
Q103	4800869987	Tstr. M9987	* 1	R155	0610621C57	Res. 4.42k 1% 1/W	1
Q104	4802081B31	Tstr. M1B31	1	R156	0611077B23	Res. 100k 5% 0.125W chip	1
Q105	4802081B30	Tstr. M1B30	1	R157	0611077A98	Res. 10k 5% 0.125W chip	1
Q107	4811043C16	Tstr. M3C16	* 1	R158	0611077A98	Res. 10k 5% 0.125W chip	1
Q151	4802081B30	Tstr. M1B30	1	R159	0611077B03	Res. 15k 5% 0.125W chip	1
Q152	4802081B31	Tstr. M1B31	1	R160	0611077A34	Res. 22 5% 0.125W chip	1
Q201	4811043C12	Tstr. FET M3C12	* 1	R161	0611077A78	Res. 1.5k 5% 0.125W chip	1
Q202	4802081B30	Tstr. M1B30	1	R162	0611077A74	Res. 1k 5% 0.125W chip	1
Q203	4811043C19	Tstr. M3C19	* 1	R201	0611077A44	Res. 56 5% 0.125W chip	1
Q204	4811043C16	Tstr. M3C16	* 1	R202	0611077A98	Res. 10k 5% 0.125W chip	1
Q205	4811043C12	Tstr. FET M3C12	* 1	R203	0611077A54	Res. 150 5% 0.125W chip	1
Q206	4802081B30	Tstr. M1B30	1	R204	0611077A90	Res. 4.7k 5% 0.125W chip	1
Q207	4811043C19	Tstr. M3C19	* 1	R205	0611077A98	Res. 10k 5% 0.125W chip	1
Q208	4811043C16	Tstr. M3C16	* 1	R206	0611077A70	Res. 680 5% 0.125W chip	1
Q251	4802081B30	Tstr. M1B30	1	R207	0611077A82	Res. 2.2k 5% 0.125W chip	1
R001	0611077B19	Res. 68k 5% 0.125W chip	1	R208	0611077A70	Res. 680 5% 0.125W chip	1
R002	0611077A68	Res. 560 5% 0.125W chip	1	R209	0611077A50	Res. 100 5% 0.125W chip	1
R051	0611077A80	Res. 1.8k 5% 0.125W chip	1	R210	0611077A70	Res. 680 5% 0.125W chip	1
R053	0611077A56	Res. 180 5% 0.125W chip	* 1	R211	0611077A40	Res. 39 5% 0.125W chip	1
R054	0611077A66	Res. 470 5% 0.125W chip	1	R212	0611077A52	Res. 120 5% 0.125W chip	* 1
R055	0611077A72	Res. 820 5% 0.125W chip	* 1	R213	0611077A42	Res. 47 5% 0.125W chip	* 1
R056	0611077B45	Res. 820k 5% 0.125W chip	1	R214	0611077B23	Res. 100k 5% 0.125W chip	1
R057	0611077B27	Res. 150k 5% 0.125W chip	* 1	R215	0611077A98	Res. 10 5% 0.125W chip	1
R058	0611077B27	Res. 150k 5% 0.125W chip	1	R216	0611077A98	Res. 10k 5% 0.125W chip	1
R059	1805500L08	Res. 22k variable	1	R217	0611077A98	Res. 10k 5% 0.125W chip	1
R060	0611077B35	Res. 330k 5% 0.125W chip	1	R218	0611077A54	Res. 150 5% 0.125W chip	1
R061	0611077B21	Res. 82k 5% 0.125W chip	1	R219	0611077B03	Res. 15k 5% 0.125W chip	1
R062	0611077A90	Res. 4.7k 5% 0.125W chip	1	R220	0602369M34	Res. 560 5% 0.6W chip	* 1
R063	0611077A94	Res. 6.8k 5% 0.125W chip	1	R221	0602369M34	Res. 560 5% 0.6W chip	* 1
R064	0611077A96	Res. 8.2k 5% 0.125W chip	1	R222	0611077A70	Res. 680 5% 0.125W chip	1
R065	0611077A96	Res. 8.2k 5% 0.125W chip	1	R223	0611077A82	Res. 2.2k 5% 0.125W chip	1
R066	0611077A90	Res. 4.7k 5% 0.125W chip	1	R224	0611077A70	Res. 680 5% 0.125W chip	1
R067	0611077A90	Res. 4.7k 5% 0.125W chip	1	R225	0611077A50	Res. 100 5% 0.125W chip	1
R068	0611077B23	Res. 100k 5% 0.125W chip	* 1	R226	0611077A70	Res. 680 5% 0.125W chip	1
R069	0611077B23	Res. 100k 5% 0.125W chip	* 1	R227	0611077A40	Res. 39 5% 0.125W chip	1
R070	0611077B23	Res. 100k 5% 0.125W chip	* 1	R228	0611077A76	Res. 1.2k 5% 0.125W chip	1
R101	0602369M27	Res. 150 5% 0.6W chip	* 1	R229	0611077A62	Res. 330 5% 0.125W chip	1
R102	0611077A76	Res. 1.2k 5% 0.125W chip	1	R230	0611077A66	Res. 470 5% 0.125W chip	1
R103	0611077A98	Res. 10k 5% 0.125W chip	1	R231	0611077A28	Res. 12 5% 0.125W chip	1
R104	0611077A50	Res. 100 5% 0.125W chip	* 1	R232	0611077A66	Res. 470 5% 0.125W chip	1
R105	0611077A98	Res. 10k 5% 0.125W chip	1	R233	0611077A74	Res. 1k 5% 0.125W chip	1
R106	0611077A26	Res. 10 5% 0.125W chip	1	R234	0611077A74	Res. 1k 5% 0.125W chip	1
R107	0611077B03	Res. 15k 5% 0.125W chip	1	R235	0611077A44	Res. 56 5% 0.125W chip	1
R108	0611077A64	Res. 390 5% 0.125W chip	1	R236	0611077A60	Res. 270 5% 0.125W chip	1
R109	0611077A62	Res. 330 5% 0.125W chip	1	R237	0611077B23	Res. 100k 5% 0.125W chip	1
R110	0611077A76	Res. 1.2k 5% 0.125W chip	1	R251	0611077A60	Res. 270 5% 0.125W chip	1
R111	0611077A62	Res. 330 5% 0.125W chip	1	R252	0611077A26	Res. 10 5% 0.125W chip	1
R112	0611077A70	Res. 680 5% 0.125W chip	1	R301	0611077B05	Res. 18k 5% 0.125W chip	1
R113	0611077A92	Res. 5.6k 5% 0.125W chip	1	R302	1805500L08	Res. 22k variable	1
R116	0611077A70	Res. 680 5% 0.125W chip	1	R303	0611077A66	Res. 470 5% 0.125W chip	1
R117	0611077A88	Res. 3.9k 5% 0.125W chip	1	R304	0611077A26	Res. 10 5% 0.125W chip	1
R118	0611077A96	Res. 8.2k 5% 0.125W chip	1	R305	1805500L08	Res. 22k variable	1
R119	0611077A96	Res. 8.2k 5% 0.125W chip	* 1	R306	0611077A26	Res. 10 5% 0.125W chip	1
R120	0611077A44	Res. 56 5% 0.125W chip	1	R307	0611077A88	Res. 3.9k 5% 0.125W chip	1
R121	0611077A44	Res. 56 5% 0.125W chip	1	R308	0611077A90	Res. 4.7k 5% 0.125W chip	1

PARTS LIST FOR RF BOARD 25 kHz GLD6165A L /GLD6166A H VHF

Pos	Code No.	Description	Qt	Pos	Code No.	Description	Qt
R309	0611077A90	Res. 4.7k 5% 0.125W chip	1				
R310	0611077A90	Res. 4.7k 5% 0.125W chip	1				
R311	0611077A01	Res. Jumper	1				
R312	0611077A01	Res. Jumper	1				
RT:							
151	0683600K06	Therm. 10k 5% 0.125W chip	1				
152	0683600K06	Therm. 10k 5% 0.125W chip	1				
153	0683600K05	Therm. 100k 5% 0.125W chip	1				
U051	5105479G05	IC Nucleus	1				
U101	5184704M75	IC Divider	1				
U102	5180135C05	IC Prescaler	1				
VR:							
101	4882256D15	Zener Diode 5.1V 5%	1				
Y051	9180082J03	Cry.Fltr 21.4MHz Matched pair	1				
Y052	4802019N01	Crystal 20.945MHz	1				
or	4802019N02	Crystal 21.855MHz	1				
Y151	4802443B21	Crystal 14.4MHz	1				
NON REFERENCED ITEMS							
	2680138J01	Shield	1				
	2680182H01	RF shield	1				
	2680153J01	Coil shield	1				
	2680210K01	Coil shield	1				

PARTS LIST FOR RF BOARD 12.5 KHZ GLD6169A L/ GLD6170A H VHF

Pos	Code No.	Description	Qt	Pos	Code No.	Description	Qt
		COMPONENTS REVISED SINCE LAST EDITION ARE MARKED ✕					

		GLD6169 L (136-162 MHz)					
		GLD6170 H (146-174 MHz)					
C001	2113740B19	Cap.5.6 0.5pF 5% 50V chip H	1	C065	2111032B15	Cap.0.22uF +80-20% 50V	1
C001	2113740B21	Cap.6.8 0.5pF 5% 50V chip L	1	C066	2113741B45	Cap.0.01uF 10% 50V	1
C002	2113740B19	Cap.5.6 0.5pF 5% 50V chip H ✕	1	C067	2111032B15	Cap.0.22uF +80-20% 50V	1
C002	2113740B21	Cap.6.8 0.5pF 5% 50V chip L	1	C068	2111032B15	Cap.0.22uF +80-20% 50V	1
C003	2113740B41	Cap.47pF 5% 50V chip H ✕	1	C069	2311054G08	Cap.10uF 20% 15V ✕	1
C003	2113740B43	Cap.56pF 5% 50V chip L ✕	1	C070	2311048B13	Cap.10uF 20% 16V	1
C004	2113740B19	Cap.5.6 0.5pF 5% 50V chip H	1	C071	2311048B06	Cap.2.2uF 20% 50V	1
C004	2111031A12	Cap.7.5 0.5pF 5% 50V chip L	1	C072	2113740B69	Cap.680pF 5% 50V chip ✕	1
C005	2113740B19	Cap.5.6 0.5pF 5% 50V chip H	1	C073	2113741B57	Cap.0.33uF +80-20% 50V ✕	1
C005	2113740B21	Cap.6.8 0.5pF 5% 50V chip L	1	C074	2113741B15	Cap.0.22uF +80-20% 50V	1
C006	2111031A33	Cap.56pF 5% 50V chip H	1	C075	2113740B65	Cap.470pF 10% 50V ✕	1
C006	2111031A36	Cap.75pF 5% 50V chip L	1	C076	2111032B15	Cap.0.22uF +80-20% 50V	1
C007	2111031A10	Cap.5.6 0.25pF 5% 50V chip H	1	C077	2111032B15	Cap.0.22uF +80-20% 50V	1
C007	2113740B21	Cap.6.8 0.5pF 5% 50V chip L	1	C078	2113741B29	Cap.0.0022uF 10% 50V	1
C008	2113740B19	Cap.5.6 0.5pF 5% 50V chip H	1	C079	2113741B15	Cap.0.22uF +80-20% 50V	1
C008	2113740B21	Cap.6.8 0.5pF 5% 50V chip L	1	C080	2311048B13	Cap.10uF 20% 16V	1
C009	2113740B41	Cap.47pF 5% 50V chip H ✕	1	C081	0811051A05	Cap.0.0047uF 10% 50V	1
C009	2113740B43	Cap.56pF 5% 50V chip L ✕	1	C082	0811044A34	Cap.0.018uF +80-20% 50V	1
C010	2113740B19	Cap.5.6 0.5pF 5% 50V chip H ✕	1	C083	0811051A01	Cap.0.001uF 20% 16V	1
C010	2113740B21	Cap.6.8 0.5pF 5% 50V chip L	1	C101	2311048B13	Cap.10uF 20% 16V	1
C011	2111031A07	Cap.3.3 0.5pF 5% 50V chip H	1	C102	0811051A13	Cap.0.1uF 5% 63V	1
C011	2113740B05	Cap.1.5 0.25pF 5% 50V chip L ✕	1	C103	2113741B45	Cap.0.01uF 10% 50V	1
C012	2113740B21	Cap.6.8 0.5pF 5% 50V chip H	1	C104	2311048B13	Cap.10uF 20% 16V	1
C012	2113740B24	Cap.9.1 0.5pF 5% 50V chip L ✕	1	C105	2113741B45	Cap.0.01uF 10% 50V	1
C013	2113740B21	Cap.6.8 0.5pF 5% 50V chip H	1	C106	2113740B29	Cap.15pF 5% 50V chip	1
C013	2113740B23	Cap.8.2 0.5pF 5% 50V chip L	1	C108	2113741B69	Cap.0.1uF +80-20% 50V	1
C014	2113740B43	Cap.56pF 5% 50V chip H ✕	1	C109	0811051A13	Cap.0.1uF 5% 63V	1
C014	2113740B47	Cap.82pF 5% 50V chip L	1	C110	2113741B69	Cap.0.1uF +80-20% 50V	1
C015	2113740B22	Cap.7.5 0.5pF 5% 50V chip H	1	C111	2311013D01	Cap.1uF 10% 35V	1
C015	2113740B24	Cap.9.1 0.5pF 5% 50V chip L	1	C112	0811051A07	Cap.0.01uF 5% 63V	1
C016	2113740B22	Cap.7.5 0.5pF 5% 50V chip H	1	C113	2113741B78	Cap.0.0056uF 10% 50V	1
C016	2113740B24	Cap.9.1 0.5pF 5% 50V chip L	1	C114	2113741B45	Cap.0.01uF 10% 50V	1
C017	2113740B43	Cap.56pF 5% 50V chip H ✕	1	C115	0811051A13	Cap.0.1uF 5% 63V	1
C017	2113740B47	Cap.82pF 5% 50V chip L	1	C116	2113741B21	Cap.0.001uF 10% 50V	1
C018	2113740B21	Cap.6.8 0.5pF 5% 50V chip H	1	C117	2113741B21	Cap.0.001uF 10% 50V	1
C018	2113740B23	Cap.8.2 0.5pF 5% 50V chip L	1	C119	2113741B21	Cap.0.001uF 10% 50V	1
C019	2113740B21	Cap.6.8 0.5pF 5% 50V chip H	1	C120	2113741B21	Cap.0.001uF 10% 50V	1
C019	2113740B24	Cap.9.1 0.5pF 5% 50V chip L	1	C151	2113741B21	Cap.0.001uF 10% 50V	1
C020	2113741B21	Cap.0.001uF 10% 50V chip	1	C152	2113740B25	Cap.10uF 0.5pF 5% 50V chip	1
C021	2113740B19	Cap.5.6 0.5pF 5% 50V chip	1	C153	2113741B21	Cap. 0.001uF 10% 50V	1
C022	2113740B32	Cap.22pF 0.25pF 5% 50V chip ✕	1	C154	2113741B45	Cap.0.01uF 10% 50V	1
C051	2113741B45	Cap.0.01uF 5% 50V chip ✕	1	C155	2302057B09	Cap.0.22uF 20% 35V	1
C052	2113740B45	Cap.68pF 5% 50V chip	1	C156	2113740B55	Cap.180pF 10% 50V chip	1
C053	2113740B29	Cap.15pF 5% 50V chip	1	C157	2113740B55	Cap.180pF 10% 50V chip	1
C054	2113740B29	Cap.15pF 5% 50V chip	1	C158	2113741B45	Cap.0.01uF 10% 50V	1
C056	2113740B25	Cap.10 0.5pF 5% 50V chip	1	C159	2113740B33	Cap.22pF 5% 50V chip	1
C057	2113741B45	Cap.0.01uF 10% 50V	1	C160	2113740B29	Cap.15pF 5% 50V chip	1
C058	2113741B45	Cap.0.01uF 10% 50V	1	C161	2113740B46	Cap.75uF 5% 50V chip	1
C059	2311054G08	Cap.10uF 20% 25V ✕	1	C203	2113740B21	Cap.6.8 0.5pF 5% 50V chip H	1
C060	2113740B41	Cap.47pF 5% 50V chip	1	C203	2113740B23	Cap.8.2 0.5pF 5% 50V chip L	1
C061	2113740B33	Cap.22pF 5% 50V chip	1	C204	2113740B09	Cap.1.5 0.25pF 5% 50V chip ✕	1
C062	2113740B41	Cap.47pF 5% 50V chip	1	C205	2113740B27	Cap.12pF 5% 50V chip H	1
C063	2113740B69	Cap.680pF 5% 50V chip	1	C205	2113740B32	Cap.20pF 0.25pF 5% 50V chip ✕	1
C064	2113740B25	Cap.10 0.5pF 5% 50V chip	1	C206	2113740B25	Cap.10 0.5pF 5% 50V chip H	1
				C206	2113740B31	Cap.18pF 5% 50V chip L	1
				C207	2113740B25	Cap.10 0.5pF 5% 50V chip H	1
				C207	2113740B31	Cap.18pF 5% 50V chip L	1
				C208	2113740B09	Cap.1.5 0.25pF 5% 50V chip ✕	1
				C209	2113741B13	Cap.470 10% 50V	1

PARTS LIST FOR RF BOARD 12.5 kHz GLD6169A L/ GLD6170A H VHF

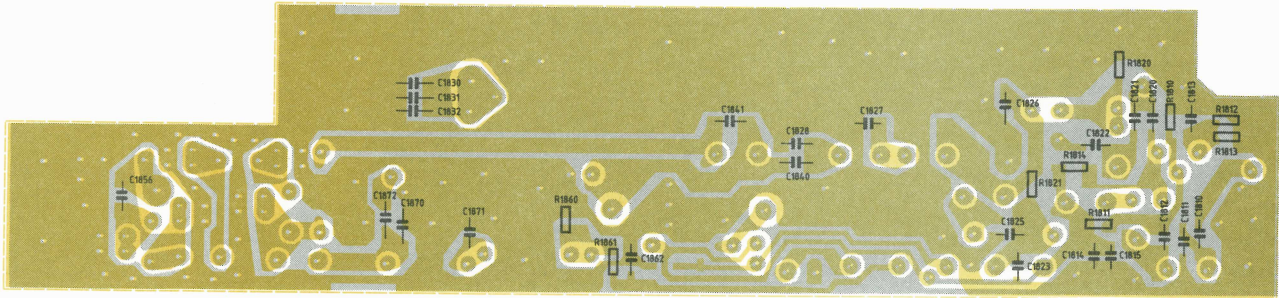
Pos	Code No.	Description	Qt	Pos	Code No.	Description	Qt
C210	2113741B21	Cap.0.001pF 10% 50V	1	CR:			
C211	2113741B21	Cap.0.001pF 10% 50V	1	51	4883654H01	Diode silicon	1
C212	2113740B05	Cap.1.5 0.25pF 5% 50V chip	1	52	4883654H01	Diode silicon	1
C214	2113741B21	Cap.0.001uF 10% 50V	1	101	4883654H01	Diode silicon	1
C215	2113740B61	Cap.330pF 5% 50V chip	1	102	4883654H01	Diode silicon	1
C216	2113741B21	Cap.0.001uF 10% 50V	1	151	4882190H54	Diode silicon varactor	1
C217	2113741B21	Cap.0.001uF 10% 50V	1	152	4882190H54	Diode silicon varactor	1
C218	2113741B21	Cap.0.001uF 10% 50V	1	153	4883654H01	Diode silicon	1
C219	2113740B19	Cap.5.6 0.5pF 5% 50V chip	1	154	4883654H01	Diode silicon	1
C220	2113740B61	Cap.330pF 5% 50V chip	1	201	4882190H54	Diode silicon varactor	1
C221	2113741B21	Cap.0.001uF 10% 50V	1	202	4882190H54	Diode silicon varactor	1
C222	2113741B21	Cap.0.001uF 10% 50V	1	203	4811034G25	Diode hot carrier	1
C223	2113740B05	Cap.1.5 0.25pF 5% 50V chip	1	204	4882190H54	Diode silicon varactor	1
C224	2113740B29	Cap.15pF 5% 50V chip	1	205	4882190H54	Diode silicon varactor	1
C225	2113740B05	Cap.1.5 0.25pF 5% 50V chip	1	206	4882190H54	Diode silicon varactor	1
C226	2113740B23	Cap.8.2 0.5pF 5% 50V chip	1	207	4811034G25	Diode hot carrier	1
C227	2111031A03	Cap.1.5 0.5pF 5% 50V chip H	1	FL51	9180097D04	Filter 6D 455kHz	1
C227	2113740B09	Cap.1.5 0.25pF 5% 50V chip L *	1	FL52	9180098D04	Filter 4D 455kHz	1
C228	2113740B23	Cap.8.2 0.5pF 5% 50V chip H	1	J1	0980168K01	Connector Coax	1
C228	2113740B27	Cap.12pF 5% 50V chip L *	1	J2	0980168K01	Connector Coax	1
C229	2113740B23	Cap.8.2 0.5pF 5% 50V chip H	1	J3	0980179H01	Connector 11-pin socket	1
C229	2113740B31	Cap.18pF 5% 50V chip L	1	L1	2480079J01	Coil 4.5 turns	H 1
C230	2113740B23	Cap.8.2 0.5pF 5% 50V chip H	1	L1	2480079J02	Coil 4.5 turns	L 1
C230	2113740B31	Cap.18pF 5% 50V chip L	1	L2	2480079J01	Coil 4.5 turns	1
C231	2111031A03	Cap.1.5 0.25pF 5% 50V chip H	1	L3	2480079J01	Coil 4.5 turns	1
C231	2113740B09	Cap.1.5 0.25pF 5% 50V chip L *	1	L4	2480079J06	Coil 4.5 turns	H 1
C232	2113741B13	Cap.470 10% 50V	1	L4	2480079J10	Coil 4.5 turns	L 1
C233	2113741B21	Cap. 0.001pF 10% 50V	1	L5	2480079J02	Coil 4.5 turns	1
C234	2113741B21	Cap.0.001pF 10% 50V	1	L6	2480079J09	Coil 4.5 turns	1
C235	2113740B05	Cap.1.5 0.25pF 5% 50V chip	1	L7	2480079J02	Coil 4.5 turns	1
C237	2113741B21	Cap.0.001pF 10% 50V chip	1	L51	2402835G03	Coil 2.6uH	1
C238	2113740B22	Cap.7.5 0.5pF 5% 50V chip H	1	L52	2482835G03	Coil 2.6uH	1
C238	2113740B23	Cap.8.2 0.5pF 5% 50V chip L	1	L53	2482835G03	Coil 2.6uH	1
C239	2113741B21	Cap.0.001pF 10% 50V	1	L54	2580000E01	Quad Coil 455kHz	1
C240	2113741B21	Cap.0.001pF 10% 50V	1	L55	2402130M09	Coil red 22uH	1
C241	2113741B21	Cap.0.001pF 10% 50V	1	L151	2402694M01	Coil Orange 17.75 turns	1
C242	2113740B09	Cap.1.5 0.25pF 5% 50V chip H *	1	L152	2482723H37	Coil blue 6.2uH	1
C242	2111031A08	Cap.3.9 0.25pF 5% 50V chip L	1	L201	2480164J01	Coil 4.5 turns	1
C243	2113740B61	Cap.330pF 5% 50V chip	1	L202	2482723H40	Coil yellow 0.29uH	1
C244	2113741B21	Cap. 0.001pF 10% 50V	1	L203	2402419M14	Coil 1.2uH	1
C245	2111032A05	Cap.470pF 10% 50V	1	L204	2402419M14	Coil 1.2uH	1
C251	2113741B45	Cap.0.01uF 10% 50V	1	L205	2402419M14	Coil 1.2uH	1
C252	2311048B19	Cap.47pF 20% 16V	1	L206	2402419M14	Coil 1.2uH	1
C253	2311048B19	Cap.47pF 20% 16V	1	L207	2402419M14	Coil 1.2uH	1
C254	2113741B45	Cap.0.01uF 10% 50V	1	L208	2482723H41	Coil yel-brn 0.14uH	1
C301	2311048B05	Cap.1uF 20% 50V	1	L209	2402419M14	Coil 1.2uH	1
C302	0811051A17	Cap.0.47uF 5% 63V	1	L210	2480164J02	Coil 3.5 turns	1
C303	2113740B49	Cap.100pF 5% 50V chip	1	L211	2482723H46	Coil blu-grn 0.2uH	1
C304	2113740B49	Cap.100pF 5% 50V chip	1	L212	2402419M14	Coil 1.2uH	1
C305	2113740B49	Cap.100pF 5% 50V chip	1	L213	2402419M14	Coil 1.2uH	1
C306	2113740B49	Cap.100pF 5% 50V chip	1	L214	2402419M14	Coil 1.2uH	1
C307	2113740B49	Cap.100pF 5% 50V chip	1	L215	2402419M14	Coil 1.2uH	1
C308	2113740B49	Cap.100pF 5% 50V chip	1	L216	2411030B15	Coil white 10.5 turns	1
C309	2113740B49	Cap.100pF 5% 50V chip	1	L217	2482723H41	Coil yel-brn 0.14uH	1
C310	2113740B49	Cap.100pF 5% 50V chip	1	L218	2402419M14	Coil 1.2uH	1
C311	2113740B49	Cap.100pF 5% 50V chip	1	Q001	4811043C12	Tstr. FET M3C12	* 1
C312	2113740B49	Cap.100pF 5% 50V chip	1	Q051	4811043C12	Tstr. FET M3C12	* 1
C313	2113741B45	Cap.0.01pF 10% 50V	1	Q052	4811043C03	Tstr. M3C03	* 1
C314	2113741B45	Cap.0.01pF 10% 50V	1	Q053	4802081B30	Tstr. M1B10	1

PARTS LIST FOR RF BOARD 12.5 kHz GLD6169A L/ GLD6170A H VHF

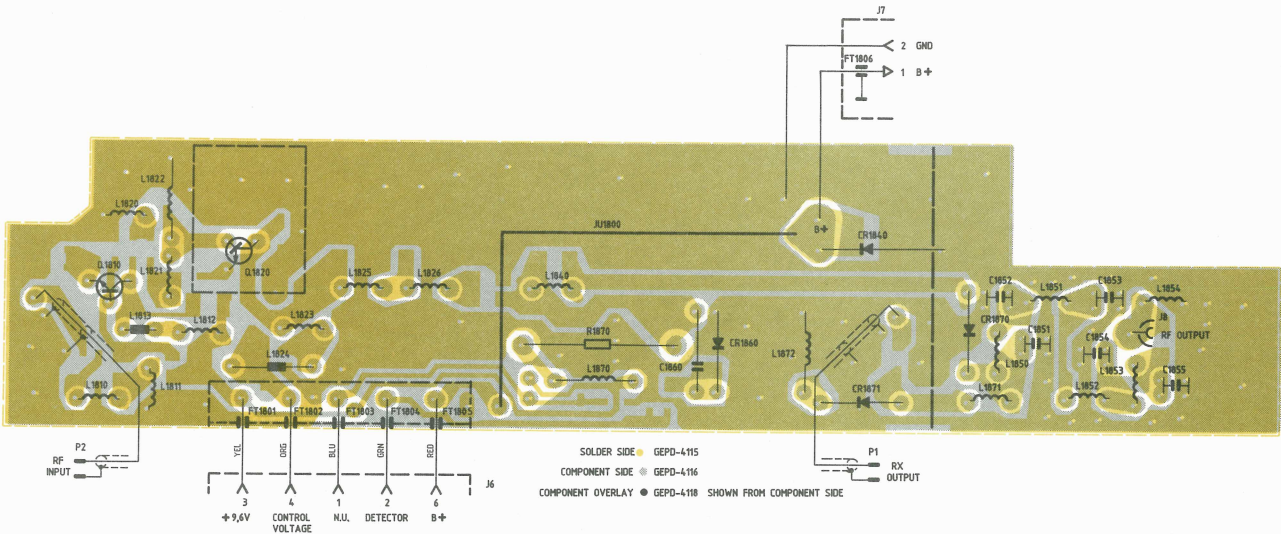
Pos	Code No.	Description	Qt	Pos	Code No.	Description	Qt
Q054	4802081B30	Tstr. M1B10	1	R122	0602369M29	Res. 220 5% 0.6W	1
Q055	4802081B30	Tstr. M1B10	1	R123	0611077A50	Res. 100 5% 0.125W	1
Q101	4802081B31	Tstr. M1B31	1	R152	0610621E25	Res. 37k 1% 0.25W	1
Q102	4800869987	Tstr. M9987	1	R153	0610621C71	Res. 6.19k 1% 0.25W	1
Q103	4800869987	Tstr. M9987	1	R155	0610621C57	Res. 4.42k 1% 0.25W	1
Q104	4802081B31	Tstr. M1B31	1	R156	0611077B23	Res. 100k 5% 0.125W	1
Q105	4802081B30	Tstr. M1B30	1	R157	0611077A98	Res. 10k 5% 0.125W	1
Q107	4811043C16	Tstr. M1C16	1	R158	0611077A98	Res. 10k 5% 0.125W	1
Q151	4802081B30	Tstr. M1B30	1	R159	0611077B03	Res. 15k 5% 0.125W	1
Q152	4802081B31	Tstr. M1B31	1	R160	0611077A34	Res. 22 5% 0.125W	1
Q201	4811043C12	Tstr. FET M3C12	1	R161	0611077A78	Res. 1.5k 5% 0.125W	1
Q202	4802081B30	Tstr. M1B30	1	R162	0611077A74	Res. 1k 5% 0.125W	1
Q203	4811043C19	Tstr. M1C19	1	R201	0611077A44	Res. 56 5% 0.125W	1
Q204	4811043C16	Tstr. M1C16	1	R202	0611077A98	Res. 10k 5% 0.125W	1
Q205	4811043C12	Tstr. FET M3C12	1	R203	0611077A54	Res. 150 5% 0.125W	1
Q206	4802081B30	Tstr. M1B30	1	R204	0611077A90	Res. 4.7k 5% 0.125W	1
Q207	4811043C19	Tstr. M1C19	1	R205	0611077A98	Res. 10k 5% 0.125W	1
Q208	4811043C16	Tstr. M1C16	1	R206	0611077A70	Res. 680 5% 0.125W	1
Q251	4802081B30	Tstr. M1B30 (alt: M1B10)	1	R207	0611077A82	Res. 2.2k 5% 0.125W	1
R001	0611077B19	Res. 68k 5% 0.125W	1	R208	0611077A70	Res. 680 5% 0.125W	1
R002	0611077A68	Res. 560 5% 0.125W	1	R209	0611077A50	Res. 100 5% 0.125W	1
R051	0611077A80	Res. 1.8k 5% 0.125W	1	R210	0611077A70	Res. 680 5% 0.125W	1
R053	0611077A56	Res. 180 5% 0.125W	1	R211	0611077A40	Res. 39 5% 0.125W	1
R054	0611077A66	Res. 470 5% 0.125W	1	R212	0611077A52	Res. 120 5% 0.125W	1
R055	0611077A72	Res. 820 5% 0.125W	1	R213	0611077A42	Res. 47 5% 0.125W	1
R056	0611077B45	Res. 820k 5% 0.125W	1	R214	0611077B23	Res. 10k 5% 0.125W	1
R057	0611077B31	Res. 220k 5% 0.125W	1	R215	0611077A98	Res. 10k 5% 0.125W	1
R058	0611077B27	Res. 150k 5% 0.125W	1	R216	0611077A98	Res. 10k 5% 0.125W	1
R059	1805500L08	Res. 22k variable	1	R217	0611077A98	Res. 10k 5% 0.125W	1
R060	0611077B19	Res. 68k 5% 0.125W	1	R218	0611077A54	Res. 150 5% 0.125W	1
R061	0611077B21	Res. 82k 5% 0.125W	1	R219	0611077B03	Res. 15k 5% 0.125W	1
R062	0611077A68	Res. 560 5% 0.125W	1	R220	0602369M34	Res. 560 5% 0.6W	1
R063	0611077A94	Res. 6.8k 5% 0.125W	1	R221	0602369M34	Res. 560 5% 0.6W	1
R064	0611077A96	Res. 8.2k 5% 0.125W	1	R222	0611077A70	Res. 680 5% 0.125W	1
R065	0611077A96	Res. 8.2k 5% 0.125W	1	R223	0611077A82	Res. 2.2k 5% 0.125W	1
R066	0611077A90	Res. 4.7k 5% 0.125W	1	R224	0611077A70	Res. 680 5% 0.125W	1
R067	0611077A88	Res. 3.9k 5% 0.125W	1	R225	0611077A50	Res. 100 5% 0.125W	1
R068	0611077B21	Res. 82k 5% 0.125W	1	R226	0611077A70	Res. 680 5% 0.125W	1
R069	0611077B23	Res. 100k 5% 0.125W	1	R227	0611077A40	Res. 39 5% 0.125W	1
R070	0611077B23	Res. 100k 5% 0.125W	1	R228	0611077A76	Res. 1.2k 5% 0.125W	1
R101	0602369M27	Res. 150 5% 0.6W	1	R229	0611077A62	Res. 330 5% 0.125W	1
R102	0611077A76	Res. 1.2k 5% 0.125W	1	R230	0611077A66	Res. 470 5% 0.125W	1
R103	0611077A98	Res. 10k 5% 0.125W	1	R231	0611077A28	Res. 12 5% 0.125W	1
R104	0611077A50	Res. 100 5% 0.125W	1	R232	0611077A66	Res. 470 5% 0.125W	1
R105	0611077A98	Res. 10k 5% 0.125W	1	R233	0611077A74	Res. 1k 5% 0.125W	1
R106	0611077A26	Res. 10 5% 0.125W	1	R234	0611077A74	Res. 1k 5% 0.125W	1
R107	0611077B03	Res. 15k 5% 0.125W	1	R235	0611077A44	Res. 56 5% 0.125W	1
R108	0611077B03	Res. 15k 5% 0.125W	1	R236	0611077A52	Res. 120 5% 0.125W	1
R109	0611077A62	Res. 330 5% 0.125W	1	R237	0611077A34	Res. 100 5% 0.125W	1
R110	0611077A72	Res. 820 5% 0.125W	1	R251	0611077A60	Res. 270 5% 0.125W	1
R111	0611077A62	Res. 330 5% 0.125W	1	R252	0611077A26	Res. 10 5% 0.125W	1
R112	0611077A70	Res. 680 5% 0.125W	1	R301	0611077B05	Res. 18k 5% 0.125W	1
R113	0611077A92	Res. 5.6k 5% 0.125W	1	R302	1805500L08	Res. 22k variable	1
R116	0611077A70	Res. 680 5% 0.125W	1	R303	0611077A58	Res. 220 5% 0.125W	1
R117	0611077A88	Res. 3.9k 5% 0.125W	1	R304	0611077A26	Res. 10 5% 0.125W	1
R118	0611077A96	Res. 8.2k 5% 0.125W	1	R305	1805500L08	Res. 22k variable	1
R119	0611077A50	Res. 100 5% 0.125W	1	R306	0611077A26	Res. 10 5% 0.125W	1
R120	0611077A44	Res. 56 5% 0.125W	1	R307	0611077A82	Res. 2.2k 5% 0.125W	1
R121	0611077A44	Res. 56 5% 0.125W	1	R308	0611077A90	Res. 4.7k 5% 0.125W	1

PARTS LIST FOR RF BOARD 12.5 kHz GLD6169A L/ GLD6170A H VHF

Pos	Code No.	Description	Qt	Pos	Code No.	Description	Qt
R309	0611077A90	Res. 4.7k 5% 0.125W	1				
R310	0611077A90	Res. 4.7k 5% 0.125W	1				
R311	0611077A01	Res. Jumper	1				
R312	0611077A01	Res. Jumper	1				
R313	0611077A34	Res. 22 5% 0.125W	* 1				
RT:							
151	0683600K06	hermistor 10k 5% 0.125W	1				
152	0683600K06	hermistor 10k 5% 0.125W	1				
153	0683600K05	hermistor 100k 5% 0.125W	1				
U051	5105479G05	IC Nucleus	1				
U101	5184704M75	IC Divider	1				
U102	5180135C05	IC Prescaler	1				
VR:							
101	4882256C15	Zener Diode 5.1V 5 %	1				
Y051	9180082J03	Crystal Matched pair A/B	1				
Y052	4802019N01	Crystal 20.945MHz	1				
or	4802019N02	Crystal 21.855MHz	1				
Y151	4882309N01	Crystal 14.4MHz	1				
NON REFERENCED ITEMS							
	2680139J01	Shield	1				
	2680182H01	RF shield	1				
	2680153J01	Coil shield	1				
	2680210K01	Coil shield	1				



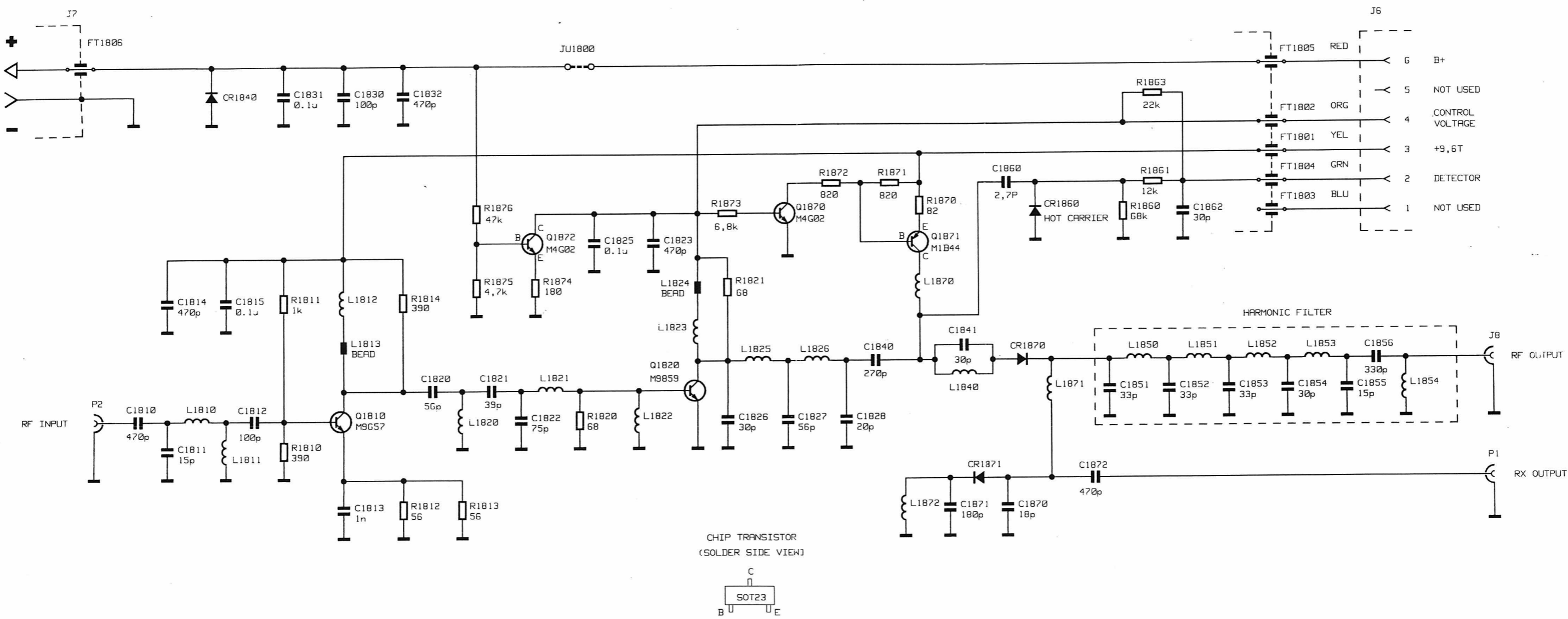
SOLDER SIDE ● GEPD-4115
COMPONENT SIDE ⊙ GEPD-4116
COMPONENT OVERLAY ● GEPD-4117 SHOWN FROM SOLDER SIDE



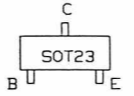
SOLDER SIDE ● GEPD-4115
COMPONENT SIDE ⊙ GEPD-4116
COMPONENT OVERLAY ● GEPD-4118 SHOWN FROM COMPONENT SIDE

GLD6161 0.1 – 1W POWER AMPLIFIER VHF
COMPONENT LAYOUT

D405.133



CHIP TRANSISTOR
(SOLDER SIDE VIEW)



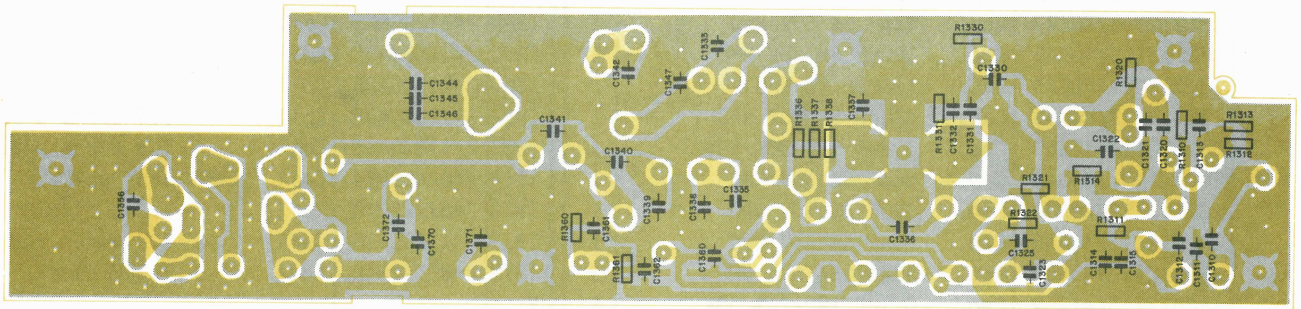
GEPD 5033-1

**GLD6161B 0.1 - 1W
POWER AMPLIFIER VHF**

D405.132/2

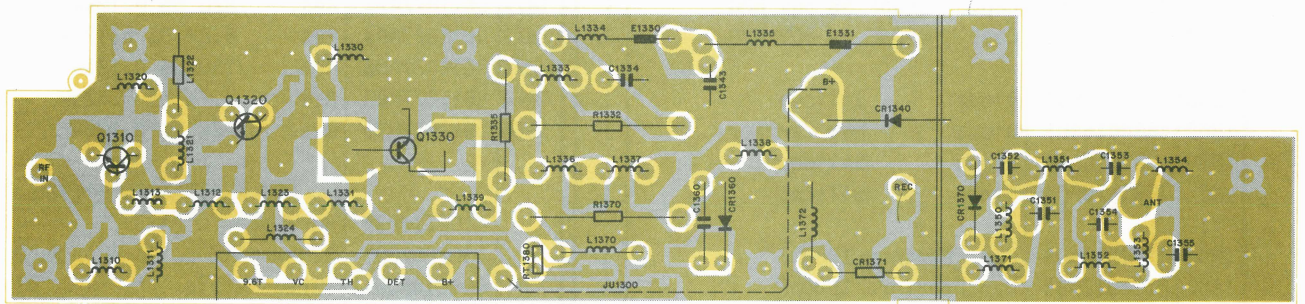
PARTS LIST FOR RF POWER AMPLIFIER 0.1-1W VHF GLD6161B

Pos	Code No.	Description	Qt	Pos	Code No.	Description	Qt
COMPONENTS REVISED SINCE LAST EDITION ARE MARKED *							
-----				-----			
C:							
1810	2113740B65	Cap. 470pF 5% 50V NPO	1	1822	2482723H37	Coil 6.2uH blue	1
1811	2113740B29	Cap. 15pF 5% 50V NPO	1	1823	2411030B08	Coil 4.5 turns brown	1
1812	2113740B49	Cap. 100pF 5% 50V NPO	1	1824	2480036A01	Choke Ferrite 0.5 turn	1
1813	2113740B73	Cap. 1000pF 5% NPO	1	1825	2411030E07	Coil 0.5 turn gray	1
1814	2113740B65	Cap. 470pF 5% 50V NPO	1	1826	2411030A03	Coil 4 turns yellow	1
1815	2113741B69	Cap. 0.1uF +80-20% 50V	1	1840	2411030E05	Coil 0.5 turn green	1
1820	2113740B43	Cap. 56pF 5% 50V NPO	1	1850	2411030A05	Coil 5.5 turns blue *	1
1821	2113740B39	Cap. 39pF 5% 50V NPO	1	1851	2411030A05	Coil 6 turns blue	1
1822	2113740B46	Cap. 75pF 5% 50V NPO	1	1852	2411030A05	Coil 5.5 turns blue *	1
1823	2113740B65	Cap. 470pF 5% 50V NPO	1	1853	2411030A05	Coil 5.5 turns blue *	1
1825	2113741B69	Cap. 0.1uF +80-20% 50V	1	1854	2402419M14	Coil 1.2uH turns white *	1
1826	2113740B36	Cap. 30pF 5% 50V NPO	1	1870	2482723H49	Coil 1.2uH black	1
1827	2113740B43	Cap. 56pF 5% 50V NPO	1	1871	2411030B10	Coil 5.5 turns red	1
1828	2113740B32	Cap. 20pF 5% 50V NPO	1	1872	2482723H49	Coil 1.2uH black	1
1830	2113740B49	Cap. 100pF 5% 50V NPO	1	P:			
1831	2113741B69	Cap. 0.1uF +80-20% 50V	1	P01	2980014A01	Clip Coax Terminal	1
1832	2113740B65	Cap. 470pF 5% 50V NPO	1	P02	2980014A01	Clip Coax Terminal	1
1840	2113740B59	Cap. 270pF 5% 50V NPO	1	Q:			
1841	2113740B36	Cap. 30pF 5% 50V NPO	1	1810	4800869657	Transistor M9657	1
1851	2180240B37	Cap. 33pF 5% 250V	1	1820	4800869859	Transistor M9859	1
1852	2180240B37	Cap. 33pF 5% 250V	1	R:			
1853	2180240B37	Cap. 33pF 5% 250V *	1	1810	0611077A64	Res. 390 5% 0.125W	1
1854	2113740B36	Cap. 30pF 5% 50V NPO *	1	1811	0611077A74	Res. 1k 5% 0.125W	1
1855	2180240B29	Cap. 15pF 5% 250V *	1	1812	0611077A44	Res. 56 5% 0.125W	1
1856	2113740B61	Cap. 330pF 5% 50V NPO *	1	1813	0611077A44	Res. 56 5% 0.125W	1
1860	2182450B11	Cap. 3pF 5% 500V	1	1814	0611077D39	Res. 390 5% 0.125W	1
1862	2113740B36	Cap. 30pF 5% 50V NPO	1	1820	0611077A46	Res. 68 5% 0.125W	1
1870	2113740B31	Cap. 18pF 5% 50V NPO *	1	1821	0611077A46	Res. 68 5% 0.125W	1
1871	2113740B55	Cap. 180pF 5% 50V NPO	1	1860	0611077A98	Res. 10k 5% 0.125W	1
1872	2113740B65	Cap. 470pF 5% 50V NPO	1	1861	0611077B01	Res. 12k 5% 0.125W	1
CR:				1870	0600126A29	Res. 150 5% 1W	1
1840	4880236E07	Diode Silicon	1	1871	0611077A72	Res. 820 5% 0.125W *	1
1860	4884616A01	Diode Hot Carrier	1	1872	0611077A72	Res. 820 5% 0.125W *	1
1870	4883510F04	Diode Silicon	1	1873	0611077A94	Res. 6.8k 5% 0.125W *	1
1871	4883510F04	Diode Silicon	1	1874	0611077A56	Res. 180 5% 0.125W *	1
FT:				1875	0611077A90	Res. 4.7k 5% 0.125W *	1
1801	2182812H03	Cap Feedthru 1000pF	1	1876	0611077B15	Res. 47k 5% 0.125W *	1
1802	2182812H03	Cap Feedthru 1000pF	1	NON REFERENCED ITEMS:			
1803	2182812H03	Cap Feedthru 1000pF	1	0102712B85	Hardware PA	1	
1804	2182812H03	Cap Feedthru 1000pF	1	0302607B01	Screw M3x8	11	
1805	2182812H03	Cap Feedthru 1000pF	1	0380165J01	Screw Metric	2	
1806	2182812H03	Cap Feedthru 1000pF	1	0780200J01	Plate Feedthru	1	
J:				0980257H01	Connector Crimp-On Lug	5	
J06	0102712B03	Cable 5-conductor	1	1482392E03	Cover Insulating	1	
J07	0980038K01	Connector Power	1	1484836A01	Insulator for Q1810	1	
J08	0902097B01	Receptacle BNC	1	1502568M01	Cover PA Hole	1	
JU:				1580151J01	Housing Connector P/O J6	1	
1800	3010286B04	Jumper Red	1	2280172J01	Pin Polarizing P/O J6	1	
L:				2680092K01	Shield Antenna Connector	1	
1810	2411030A03	Coil 2 turns rede	1	2680176H01	Heatsink	1	
1811	2411030B07	Coil 3.5 turns white	1	2680197J01	Shield PA Gnd	1	
1812	2411030B15	Coil 10.5 turns white	1	2680199J01	Shield Harmonic Filter	1	
1813	2480036A01	Choke Ferrite 0.5 turn	1	2680222H01	Heatsink Copper for Q1820	1	
1820	2411030A03	Coil 4 turns yellow	1	3280119J01	Gasket Front Scr	1	
1821	2411030E06	Coil 0.5 turn blue	1	3280266H01	Gasket	1	
				4280276H01	Retainer Cable	1	
				8480265K01	Board Printed Circuit	1	
				9187511C01	Filter RFI	5	



SHOWN FROM SOLDER SIDE

COMPONENT SIDE ● GDW-1549-O
 SOLDER SIDE ● GDW-1550-O
 OVERLAY — GDW-1552-O

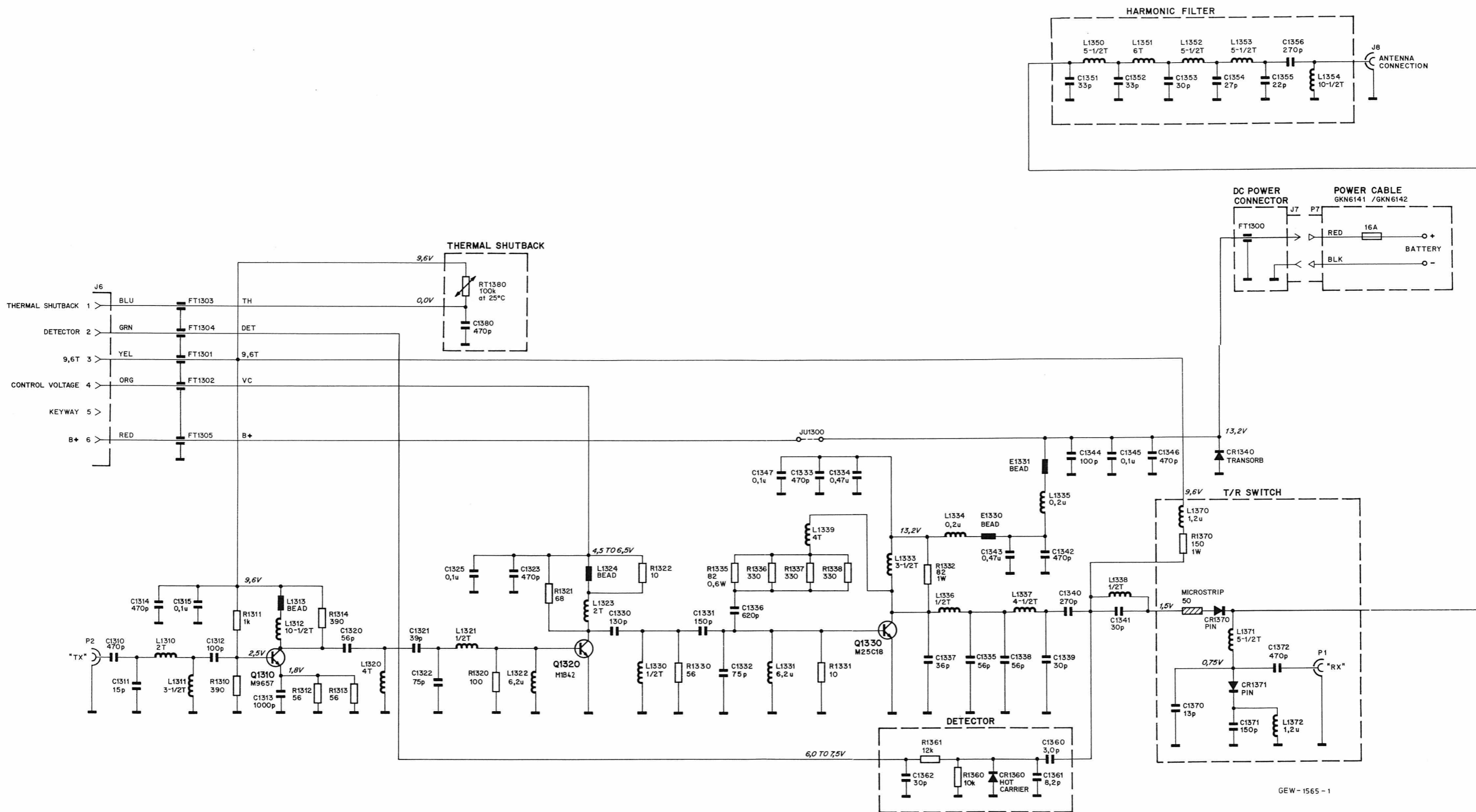


SHOWN FROM COMPONENT SIDE

COMPONENT SIDE ● GDW-1549-O
 SOLDER SIDE ● GDW-1550-O
 OVERLAY — GDW-1551-O

**GLD6157 10W POWER AMPLIFIER VHF
 COMPONENT LAYOUT**

D405.135



NOTE:
VOLTAGE ARE DC VOLTS MEASURED UNDER NOMINAL
TRANSMIT CONDITIONS WITH 10 WATTS OUTPUT.

GLD6157 10W POWER AMPLIFIER VHF

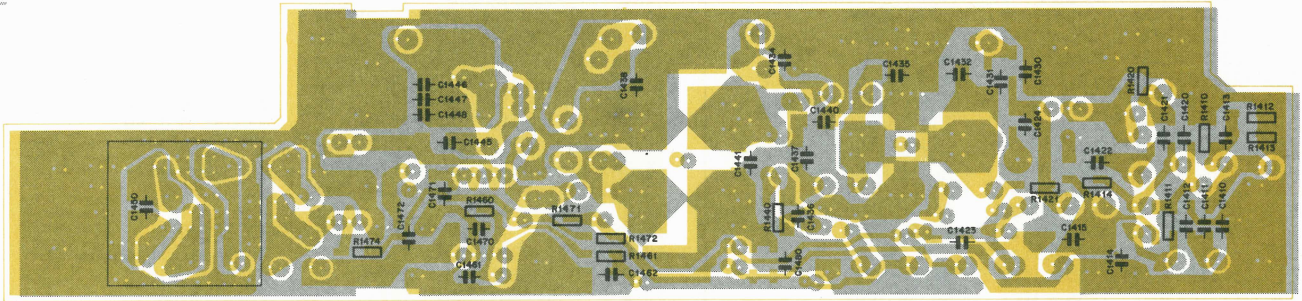
D405.134

GEW-1565-1

DATE: 9/15/1988

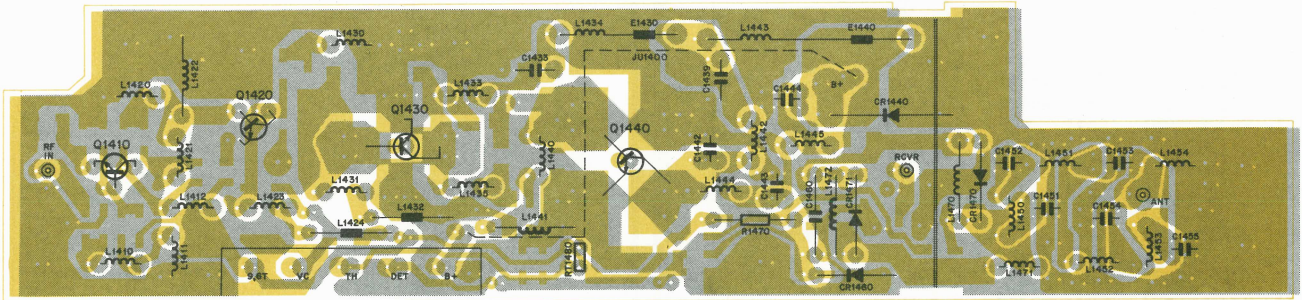
Pos	Code No	Description	Qt
C1310	2111031A55	Capacitor 470 5% 50V	1
C1311	2111031A19	Capacitor 15 5% 50V	1
C1312	2111031A39	Capacitor 100 5% 50V	1
C1313	2111031A61	Capacitor 1000 5% 50V	1
C1314	2111031A55	Capacitor 470 5% 50V	1
C1315	2111032A13	Capacitor 0.1uF +80-20% 50V	1
C1320	2111031A33	Capacitor 56 5% 50V	1
C1321	2111031A29	Capacitor 39 5% 50V	1
C1322	2111031A36	Capacitor 75 5% 50V	1
C1323	2111031A55	Capacitor 470 5% 50V	1
C1325	2111032A33	Capacitor 0.1uF +80-20% 50V	1
C1330	2111031A42	Capacitor 130 5% 50V	1
C1331	2111031A43	Capacitor 150 5% 50V	1
C1332	2111031A36	Capacitor 75 5% 50V	1
C1333	2111031A55	Capacitor 470 5% 50V	1
C1334	0811051A17	Capacitor 0.7uF 5% 63V	1
C1335	2111033B31	Capacitor 54 5% 100V	1
C1336	2111031A58	Capacitor 620 5% 50V	1
C1337	2111033B26	Capacitor 36 5% 100V	1
C1338	2111033B31	Capacitor 56 5% 100V	1
C1339	2111033B24	Capacitor 30 5% 50V	1
C1340	2111031A49	Capacitor 270 5% 100V	1
C1341	2111033B24	Capacitor 30 5% 100V	1
C1342	2111031A55	Capacitor 470 5% 50V	1
C1343	0811051A17	Capacitor 0.7uF 5% 63V	1
C1344	2111031A39	Capacitor 100 5% 50V	1
C1345	2111032A33	Capacitor 0.1uF +80-20% 50V	1
C1346	2111031A55	Capacitor 470 5% 50V	1
C1347	2111032A33	Capacitor 0.01uF +80-20% 50V	1
C1351	2180240G02	Capacitor 33 5% 250V	1
C1352	2180240G02	Capacitor 33 5% 250V	1
C1353	2180240G01	Capacitor 30 5% 250V	1
C1354	2180240G40	Capacitor 27 5% 250V	1
C1355	2180240G38	Capacitor 22 5% 250V	1
C1356	2111031A49	Capacitor 270 5% 50V	1
C1360	2182450B11	Capacitor 3 5% 500V	1
C1361	2111031A13	Capacitor 8.2 5% 50V	1
C1362	2111031A26	Capacitor 30 5% 50V	1
C1370	2111031A18	Capacitor 13 5% 50V	1
C1371	2111031A43	Capacitor 150 5% 500V	1
C1472	2111031A55	Capacitor 470 5% 50V	1
C1480	2111031A55	Capacitor 470 5% 50V	1
CR1340	4880236E07	Diode Zener 28V	1
CR1360	4884616A01	Diode Hot carrier	1
CR1370	4883510F04	Diode Pin	1
CR1371	4883510F04	Diode Pin	1
J0007	0980038K01	Connector Power	1
J0008	0902097B04	Connector 50 Ohm	1
E1330	7683960B01	Coil Ferrite 0.5 turn	1
E1331	7683960B01	Coil Ferrite 0.5 turn	1
L1310	2411030A01	Coil red 2 turns	1
L1311	2411030B07	Coil white 3.5 turns	1
L1312	2411030B15	Coil white 10.5 turns	1
L1313	2480036A01	Coil Ferrite 0.5 turn	1
L1320	2411030A03	Coil yellow 4 turns	1
L1321	2411030E07	Coil gray	1
L1322	2482723H37	Coil blue 6.2uH	1
L1323	2411030A01	Coil red 2 turns	1
L1324	2480036A01	Coil Ferrite 0.5 turn	1
L1330	2411030E02	Coil red	1
L1331	2482723H37	Coil blue 6.2uH	1
L1333	2411030B07	Coil white 3.5 turns	1
L1334	2482723H46	Coil blu-grn 0.2uH	1
L1335	2484346A02	Coil 0.23uH	1
L1336	2411030E01	Coil brown	1
L1337	2411030B08	Coil brown 4.5 turns	1
L1338	2411030E05	Coil green	1
L1339	2411030A03	Coil yellow 4 turns	1
L1350	2411030B10	Coil red 5.5 turns	1
L1351	2411030A05	Coil blue 6 turns	1
L1352	2411030B10	Coil red 5.5 turns	1
L1353	2411030B10	Coil red 5.5 turns	1
L1354	2411030B15	Coil white 10.5 turns	1
L1370	2482723H49	Coil blu-blk 1.2uH	1
L1371	2411030B10	Coil red 5.5 turns	1
L1372	2482723H49	Coil blu-blk 1.2uH	1
Q1310	4800869657	Transistor M9657	1
Q1320	4802081B42	Transistor M1B42	1
Q1330	4880225C18	Transistor 25C18	1
RT1380	0683600K05	Thermistor 100k	1
R1310	0611077A64	Resistor 390 5% 0.125W	1
R1311	0611077A74	Resistor 1k 5% 0.125W	1
R1312	0611077A44	Resistor 56 5% 0.125W	1

Pos	Code No	Description	Qt
R1313	0611077A44	Resistor 56 5% 0.125W	1
R1314	0611077A64	Resistor 390 5% 0.125W	1
R1320	0611077A50	Resistor 100 5% 0.125W	1
R1321	0611077A46	Resistor 68 5% 0.125W	1
R1322	0611077A26	Resistor 10 5% 0.125W	1
R1330	0611077A44	Resistor 56 5% 0.125W	1
R1331	0611077A26	Resistor 10 5% 0.125W	1
R1332	0600126A23	Resistor 82 5% 1W	1
R1335	1702280M24	Resistor 82 5% 0.125W	1
R1336	0611077A62	Resistor 330 5% 0.125W	1
R1337	0611077A62	Resistor 330 5% 0.125W	1
R1338	0611077A62	Resistor 330 5% 0.125W	1
R1360	0611077A98	Resistor 10k 5% 0.125W	1
R1361	0611077B01	Resistor 12k 5% 0.125W	1
R1370	0600126A29	Resistor 150 5% 1W	1
		NON REFERENCED ITEMS	
	2680092K01	Shield Antenna Connector	1
	2680199J01	Harmonic Filter Shield	1
	2280172J01	Pin Polarizing	1
	0102712B02	Assy Feedthru Bracket	1
	3080116K01	Coax Receive	1
	3080116K02	Coax Transmit	1
	2980014A01	Clip term.	2
	2680222H01	Heatsink	1
	1484936A01	Insulator Transistor	1
	0200007003	Nut	1
	0980257H01	Contact	5
	1580151J01	Housing Connector	1



COMPONENT SIDE ● GDW-1505-0
 SOLDER SIDE ● GDW-1506-0
 OVERLAY — GDW-1508-0

SHOWN FROM SOLDER SIDE

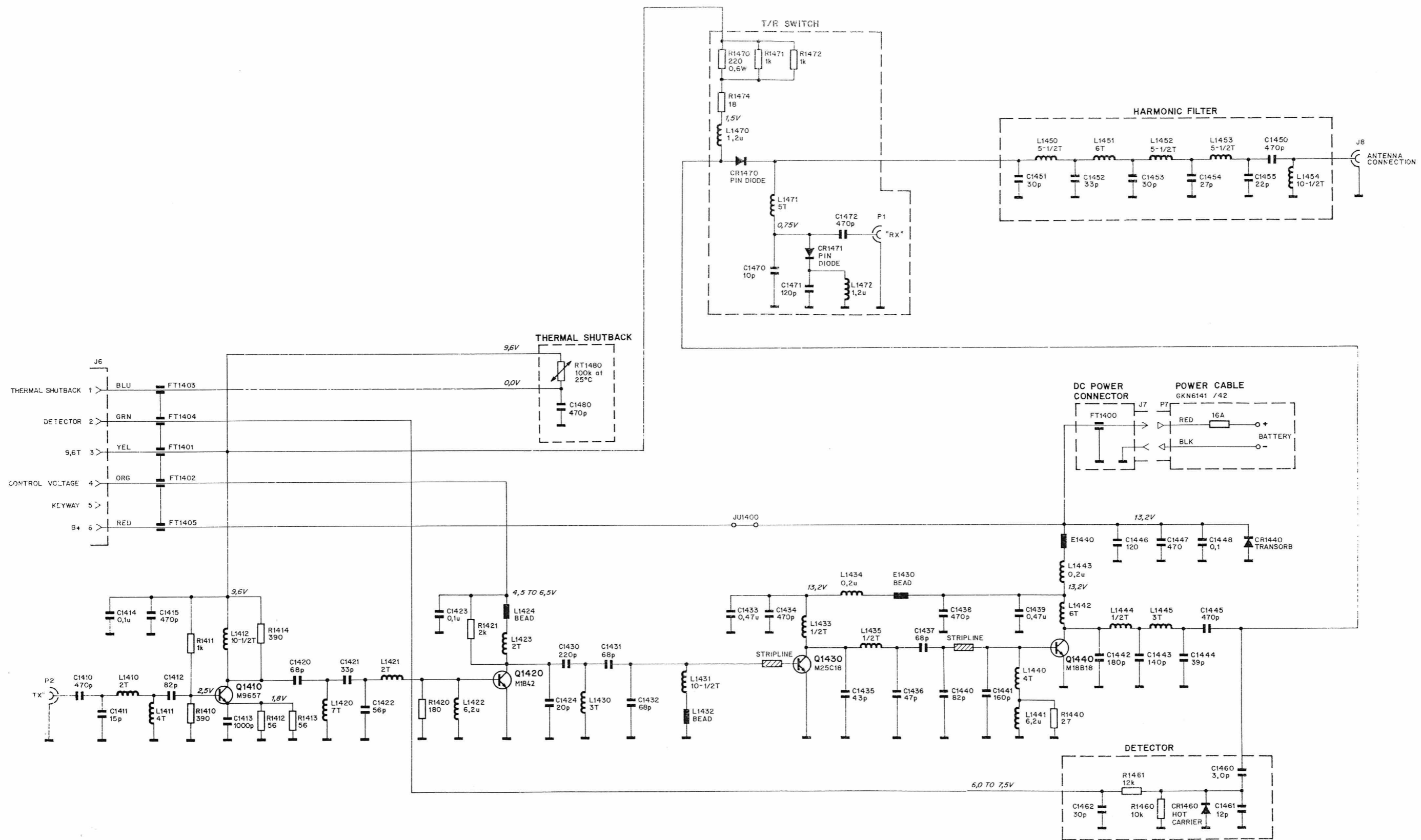


SHOWN FROM COMPONENT SIDE

COMPONENT SIDE ● GDW-1505-0
 SOLDER SIDE ● GDW-1506-0
 OVERLAY — GDW-1507-1

**GLD6153 25W POWER AMPLIFIER VHF
 COMPONENT LAYOUT**

D405.137



NOTE:
VOLTAGE ARE DC VOLTS MEASURED UNDER NOMINAL
TRANSMIT CONDITIONS WITH 25 WATTS OUTPUT.

GEW-156-1

GLD6153 25W POWER AMPLIFIER VHF

D405.136

DATE: 8/29/1988

Pos	Code No	Description	Qt
C1410	2111031A55	Capacitor 470 5% 50V	1
C1411	2111031A19	Capacitor 15 5% 50V	1
C1412	2111031A37	Capacitor 82 5% 50V	1
C1413	2111031A61	Capacitor 1000 5% 50V	1
C1414	2111032A33	Capacitor 0.10uF +80-20% 50V	1
C1415	2111031A55	Capacitor 470 5% 50V	1
C1420	2111031A35	Capacitor 68 5% 50V	1
C1421	2111031A27	Capacitor 33 5% 50V	1
C1422	2111031A33	Capacitor 56 5% 50V	1
C1423	2111032A33	Capacitor 0.10uF +80-20% 50V	1
C1424	2111031A22	Capacitor 20 5% 50V	1
C1430	2111031A47	Capacitor 220 5% 50V	1
C1431	2111031A35	Capacitor 68 5% 50V	1
C1432	2111031A35	Capacitor 68 5% 50V	1
C1433	2111031A17	Capacitor 0.47uF 5% 63V	1
C1434	2111031A55	Capacitor 470 5% 50V	1
C1435	2111033B28	Capacitor 43 5% 100V	1
C1436	2111033B29	Capacitor 47 5% 100V	1
C1437	2111033B33	Capacitor 68 5% 100V	1
C1438	2111031A55	Capacitor 470 5% 50V	1
C1439	0811051A17	Capacitor 0.47uF 5% 63V	1
C1440	2111033B35	Capacitor 82 5% 100V	1
C1441	2111033B42	Capacitor 160 5% 100V	1
C1442	2180240G55	Capacitor 180 5% 250V	1
C1443	2180240G52	Capacitor 180 5% 250V	1
C1443	2180240G52	Capacitor 140 5% 250V	1
C1444	2180240G03	Capacitor 39 5% 250V	1
C1445	2111031A55	Capacitor 470 5% 50V	1
C1446	2111031A41	Capacitor 120 5% 50V	1
C1447	2111031A55	Capacitor 470 5% 50V	1
C1448	2111032A33	Capacitor 0.01uF +80-20% 50V	1
C1450	2111031A55	Capacitor 470 5% 50V	1
C1451	2180240G01	Capacitor 30 5% 250V	1
C1452	2180240G02	Capacitor 33 5% 250V	1
C1453	2180240G01	Capacitor 30 5% 250V	1
C1454	2180240G40	Capacitor 27 5% 250V	1
C1455	2180240G38	Capacitor 22 5% 250V	1
C1460	2182450B11	Capacitor 3 5% 500V	1
C1461	2111031A17	Capacitor 12 5% 50V	1
C1462	2111031A26	Capacitor 30 5% 50V	1
C1470	2111031A15	Capacitor 10 +0.5% 50V	1
C1471	2111031A41	Capacitor 120 5% 500V	1
C1472	2111031A55	Capacitor 470 5% 50V	1
C1480	2111031A55	Capacitor 470 5% 50V	1
CR1440	4880236E07	Diode Zener 28V	1
CR1460	4884616A01	Diode Hot carrier	1
CR1470	4883510F04	Diode Pin	1
CR1471	4883510F04	Diode Pin	1
J0007	0980038K01	Connector Power	1
J0008	0902097B04	Connector 50 Ohm	1
E1430	7683960B01	Coil Ferrite 0.5 turn	1
E1440	7683960B01	Coil Ferrite 0.5 turn	1
L1410	2411030A01	Coil red 2 turns	1
L1411	2411030A03	Coil yellow 4 turns	1
L1412	2411030B15	Coil white 10.5 turns	1
L1420	2411030A06	Coil violet 7 turns	1
L1421	2411030A01	Coil red 2 turns	1
L1422	2482723H37	Coil blue 6.2uH	1
L1423	2411030A01	Coil red 2 turns	1
L1424	2480036A01	Coil Ferrite 5 turn	1
L1430	2411030A02	Coil orange 3 turns	1
L1431	2411030B15	Coil white 10.5 turns	1
L1432	2480036A01	Coil Ferrite 0.5 turn	1
L1433	2411030E01	Coil brown	1
L1434	2482723H46	Coil blu-grn 0.2uH	1
L1435	2411030E01	Coil brown	1
L1440	2411030A03	Coil yellow 4 turns	1
L1441	2482723H37	Coil blue 6.2uH	1
L1442	2411030A05	Coil blue 6 turns	1
L1443	2484346A02	Coil 0.23uH	1
L1444	2411030E01	Coil brown	1
L1445	2411030A02	Coil orange 3 turns	1
L1450	2411030B10	Coil red 5.5 turns	1
L1451	2411030A05	Coil blue 6 turns	1
L1452	2411030B10	Coil red 5.5 turns	1
L1453	2411030B10	Coil red 5.5 turns	1
L1454	2411030B15	Coil white 10.5 turns	1
L1470	2482723H49	Coil blu-blk 1.2uH	1
L1471	2411030A04	Coil green 5 turns	1
L1472	2482723H49	Coil blu-blk 1.2uH	1
Q1410	4800869657	Transistor M9657	1
Q1420	4802081B42	Transistor M1B42	1
Q1430	4880225C18	Transistor M2518	1
















































Pos	Code No	Description	Qt
Q1440	4802081B18	Transistor M8118	1
RT1480	0683600K05	Thermistor 100k	1
R1410	0611077A64	Resistor 390 5% 0.125W	1
R1411	0611077A74	Resistor 1k 5% 0.125W	1
R1412	0611077A44	Resistor 56 5% 0.125W	1
R1413	0611077A44	Resistor 56 5% 0.125W	1
R1414	0611077A64	Resistor 390 5% 0.125W	1
R1420	0611077A56	Resistor 180 5% 0.125W	1
R1421	0611077A81	Resistor 2k 5% 0.125W	1
R1440	0611077A36	Resistor 27 5% 0.125W	1
R1460	0611077A98	Resistor 10k 5% 0.125W	1
R1461	0611077B01	Resistor 12k 5% 0.125W	1
R1470	0602369M29	Resistor 220 5% 0.6W	1
R1471	0611077A74	Resistor 1k 5% 0.125W	1
R1472	0611077A74	Resistor 1k 5% 0.125W	1
R1474	0611077A32	Resistor 18 5% 0.125W	1
		NON REFERENCED ITEMS	
	2980014A01	Coax clip	2
	1580151J01	Housing Connector	1
	2680092K01	Shield Antenna Connector	1
	2680199J01	Harmonic Filter Shield	1
	2280172J01	Pin Polarizing	1
	0102712B02	Assy Feedthru Bracket	1
	3080116K01	Coax Receive	1
	3080116K02	Coax Transmit	1
	2680222H01	Heatsink	1
	4280201J01	Clip Ground	2
	1484836A01	Insulator Transistor	1
	0200007003	Nut	1
	0302607B01	Screw Taptite	1
	0980257H01	Contact	5

CHAPTER
CHAPITRE
KAPITEL

7

PARTS NUMBERS FOR PUSHBUTTON KEYS

STORNOPHONE 5500

38D03396A01		38D03396A17		38D03396A33	
38D03396A02		38D03396A18		38D03396A34	
38D03396A03		38D03396A19		38D03396A35	
38D03396A04		38D03396A20		38D03396A36	
38D03396A05		38D03396A21		38D03396A37	
38D03396A06		38D03396A22		38D80230J01	
38D03396A07		38D03396A23		38D80230J02	
38D03396A08		38D03396A24		38D80230J03	
38D03396A09		38D03396A25		38D80230J04	
38D03396A10		38D03396A26		38D80230J05	
38D03396A11		38D03396A27		38D80230J06	
38D03396A12		38D03396A28		38D80230J07	
38D03396A13		38D03396A29		38D80230J08	
38D03396A14		38D03396A30		38D80230J09	
38D03396A15		38D03396A31		38D80230J10	
38D03396A16		38D03396A32			

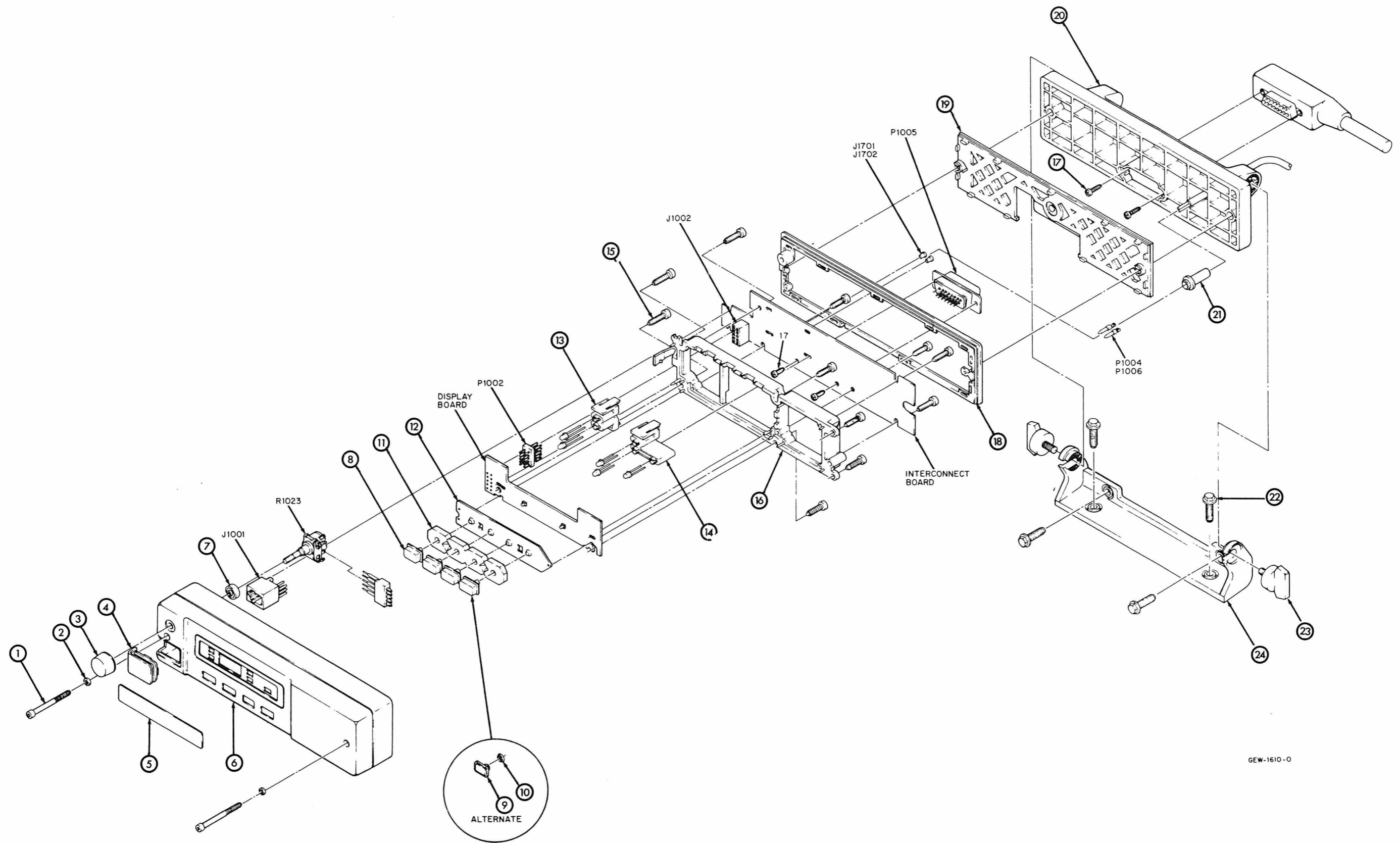
CONTROL HEADS

DIAGRAMS & PARTS LISTS

CONTROL HEADS G1031/32/33 (EZ MODELS) PARTS LIST	MPL405.508
CONTROL HEADS G1031/32/33 (EZ MODELS) MECHANICAL	M405.508
CONTROL HEADS G1041/42/43 (EZ MODELS), G1053 (EV MODEL) PARTS LIST	MPL405.509
CONTROL HEADS G1041/42/43 (EZ MODELS), G1053 (EV MODEL) MECHANICAL	M405.509
GLN6616/18 LCD CONTROL HEAD DISPLAY BOARD, INTERCONNECT BOARD COMPONENT LAYOUT	D405.141
GLN6616/18 LCD CONTROL HEAD DISPLAY BOARD, INTERCONNECT BOARD CIRCUIT DIAGRAM	D405.140
GLN6616/18 LCD CONTROL HEAD DISPLAY BOARD, INTERCONNECT BOARD PARTS LIST	X405.191
GLN6617/19/GLN6960 LCD CONTROL HEAD DISPLAY BOARD, INTERCONNECT BOARD COMPONENT LAYOUT	D405.139
GLN6617/19/GLN6960 LCD CONTROL HEAD DISPLAY BOARD, INTERCONNECT BOARD CIRCUIT DIAGRAM	D405.138
GLN6617/6960 LCD CONTROL HEAD DISPLAY BOARD PARTS LIST	X405.190
GLN6619 LCD INTERCONNECT BOARD PARTS LIST	X405.192

MECHANICAL PARTS LIST FOR GLN6620 CONTROL HEAD HARDWARE

Pos	Code No.	Description	Qt	Pos	Code No.	Description	Qt
	GLN6620	CONTROL HEADS G1031,G1032,G1033					
1	0380029J01	SCREW MOUNTING	4				
2	4210128A10	RETAINING RING RUBBER	1				
3	3602063N01	KNOB VOLUME CONTROL	1				
4	1580022J01	COVER MICROPHONE CONNECTOR	1				
5	1380025K01	ESCUTCHEON	1				
6	1580237J01	HOUSING FRONT	1				
7	3280034J01	GASKET POTENTIOMETER	1				
8	3880230J03	KEY	1				
9	3880284J01	BUTTON PLUG	1				
10	3280119J02	GASKET	1				
11	6180287J01	LIGHTPIPE (1x4)	1				
12	7580236J01	ELASTOMERIC PAD (1x4)	1				
13	4280021J02	RETAINER LED	1				
14	4280021J01	RETAINER LED	1				
15	0380030J01	SCREW M3x10	8				
16	2780233J01	FRAME INTERNAL CHASSIS	1				
17	0384723C02	SCREW M3x6	4				
18	3280032J01	GASKET HOUSING	1				
19	1580031J01	BACK COVER HOUSING	1				
20	1580037J01	BACK COVER (REMOTE MOUNT)	1				
21	3280120J01	GROMMET SPEAKER	1				
22	0300136756	SCREW TAPPING	4				
23	0380036J01	SCREW TRUNNION	2				
24	0780035J01	TRUNNION REMOTE MOUNT	1				



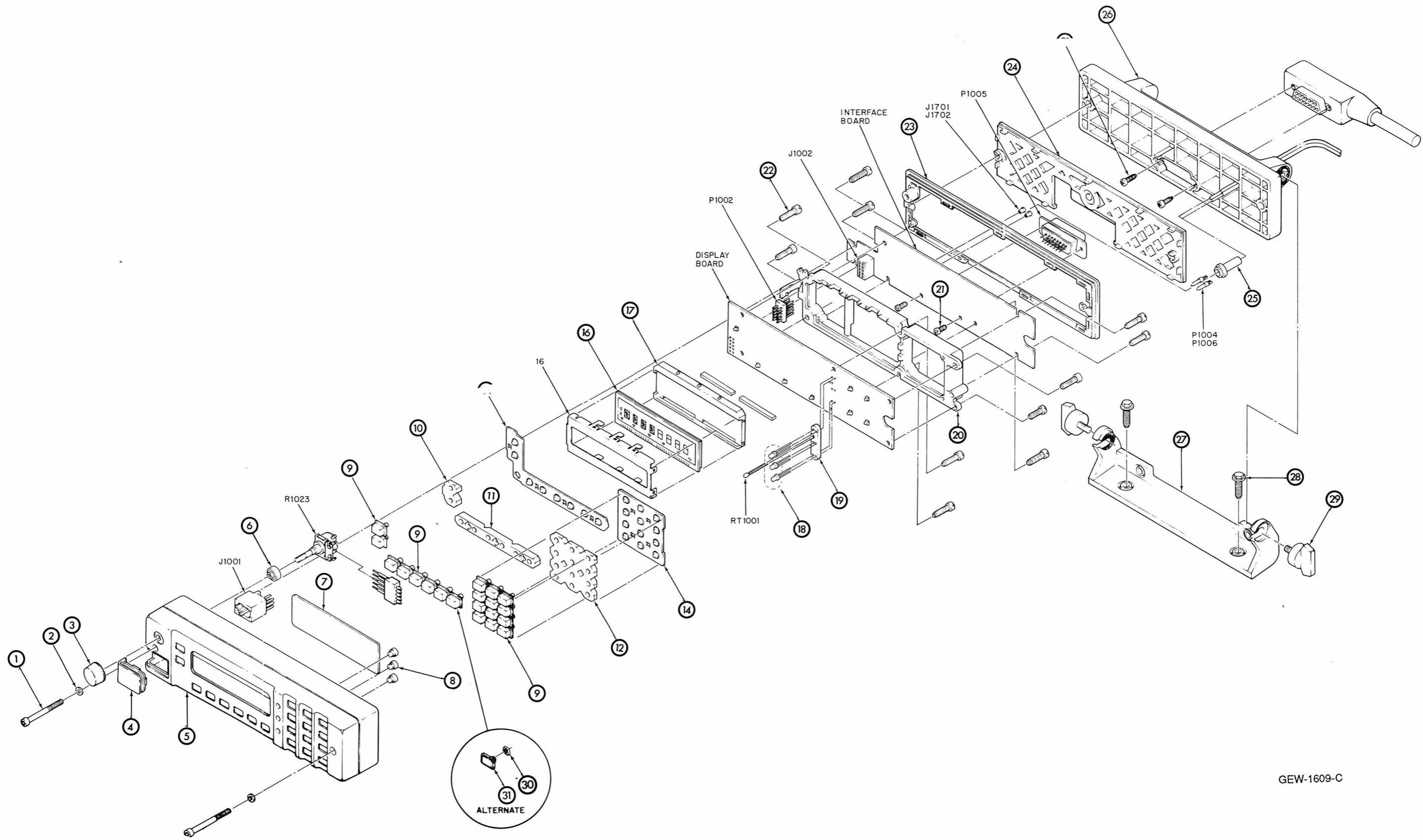
GEW-1610-0

**GLN6620 CONTROL HEAD HARDWARE
FOR CONTROL HEADS G1031, G1032 & G1033**

M405.508

MECHANICAL PARTS LIST FOR LCD CONTROL HEADS

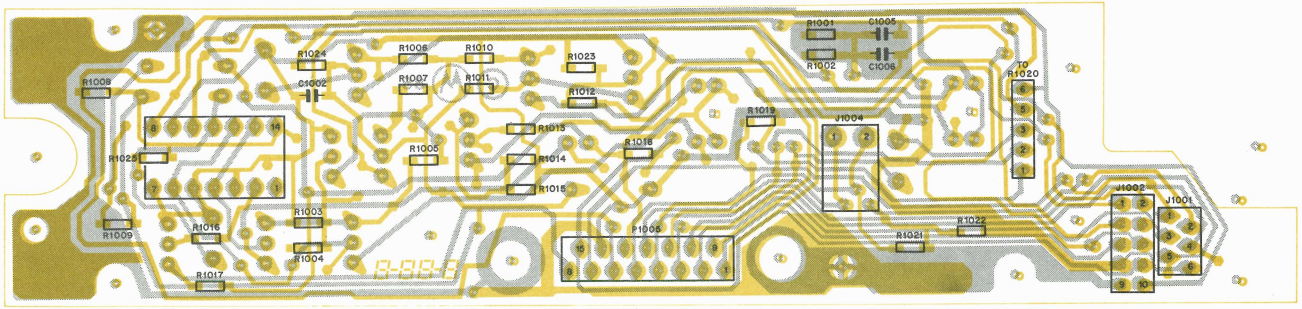
Pos	Code No.	Description	Qt	Pos	Code No.	Description	Qt
	GLN6621A	CONTROL HEAD HARDWARE FOR G1041A, G1042A & G1043A (FOR EZ MODELS)					
	GLN6623A	CONTROL HEAD HARDWARE FOR G1053A (FOR EV MODELS)					
1	0380029J01	SCREW MOUNTING	4				
2	4210128A10	RETAINING RING RUBBER	1				
3	3680248H01	KNOB VOLUME CONTROL	1				
4	1580022J01	COVER MICROPHONE CONNECTOR	1				
5	1580239J02	HOUSING FRONT	1				
6	3280034J01	GASKET POTENTIOMETER	1				
7	6180015J01	LENS LCD	1				
8	6180235J02	LENS BEZEL LIGHT BRONZE	1				
9	3880220H	KEY	1				
10	6180287J01	LIGHTPIPE (1x4)	1				
11	6180288J01	LIGHTPIPE (1x8)	1				
12	6180289J01	LIGHTPIPE (1x2)	1				
13	7580217H01	ELASTOMERIC PAD L-SHAPE	1				
14	7580218H01	ELASTOMERIC PAD (3x4)	1				
15	0780231J01	BRACKET LCD	1				
16	7280045K01	DISPLAY LCD	1				
17	6180020J01	LIGHTPIPE LCD	1				
18	4880014J02	LED YELLOW	1				
	4880014J01	LED RED	1				
	4880014J03	LED GREEN	1				
19	4280283J01	RETAINER LED	1				
20	2780233J01	FRAME INTERNAL CHASSIS	1				
21	0384723C02	SCREW M3x6	4				
22	0380030J01	SCREW M3x10	8				
23	3280032J01	GASKET HOUSING	1				
24	1580031J01	BACK COVER HOUSING	1				
25	3280120J01	GROMMET SPEAKER	1				
26	1580037J01	BACK COVER (REMOTE MOUNT)	1				
27	0780035J01	TRUNNION REMOTE MOUNT	1				
28	0300136756	SCREW TAPPING	4				
29	0380036J01	SCREW TRUNNION	2				
30	3880284J02	BUTTON PLUG	1				
31	3280119J02	GASKET	1				



GEW-1609-C

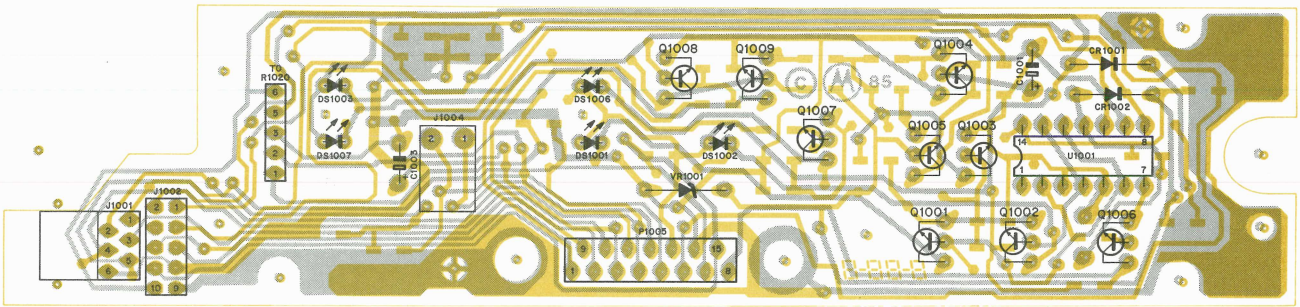
LCD CONTROL HEADS G1041A, G1042A & G1043A

M405.509/2



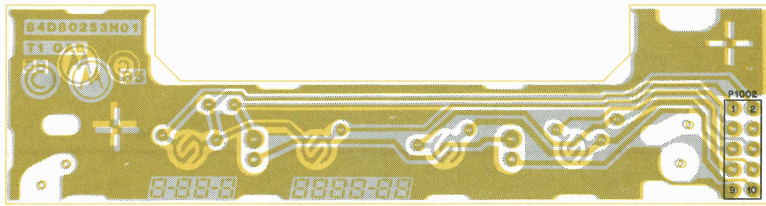
SHOWN FROM SOLDER SIDE

COMPONENT SIDE ● GDW-1521-0
 SOLDER SIDE ● GDW-1522-0
 OVERLAY — GDW-1524-0



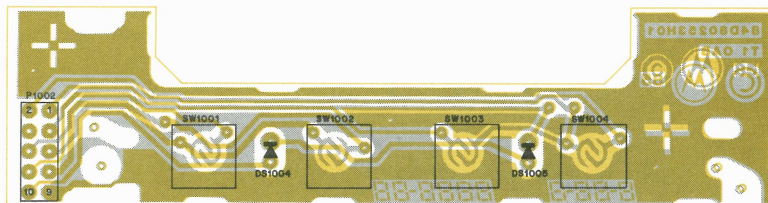
SHOWN FROM COMPONENT SIDE

COMPONENT SIDE ● GDW-1521-0
 SOLDER SIDE ● GDW-1522-0
 OVERLAY — GDW-1523-0



SHOWN FROM SOLDER SIDE

COMPONENT SIDE ● GDW-1517-0
 SOLDER SIDE ● GDW-1518-0
 OVERLAY — GDW-1520-0

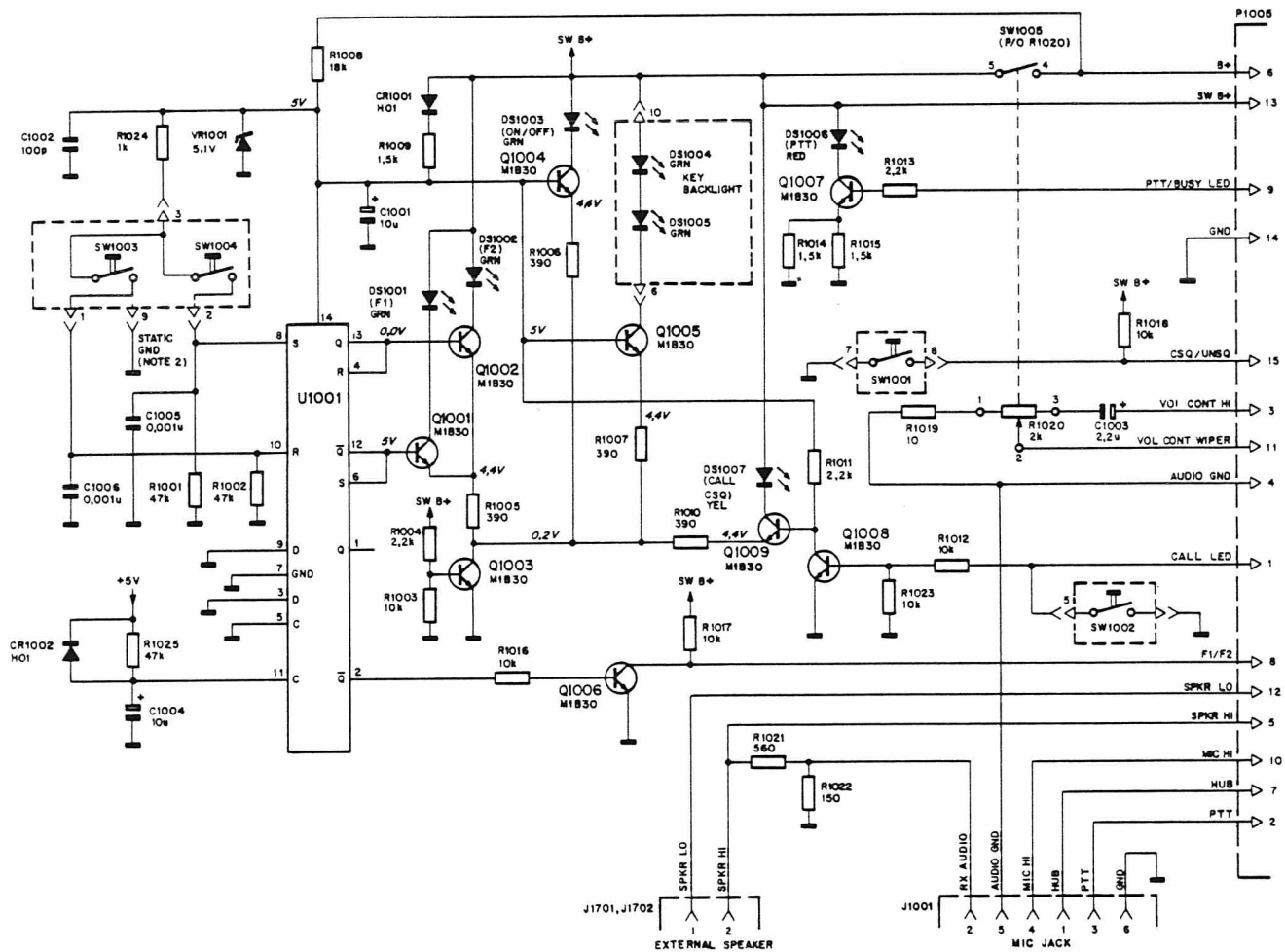


SHOWN FROM COMPONENT SIDE

COMPONENT SIDE ● GDW-1517-0
 SOLDER SIDE ● GDW-1518-0
 OVERLAY — GDW-1519-0

GLN6616 CONTROL HEAD DISPLAY BOARD
 GLN6618 INTERCONNECT BOARD
 COMPONENT LAYOUT

D405.141



- NOTES:**
1. UNLESS OTHERWISE SPECIFIED, ALL RESISTOR VALUES ARE IN OHMS.
 2. PIN 9 OF P1002/J1002 IS THE BOARD TO BOARD STATIC GROUND INTERCONNECT.
 3. DC TEST VOLTAGES ARE SHOWN WITH THE FOLLOWING CONDITIONS: F1 SELECTED, SW1005 CLOSED, SW1002 CLOSED.
 4. CIRCUITRY SHOWN IN DASHED BOXES IS LOCATED ON THE DISPLAY BOARD VIA THE P1002/J1002 INTERCONNECTION.

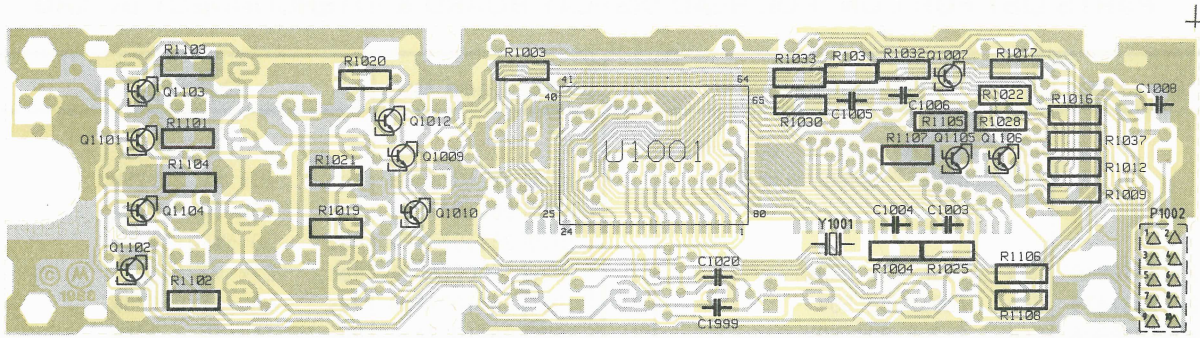
GDW-1575-0

**GLN6616 CONTROL HEAD DISPLAY BOARD
GLN6618 INTERCONNECT BOARD**

D405.140

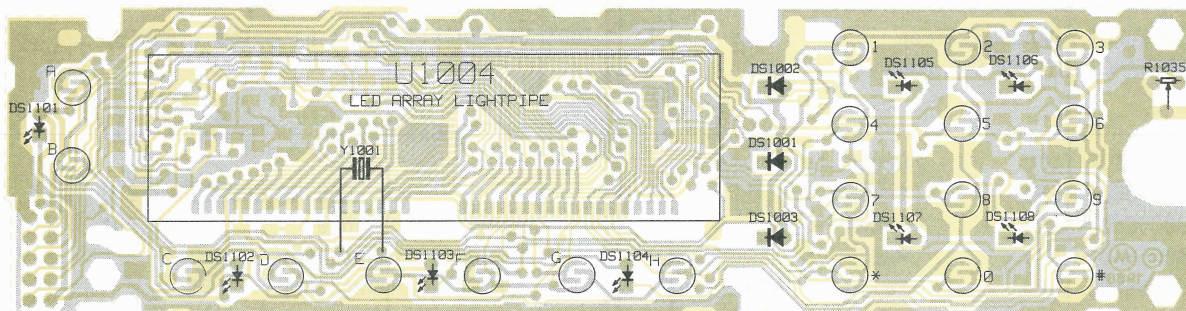
PARTS LIST FOR CONTROL HEAD DISPLAY BOARD & INTERCONNECT BOARD

Pos	Code No.	Description	Qt	Pos	Code No.	Description	Qt
		CONTROL HEAD DISPLAY BD GLN6616					
		INTERCONNECT BOARD GLN6618					
C				R			
1001	2113740B49	Cap 10uF CL1 ±30%	1	1017	0611077A98	Res 10k 5% 0.125W	1
1002	2111031A39	Cap 100pF 5% 50V	1	1018	0611077A98	Res 10k 5% 0.125W	1
1003	2311048B06	Cap 2.2uF 20% 50V	1	1019	0611077A26	Res 10 5% 0.125W	1
1004	2111032A33	Cap 0.1uF +80-20% 50V	1	1020	1880065K01	Res 22k variable	1
1005	2113741B21	Cap 1000pF CL2 X7R	1	1021	0611077A68	Res 560 5% 0.125W	1
1006	2113741B21	Cap 1000pF CL2 X7R	1	1022	0611077A54	Res 150 5% 0.125W	1
CR				1023	0611077A98	Res 10k 5% 0.125W	1
1001	4883654H01	Diode Silicon	1	1024	0611077A74	Res 1k 5% 0.125W	1
1002	4883654H01	Diode Silicon	1	1025	0611077B15	Res 47k 5% 0.125W	1
DS				U			
1001	4880058K02	LED Green	1	1001	5184887K13	Dual Flipflop 84L13	1
1002	4880058K02	LED Green	1	VR			
1003	4880058K02	LED Green	1	1001	4882256C15	Diode Zener 5.1V	1
1006	4880058K01	LED Red	1			NON REFERENCED ITEMS	
1007	4880058K03	LED Yellow	1		3080014K01	Cable Volume Pot	1
J					4280021J01	Retainer LED	1
1001	0980023J01	Receptacle Microphone	1		4280021J02	Retainer LED	1
1002	0980027J01	Receptacle 10 way	1			DISPLAY BOARD GLN6616	
1701	0905604C06	Socket Speaker	1	DS			
1702	0905604C06	Socket Speaker	1	1004	4802668M01	LED	1
P				1005	4802668M01	LED	1
1005	2880024J01	Conn. D 15 Pos	1	P			
Q				1000	2880026J01	Connector Header 10 pin	1
1001	4802081B30	Trst M1B30	1				
1002	4802081B30	Trst M1B30	1				
1003	4802081B30	Trst M1B30	1				
1004	4802081B30	Trst M1B30	1				
1005	4802081B30	Trst M1B30	1				
1006	4802081B30	Trst M1B30	1				
1007	4802081B30	Trst M1B30	1				
1008	4802081B30	Trst M1B30	1				
1009	4802081B30	Trst M1B30	1				
R							
1001	0611077B15	Res 47k 5% 0.125W	1				
1002	0611077B15	Res 47k 5% 0.125W	1				
1003	0611077A98	Res 10k 5% 0.125W	1				
1004	0611077A82	Res 2.2k 5% 0.125W	1				
1005	0611077A64	Res 390 5% 0.125W	1				
1006	0611077A64	Res 390 5% 0.125W	1				
1007	0611077A64	Res 390 5% 0.125W	1				
1008	0611077B05	Res 18k 5% 0.125W	1				
1009	0611077A78	Res 1.5k 5% 0.125W	1				
1010	0611077A64	Res 390 5% 0.125W	1				
1011	0611077A82	Res 2.2k 5% 0.125W	1				
1012	0611077A98	Res 10k 5% 0.125W	1				
1013	0611077A82	Res 2.2k 5% 0.125W	1				
1014	0611077A78	Res 1.5k 5% 0.125W	1				
1015	0611077A78	Res 1.5k 5% 0.125W	1				
1016	0611077A98	Res 10k 5% 0.125W	1				



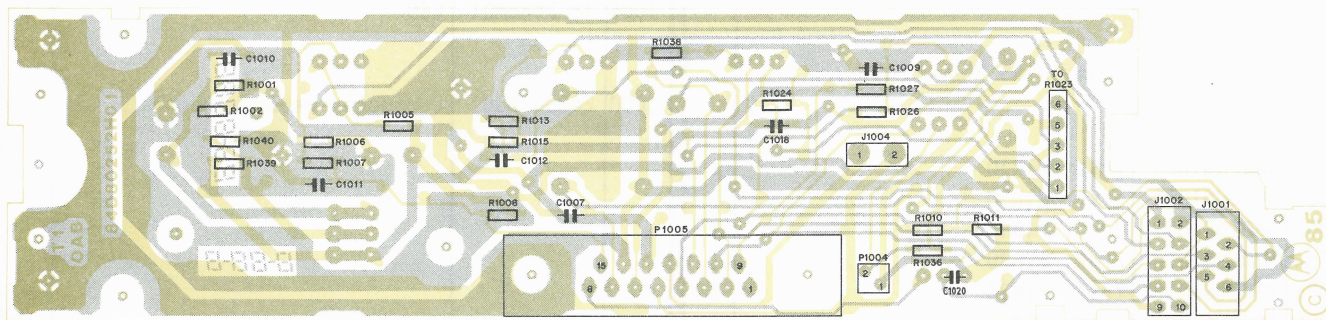
COMPONENT SIDE ● GEPD 4421-1 (8402637M03)
 SOLDER SIDE ● GEPD 4420-1 (8402637M03)
 CHIP OVERLAY ● GEPD 4423-1

SHOWN FROM SOLDER SIDE



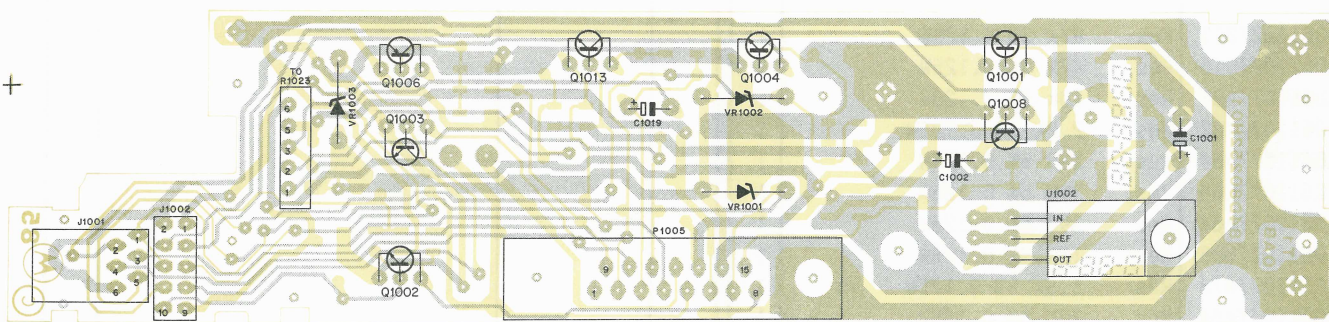
COMPONENT SIDE ● GEPD 4421-1 (8402637M03)
 SOLDER SIDE ● GEPD 4420-1 (8402637M03)
 COMPONENT OVERLAY ● GEPD 4422-2

SHOWN FROM COMPONENT SIDE



COMPONENT SIDE ● GDW-1529-0
 SOLDER SIDE ● GDW-1530-0
 OVERLAY — GDW-1532-1

SHOWN FROM SOLDER SIDE

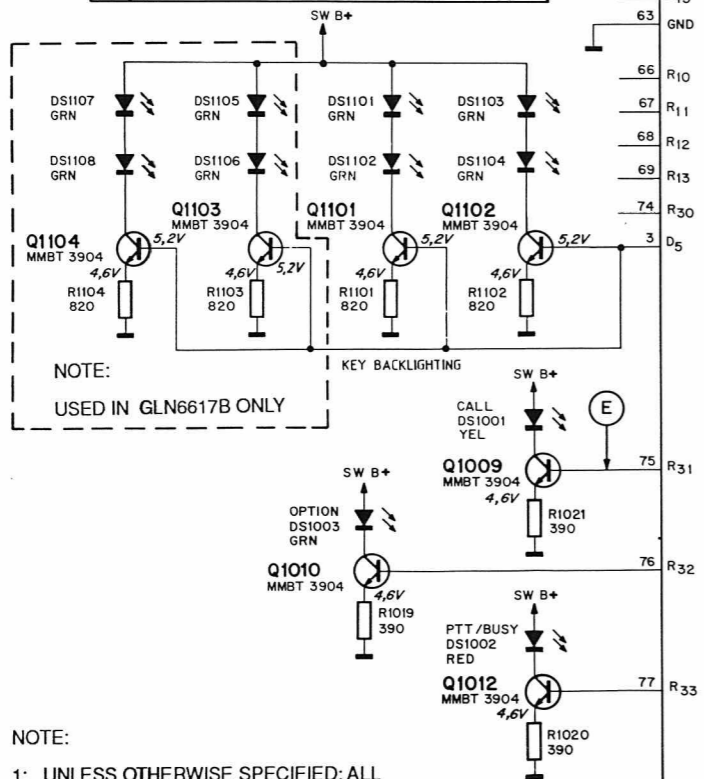
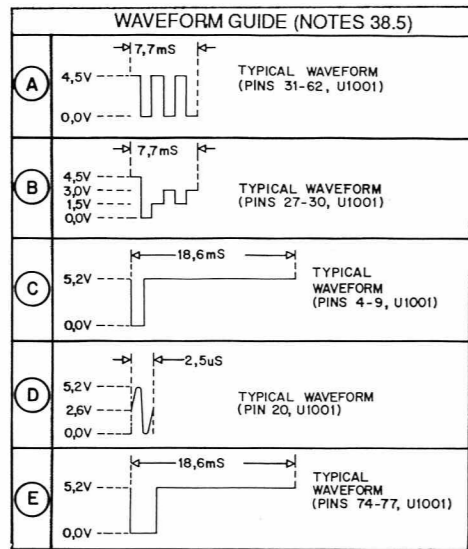


COMPONENT SIDE ● GDW-1529-0
 SOLDER SIDE ● GDW-1530-0
 OVERLAY — GDW-1531-0

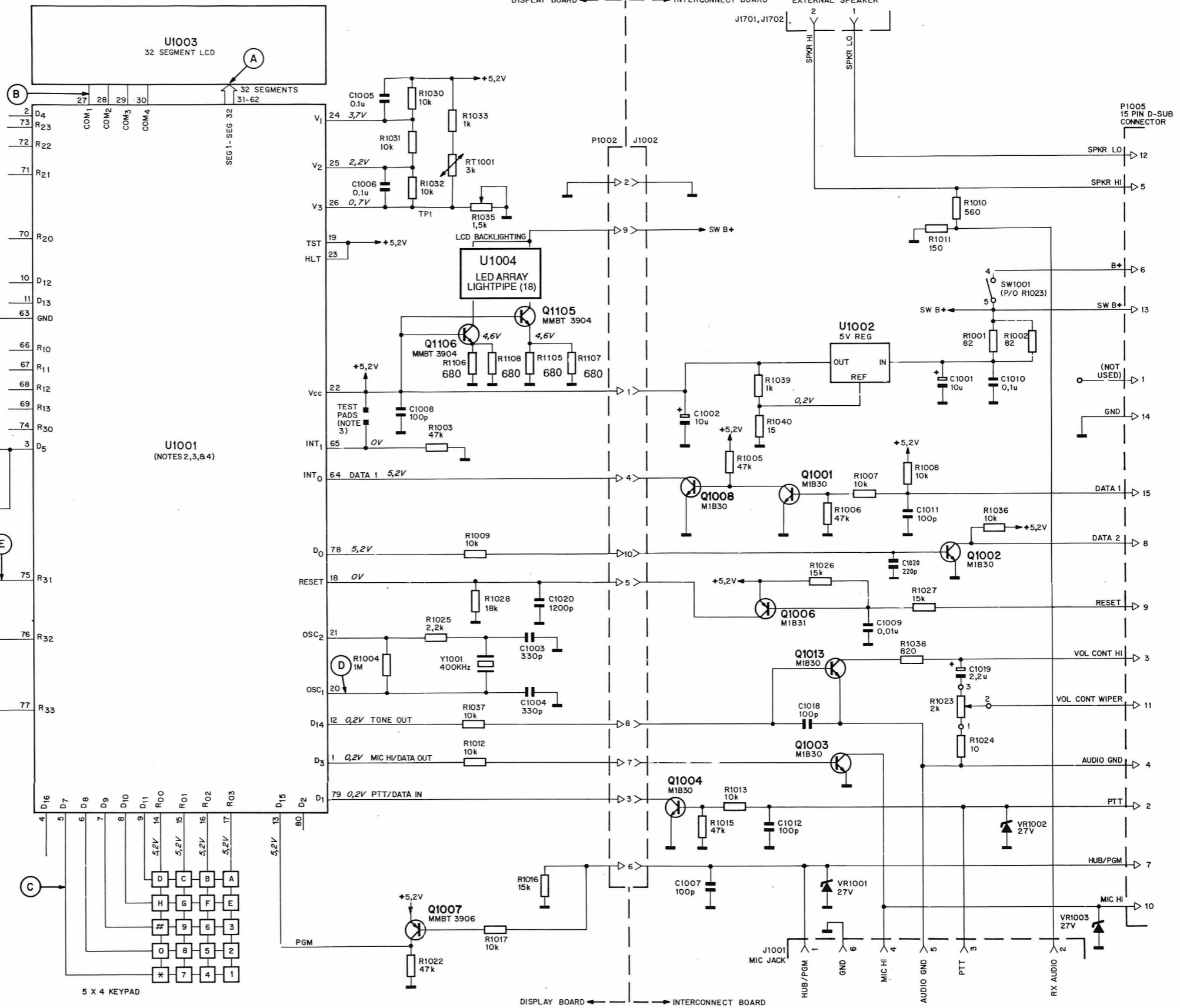
SHOWN FROM COMPONENT SIDE

GLN6960B LCD CONTROL HEAD DISPLAY BOARD
 GLN6617B LCD CONTROL HEAD DISPLAY BOARD
 GLN6619B INTERCONNECT BOARD
 COMPONENT LAYOUT

D405.139/2



- NOTE:
- UNLESS OTHERWISE SPECIFIED; ALL RESISTOR VALUES ARE IN OHMS.
 - ALL KEYS SHOWN ARE MOMENTARY.
 - DC VOLTAGES SHOWN ARE AFTER THE TEST PADS ARE MOMENTARILY SHORTED WITH NO RADIO ATTACHED.
 - THE VOLTAGES ON PINS 24, 25, 26 OF U1001 ARE WITH THE VOLTAGE FROM PIN 22 TO PIN 26 ADJUSTED TO 4.5V AT 25 BY R1035.
 - ALL WAVEFORMS ARE DC COUPLED.
 - FOR PROGRAMMING, THE MIC HI AND PTT BECOME DATA LINES.



GEW-1574-5

GLN6960B LCD CONTROL HEAD DISPLAY BOARD
 GLN6617B LCD CONTROL HEAD DISPLAY BOARD
 GLN6619B INTERCONNECT BOARD

D405.138/2

PARTS LIST FOR LCD CONTROL HEAD DISPLAY BOARDS

Pos	Code No.	Description	Qt	Pos	Code No.	Description	Qt
		GLN6617		1033	0611077A74	Resistor 1k 5% 0.125W	1
		GLN6960 2A		1035	1880080J02	Resistor 1.5k variable	1
C				1037	0611077A98	Resistor 10k 5% 0.125W	1
1003	2111031A51	Capacitor 330pF 5% 50V	1	1101	0611077A72	Resistor 820 5% 0.125W	1
1004	2111031A51	Capacitor 330pF 5% 50V	1	1102	0611077A72	Resistor 820 5% 0.125W	1
1005	2111032A33	Capacitor 0.1uF +80-20% 50V	1	1103	0611077A72	Resistor 820 5% 0.125W	1
1006	2111032A33	Capacitor 0.1uF +80-20% 50V	1			(GLN6617 only)	1
1008	2111031A39	Capacitor 100pF 5% 50V	1	1104	0611077A72	Resistor 820 5% 0.125W	1
1020	2111031A63	Capacitor 1200pF 5% 50V	1			(GLN6617 only)	1
DS				1105	0611077A66	Resistor 470 5% 0.125W	1
1001	4802669M03	LED Yellow	1	1106	0611077A66	Resistor 470 5% 0.125W	1
1002	4802669M01	LED Red	1	1107	0611077A66	Resistor 470 5% 0.125W	1
1003	4802669M02	LED Green (GLN6617 only)	1	1108	0611077A66	Resistor 470 5% 0.125W	1
1101	4802668M01	LED Green	1	RT			
1102	4802668M01	LED Green	1	1001	0683600K11	Thermistor 3k 5%	1
1103	4802668M01	LED Green	1	U			
1104	4802668M01	LED Green	1	1001	5197020C01	uP/LED Driver M20C01	1
1105	4802668M01	LED Green (GLN6617 only)	1	Y			
1106	4802668M01	LED Green (GLN6617 only)	1	1001	4805705G02	Resonator 400kHz	1
1107	4802668M01	LED Green (GLN6617 only)	1			NON REFERENCED ITEMS	
1108	4802668M01	LED Green (GLN6617 only)	1		4280283J01	Retainer LED	1
1109	DELETED	LED Green					
1110	DELETED	LED Green					
1111	DELETED	LED Green					
1112	DELETED	LED Green					
P							
1002	2880026J01	Connector Header 10 pin	1				
Q							
1007	4880214G01	Trst M14G01	1				
1009	4880214G02	Trst M14G02	1				
1010	4880214G02	Trst M14G02 (GLN6617 only)	1				
1012	4880214G02	Trst M14G02	1				
1101	4880214G02	Trst M14G02	1				
1102	4880214G02	Trst M14G02	1				
1103	4880214G02	Trst M14G02 (GLN6617 only)	1				
1104	4880214G02	Trst M14G02 (GLN6617 only)	1				
1105	4880214G02	Trst M14G02	1				
1106	4880214G02	Trst M14G02	1				
R							
1003	0611077B15	Resistor 47k 5% 0.125W	1				
1004	0611077B47	Resistor 1M 5% 0.125W	1				
1009	0611077A98	Resistor 10k 5% 0.125W	1				
1012	0611077A98	Resistor 10k 5% 0.125W	1				
1014	0611077A98	Resistor 10k 5% 0.125W	1				
1016	0611077B03	Resistor 15k 5% 0.125W	1				
1017	0611077A98	Resistor 10k 5% 0.125W	1				
1019	0611077A64	Res 390 5% 0.125W GLN6617 only	1				
1020	0611077A64	Res 390 5% 0.125W	1				
1021	0611077A64	Res 390 5% 0.125W	1				
1022	0611077B15	Resistor 47k 5% 0.125W	1				
1025	0611077A82	Resistor 2.2k 5% 0.125W	1				
1028	0611077B23	Resistor 100k 5% 0.125W	1				
1030	0611077A98	Resistor 10k 5% 0.125W	1				
1031	0611077A98	Resistor 10k 5% 0.125W	1				
1032	0611077A98	Resistor 10k 5% 0.125W	1				

PARTS LIST FOR LCD CONTROL HEAD INTERCONNECT BOARD GLN6619

Pos	Code No.	Description	Qt	Pos	Code No.	Description	Qt
C				NON REFERENCED ITEMS			
1001	2311048B11	Capacitor 10uF 20% 35V	1	0384723C02	Screw M3x6		2
1002	2311048B13	Capacitor 10uF 20% 16V	1	DELETED	Rivet Nylon		1
1007	2111031A39	Capacitor 100pF 5% 50V	1				
1009	2111032A21	Capacitor 0.01uF 10% 50V	1				
1010	2111032A33	Capacitor 0.1uF +80-20% 50V	1				
1011	2111031A39	Capacitor 100pF 5% 50V	1				
1012	2111031A39	Capacitor 100pF 5% 50V	1				
1018	2111031A39	Capacitor 100pF 5% 50V	1				
1019	2311048B06	Capacitor 2.2uF 20% 50V	1				
1020	2111031A47	Capacitor 220pF 5% 50V	1				
J							
1001	0980023J01	Receptacle Microphone	1				
1002	0980027J01	Receptacle 10 way	1				
1701	0905604C06	Socket Speaker	1				
1702	0905604C06	Socket Speaker	1				
P							
1005	2880024J01	Connector D 15 Pos	1				
Q							
1001	4802081B30	Transistor M1B30	1				
1002	4802081B30	Transistor M1B30	1				
1003	4802081B30	Transistor M1B30	1				
1004	4802081B30	Transistor M1B30	1				
1006	4802081B31	Transistor M1B31	1				
1008	4802081B30	Transistor M1B30	1				
1013	4802081B30	Transistor MU30	1				
R							
1001	0611077A48	Resistor 82 5% 0.125W	1				
1002	0611077A48	Resistor 82 5% 0.125W	1				
1005	0611077B15	Resistor 47k 5% 0.125W	1				
1006	0611077B15	Resistor 47k 5% 0.125W	1				
1007	0611077A98	Resistor 10k 5% 0.125W	1				
1008	0611077A98	Resistor 10k 5% 0.125W	1				
1010	0611077A68	Resistor 560 5% 0.125W	1				
1011	0611077A54	Resistor 150 5% 0.125W	1				
1013	0611077A98	Resistor 10k 5% 0.125W	1				
1015	0611077B15	Resistor 47k 5% 0.125W	1				
1023	1880065K01	Resistor 22k variable	1				
1024	0611077A26	Resistor 10 5% 0.125W	1				
1026	0611077B03	Resistor 15k 5% 0.125W	1				
1027	0611077B03	Resistor 15k 5% 0.125W	1				
1036	0611077A98	Resistor 10k 5% 0.125W	1				
1038	0611077A72	Resistor 820 5% 0.125W	1				
1039	0611077A74	Resistor 1k 5% 0.125W	1				
1040	0611077A30	Resistor 15 5% 0.125W	1				
U							
1002	5180068C02	Volt Regulator M8C02	1				
VR							
1001	4882256C20	Diode Zener 27V	1				
1002	4882256C20	Diode Zener 27V	1				
1003	4882256C20	Diode Zener 27V	1				

CHAPTER
CHAPITRE
KAPITEL

8

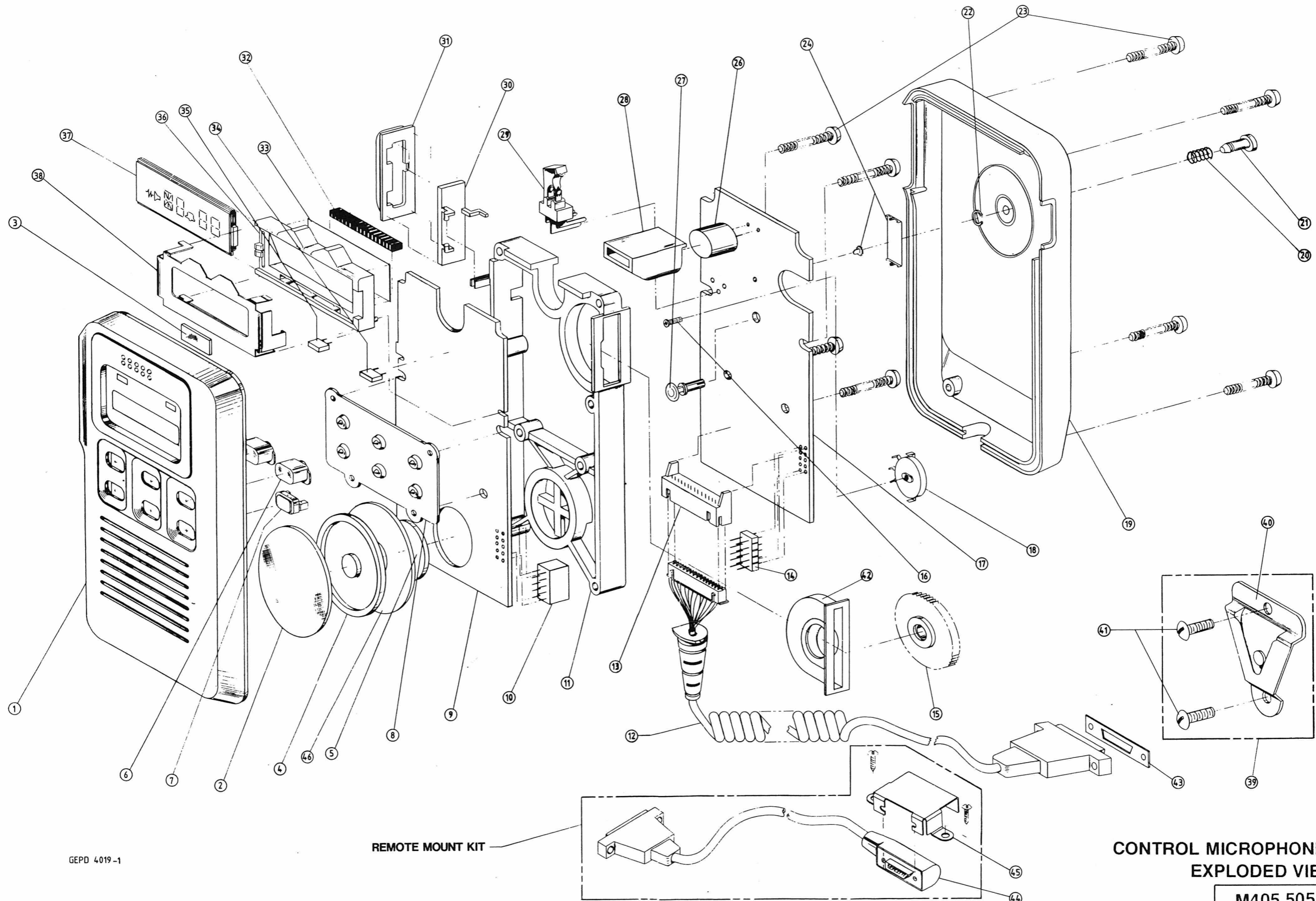
CONTROL MICROPHONES

DIAGRAMS & PARTS LISTS

CONTROL MICROPHONES PARTS LIST	MPL405.505/X
CONTROL MICROPHONES EXPLODED VIEW	M405.505/X
BASIC CONTROL MICROPHONES G1061/72/73 COMPONENT LAYOUT	D405.087/X
BASIC CONTROL MICROPHONES G1061/72/73 CIRCUIT DIAGRAM	D405.153/X
BASIC CONTROL MICROPHONES G1061/72/73 PARTS LIST	X405.154/X
EXTENDED CONTROL MICROPHONE DISPLAY BOARD, INTERCONNECT BOARD G1083 COMPONENT LAYOUT	D405.088/X
EXTENDED CONTROL MICROPHONE DISPLAY BOARD, INTERCONNECT BOARD G1083 CIRCUIT DIAGRAM	D405.152/X
EXTENDED CONTROL MICROPHONE DISPLAY BOARD, INTERCONNECT BOARD G1071/82 COMPONENT LAYOUT	D405.089/X
EXTENDED CONTROL MICROPHONE DISPLAY BOARD, INTERCONNECT BOARD G1071/82 CIRCUIT DIAGRAM	D405.155/X
EXTENDED CONTROL MICROPHONE DISPLAY BOARD, INTERCONNECT BOARD G1071/82/83 PARTS LIST	X405.225/X

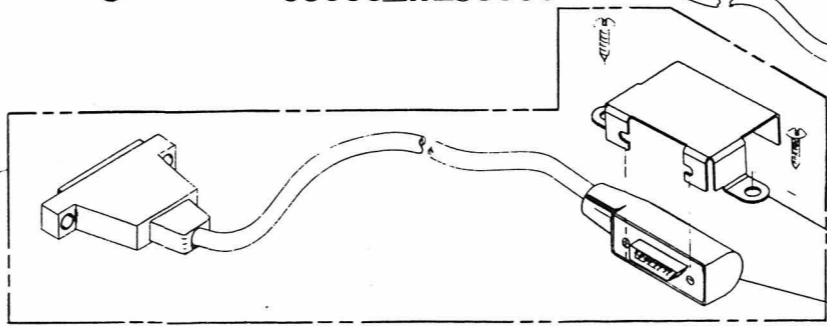
DATE: 8/11/1988

Pos	Code No	Description	Qt	Pos	Code No	Description	Qt
1	GHN6135	HOUSING TOP BASIC CONTROL MICROPHONE (INCL. ITEMS 2 & 3)	1				
	GHN6133	HOUSING TOP EXTENDED CONTROL MICROPHONE (INCL. ITEMS 2 & 3)	1				
2	3202588M01	SEAL FELT SPEAKER (PART OF ITEM 1)	1				
3	3202588M02	SEAL FELT MICROPHONE(PART OF ITEM 1)	1				
4	GSN6043	SPEAKER (INCL. ITEM 5)	1				
5	3280102K01	PAD SPEAKER (PART OF ITEM 4)	1				
6		KEY BUTTON:					
	3880205K01	CHANNEL SELECT (INCR. OF 1)	1				
	3880205K02	CHANNEL SELECT (INCR. OF 10)	1				
	3880205K03	MONITOR SQ RESET	1				
	3880205K04	SEC CALL EXT ALARM	1				
	3880205K05	CALL EXECUTE	1				
	3880205K06	MULTICALL SELECT (INCR. OF 1)	1				
	3880205K07	MULTICALL SELECT (INCR. OF 10)	1				
	3880205K08	CHANNEL SELECT	1				
	3880205K09	SQUELCH	1				
	3880205K10	CHANNEL 1	1				
	3880205K11	CHANNEL 2	1				
	3880205K12	MULIT PL ENCODE SELECT	1				
	3880205K13	BASE CALL	1				
	3880205K14	MANUEL RPTR ACCESS	1				
	3880206K01	BUTTON PLUG	1				
7	7580078K01	KEYPAD	1				
8		BOARD DISPLAY:					
9	GLN6790	BASIC VERSIONS (A11)	1				
	GLN6888	EXTENDED VERSIONS (A11 WITHOUT SELECT 5)	1				
	GLN6791	EXT SELECT 5 VERSION	1				
10		RECEPTACLE J1006 SEE X405.					
11	2780177K01	CHASSIS INTERNAL	1				
12	3080204K02	CABLE COILED	1				
13		CONNECTOR P1005 SEE X405.					
14		CONNECTOR P1006 SEE X405.					
15	3680103K03	KNOB VOLUME	1				
16	0384722C36	SCREW M1.7 x 3 DIN 84	1				
17		BOARD INTERCONNECT:					
	GLN6792	BASIC VERSIONS (A11)	1				
	GLN6793	EXTENDED VERSION (A11)	1				
18		POT R1301 SEE X405.					
19	GHN6134	HOUSING BOTTOM (INCL. ITEMS 20, 21 & 22)	1				
20	4180000L01	SPRING (PART OF ITEM 19)	1				
21	4502560M01	PLUNGER ACUATING (PART OF ITEM 19)	1				
22	4280005L01	RING RETAINING (PART OF ITEM 19)	1				
23	0380030J02	SCREW	8				
24		SWITCH S1302 SEE X405.					
26		MICROPHONE MK1301 SEE X405.					
27	0580200K01	RIVET NYLON	1				
28	3280084K01	GROMMET MICROPHONE	1				
29		SWITCH PTT S1301 SEE X405.					
30	4580106K02	ACTUATOR PTT	1				
31	3880104K01	KEY PTT BUTTON	1				
32	2880019J02	CONNECTOR ELASTOMERIC	1				
33	5402446M02	REFLECTOR LIGHTPIPE	1				
34		LED RED SEE X405.					
35		LED GREEN SEE X405					
36	6180080K01	LIGHTPIPE LCD	1				
37	7280176K01	DISPLAY LCD	1				
38	0780082K01	BRACKET LCD	1				
39	0102714B55	HANGUP ASSEMBLY(INCL. ITEMS 40 & 41)	1				
40	0100851094	BRACKET HANGUP (PART OF ITEM 3)	1				
41	0302471M01	SCREW B3.5 x 13 (PART OF ITEM 39)	1				
42	3280178K01	SEAL POT KNOB	1				
43	3280063K01	GASKET	1				
44	GKN6146	CABLE REMOTE MTN 5.5m	1				
45	GRN6122	BRACKET REMOTE MNT (INCL. SCREWS)	1				
46	0402145B23	WASHER SPEAKER	1				



GEPD 4019-1

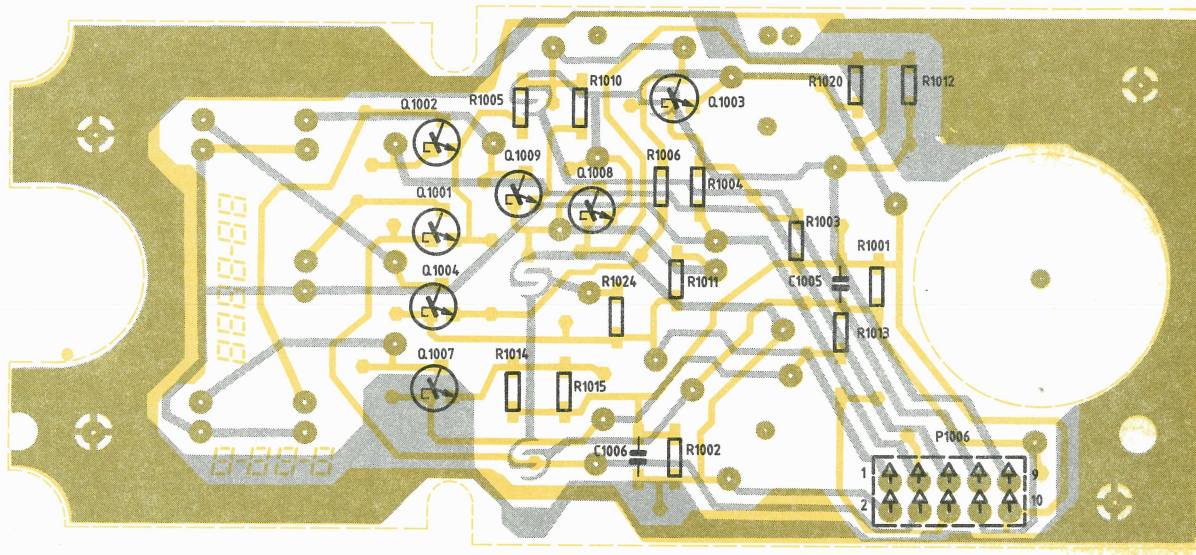
REMOTE MOUNT KIT



CONTROL MICROPHONES
EXPLODED VIEW

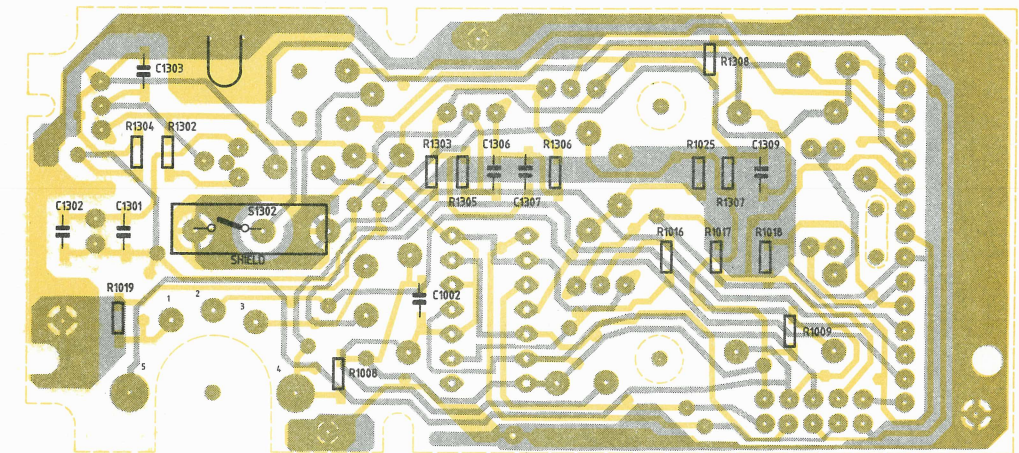
M405.505

DISPLAY BOARD GLN6790

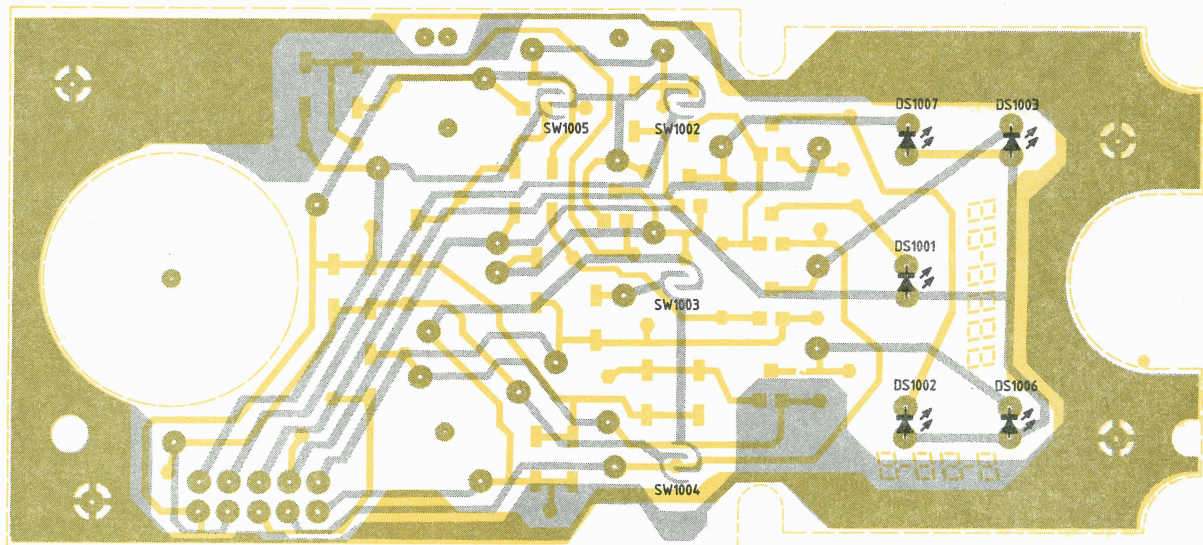


SOLDER SIDE ● GEPD-4037
 COMPONENT SIDE ● GEPD-4038
 COMPONENT OVERLAY ● GEPD-4039 SHOWN FROM SOLDER SIDE.

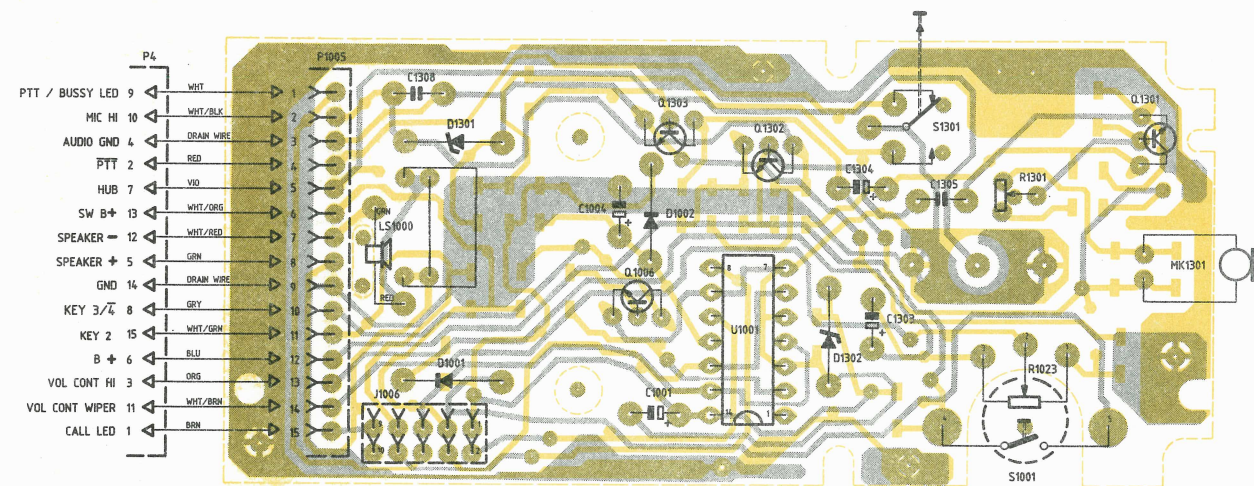
INTERCONNECT BOARD GLN6792



SOLDER SIDE ● GEPD-4043
 COMPONENT SIDE ● GEPD-4044
 COMPONENT OVERLAY ● GEPD-4045 SHOWN FROM SOLDER SIDE



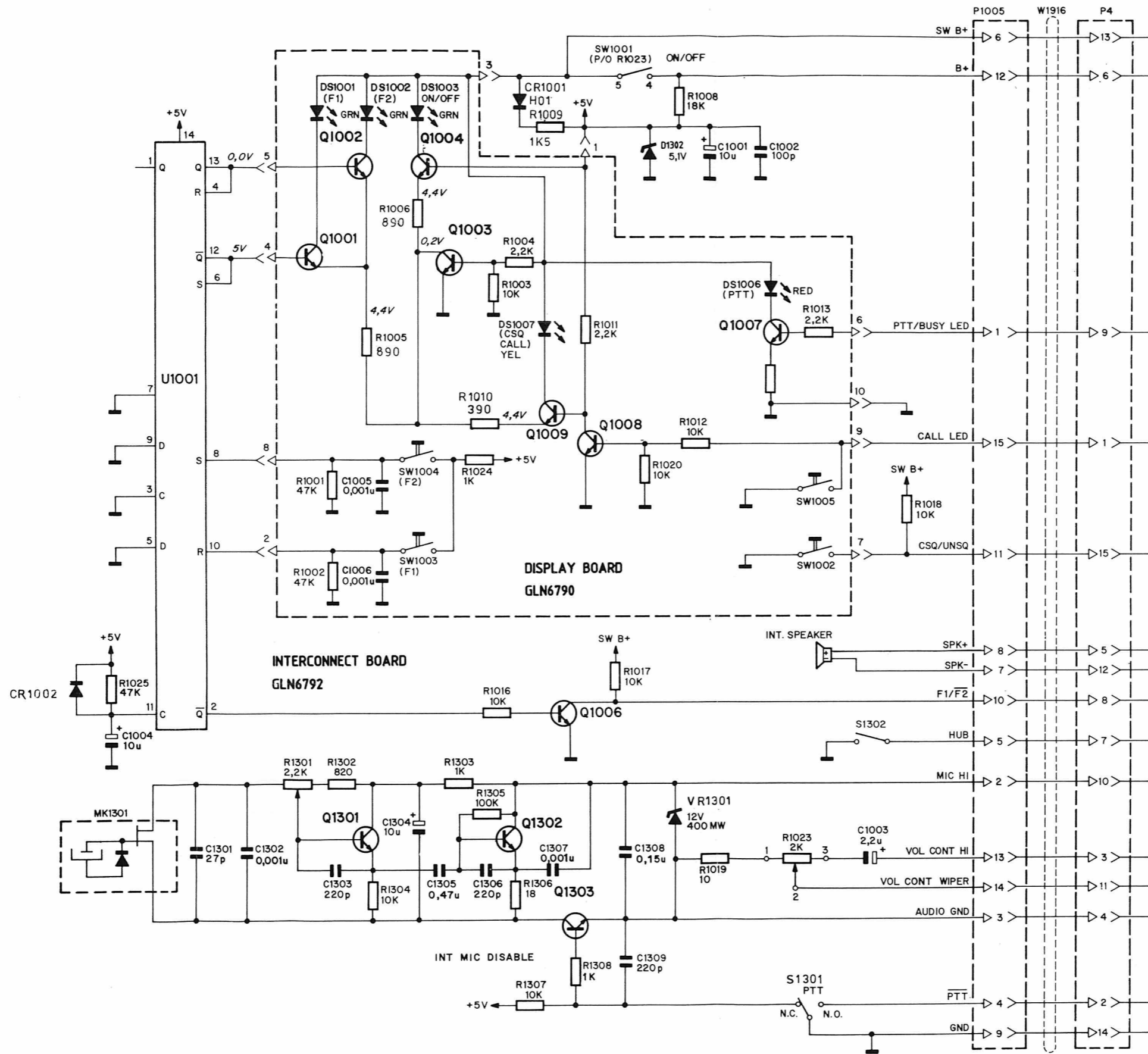
SOLDER SIDE ● GEPD-4037
 COMPONENT SIDE ● GEPD-4038
 COMPONENT OVERLAY ● GEPD-4040 SHOWN FROM COMPONENT SIDE



SOLDER SIDE ● GEPD-4043
 COMPONENT SIDE ● GEPD-4044
 COMPONENT OVERLAY ● GEPD-4044-1 SHOWN FROM COMPONENT SIDE

BASIC CONTROL MICROPHONES G1061, G1072, G1073 COMPONENT LAYOUT

D405.087/3

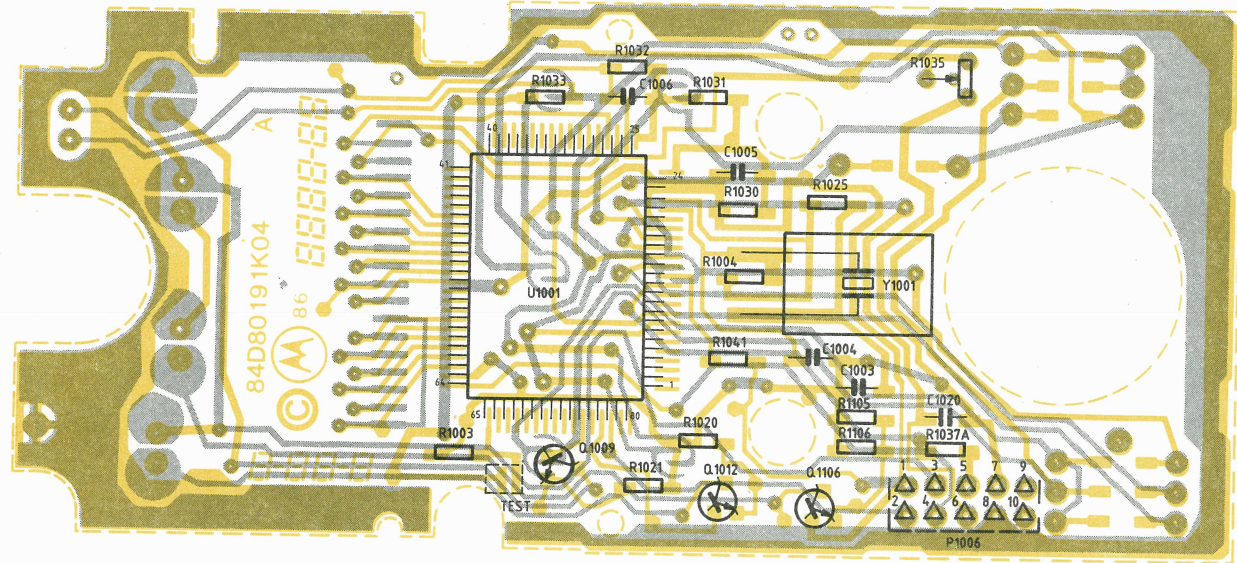


- NOTES:**
1. UNLESS OTHERWISE SPECIFIED, ALL RESISTOR VALUES ARE IN OHMS.
 2. DC TEST VOLTAGES ARE SHOWN WITH THE FOLLOWING CONDITIONS: F1 SELECTED, SW1001 CLOSED, AND SW1005 CLOSED.
 3. CIRCUITRY SHOWN IN DASHED BOX IS LOCATED ON THE DISPLAY BOARD VIA THE P1006/J1006 INTERCONNECTION.

PARTS LIST FOR BASIC CONTROL MICROPHONE G1061/72/73

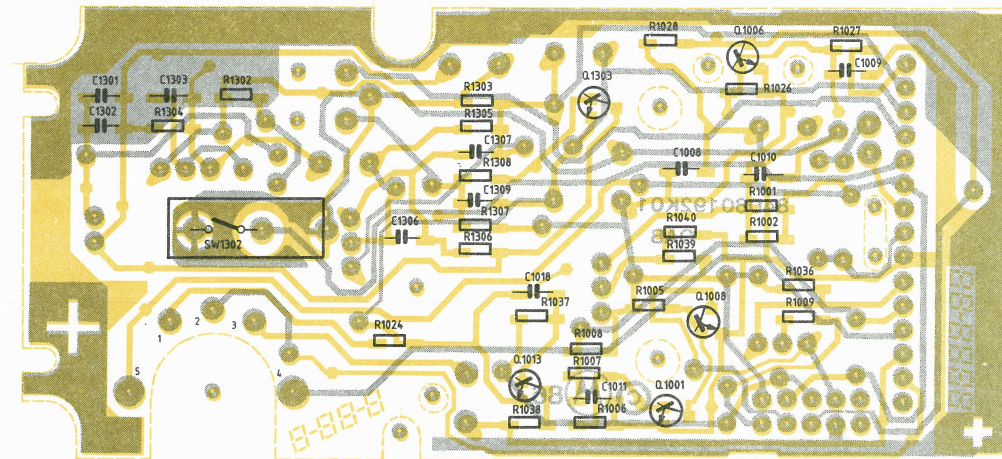
Pos	Code No.	Description	Qt	Pos	Code No.	Description	Qt
	G1061	CTR.MIC. BASIC SQUELCH		R			
	G1072	CTR.MIC. BASIC SELECT 5		1002	0611077B15	RES 47k 5% 0.125W CHIP	1
	G1073	CTR.MIC. BASIC PRIVATE LINE		1003	0611077A98	RES 10k 5% 0.125W CHIP	1
	GLN6790	DISPLAY BOARD		1004	0611077A82	RES 2.2k 5% 0.125W CHIP	1
	GLN6792	INTERCONNECT BOARD		1005	0611077A64	RES 390 5% 0.125W CHIP	1
	-----	-----	-	1006	0611077A64	RES 390 5% 0.125W CHIP	1
C				1008	0611077B05	RES 18k 5% 0.125W CHIP	1
1001	2311048B13	CAP 10 μ F 20% 16V A/I	1	1009	0611077A78	RES 1.5k 5% 0.125W CHIP	1
1002	2113740B49	CAP 100pF CL1 \pm 30% CHIP	1	1010	0611077A98	RES 390 5% 0.125W CHIP	1
1003	2311048B06	CAP 2.2 μ F 20% 50V A/I	1	1011	0611077A82	RES 2.2k 5% 0.125W CHIP	1
1004	2311048B13	CAP 10 μ F 20% 16V A/I	1	1012	0611077A98	RES 10k 5% 0.125W CHIP	1
1005	2113741B21	CAP 1000pF CL2 X7R CHIP	1	1013	0611077A82	RES 2.2k 5% 0.125W CHIP	1
1006	2113741B21	CAP 1000pF CL2 X7R CHIP	1	1014	0611077A78	RES 1.5k 5% 0.125W CHIP	1
1301	2113740B35	CAP 27pF CL1 \pm 30% CHIP	1	1015	0611077A78	RES 1.5k 5% 0.125W CHIP	1
1302	2113741B21	CAP 1000pF CL2 X7R CHIP	1	1016	0611077A98	RES 10k 5% 0.125W CHIP	1
1303	2113740B57	CAP 220pF CL1 \pm 30% CHIP	1	1017	0611077A98	RES 10k 5% 0.125W CHIP	1
1304	2311048B13	CAP 10 μ F 20% 16V A/I	1	1018	0611077A98	RES 10k 5% 0.125W CHIP	1
1305	0811051A17	CAP 0.47 μ F 5% 63V MTLZ POLYEST	1	1019	0611077A26	RES 10 5% 0.125W CHIP	1
1306	2113740B57	CAP 220pF CL1 \pm 30% CHIP	1	1020	0611077A98	RES 10k 5% 0.125W CHIP	1
1307	2113741B21	CAP 1000pF CL2 X7R CHIP	1	1023	1880093K01	RES 2.2K VARIABLE	1
1308	0811051A14	CAP 0.15 μ F 5% 63V MTLZ POLYEST	1	1024	0611077A74	RES 1K 5% 0.125W CHIP	1
1309	2113740A57	CAP 220pF CL1 \pm 30% CHIP	1	1025	0611077B15	RES 47k 5% 0.125W CHIP	1
CR				1301	1805500L04	RES 2.2k 20% 100V POT BD CKT	1
1001	4883654H01	DIO SILICON	1	1302	0611077A72	RES 820 5% 0.125W CHIP	1
1002	4883654H01	DIO SILICON	1	1303	0611077A74	RES 1k 5% 0.125W CHIP	1
DS				1304	0611077A98	RES 10k 5% 0.125W CHIP	1
1001	4880058K02	LED GREEN	1	1305	0611077B23	RES 100k 5% 0.125W CHIP	1
1002	4880058K02	LED GREEN	1	1306	0611077A32	RES 18 5% 0.125W CHIP	1
1003	4880058K02	LED GREEN	1	1307	0611077A98	RES 10k 5% 0.125W CHIP	1
1006	4880058K01	LED RED	1	1308	0611077A74	RES 1k 5% 0.125W CHIP	1
1007	4880058K03	LED YELLOW	1	S			
J				1301	4080094K01	SWITCH PTT	1
1006	0980027J01	RECEPTACLE 10 POSTN	1	1302	4080252E03	SWITCH CONTROL (PART 1 CONTACT SPRING)	1
MK				1302	4080252E04	SWITCH CONTROL (PART 2 CONTACT BUTTON)	1
1301	5080258E04	CARTRIDGE MIC	1	U			
P				1001	5184887K13	IC CMOS DUAL F/F 4013	1
1005	2880162G14	PLUG SIDE ENTRY	1	VR			
1006	2880026J01	CONN HEADER 10P	1	1001	4882256C15	DIO ZENER 56C15 5.1V	1
Q				1301	4880007E02	DIO SILICON ZENER 12V 5% 0.4W	1
1001	4880214G02	TSTR MMBT3904	1				
1002	4880214G02	TSTR MMBT3904	1				
1003	4880214G02	TSTR MMBT3904	1				
1004	4880214G02	TSTR MMBT3904	1				
1006	4802081B30	TSTR M1B30 AUTO-INS. REEL PACK.	1				
1007	4880214G02	TSTR MMBT3904	1				
1008	4880214G02	TSTR MMBT3904	1				
1009	4880214G02	TSTR MMBT3904	1				
1301	4802081B30	TSTR M1B30 AUTO-INS. REEL PACK.	1				
1302	4802081B30	TSTR M1B30 AUTO-INS. REEL PACK.	1				
1303	4802081B30	TSTR M1B30 AUTO-INS. REEL PACK.	1				
R							
1001	0611077B15	RES 47k 5% 0.125W CHIP	1				

DISPLAY BOARD GLN6791

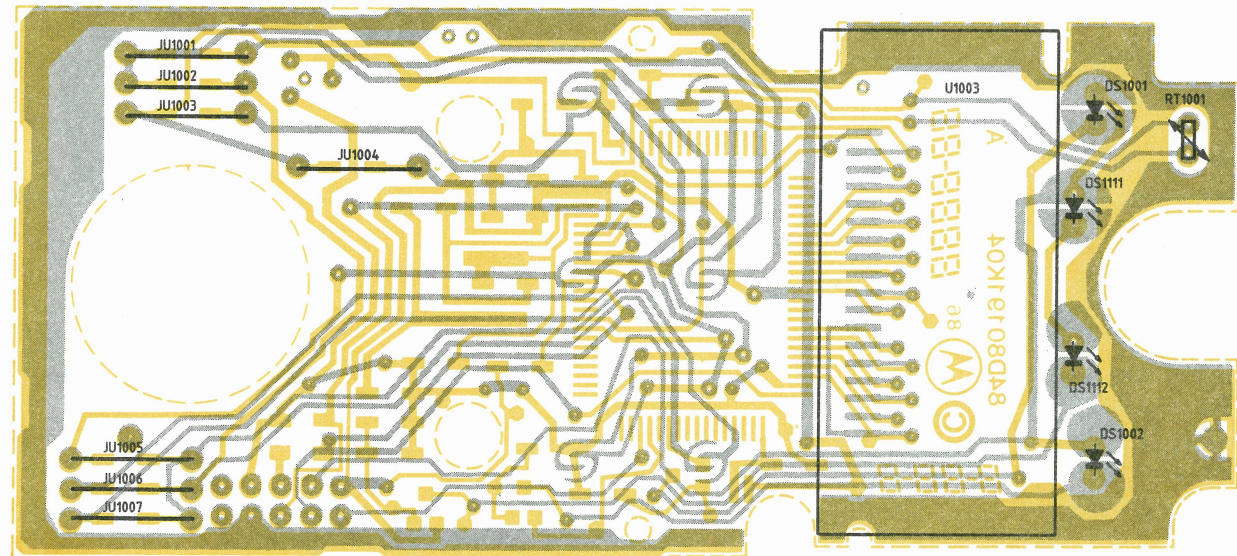


SOLDER SIDE ● GEPD 4047-1
 COMPONENT SIDE ● GEPD 4048-1
 COMPONENT OVERLAY ● GEPD 4050-1

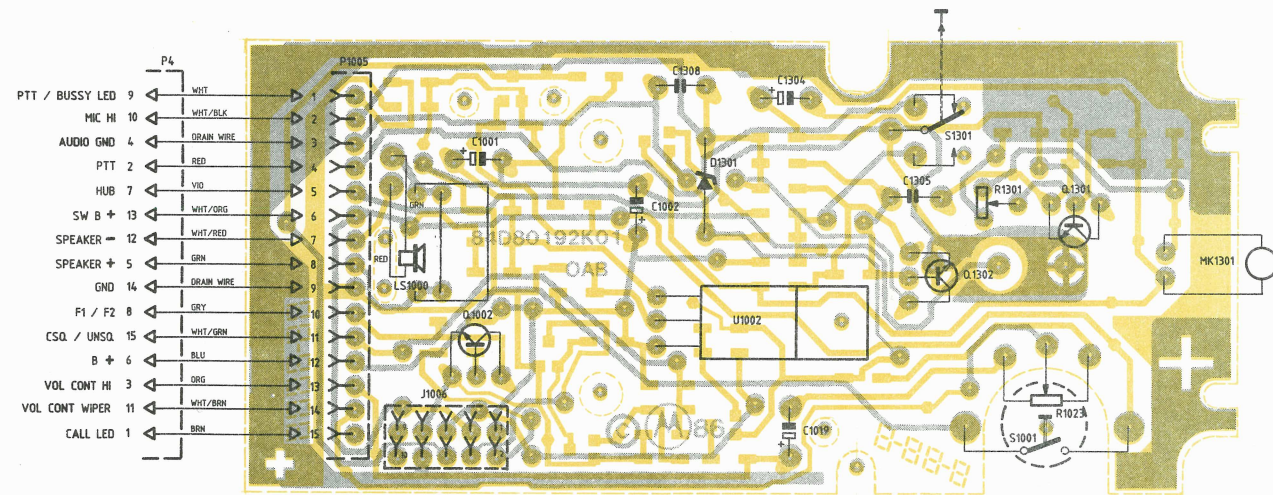
INTERCONNECT BOARD GLN6793



SOLDER SIDE ● GEPD-4061
 COMPONENT SIDE ● GEPD-4062
 COMPONENT OVERLAY ● GEPD-4063 SHOWN FROM SOLDER SIDE



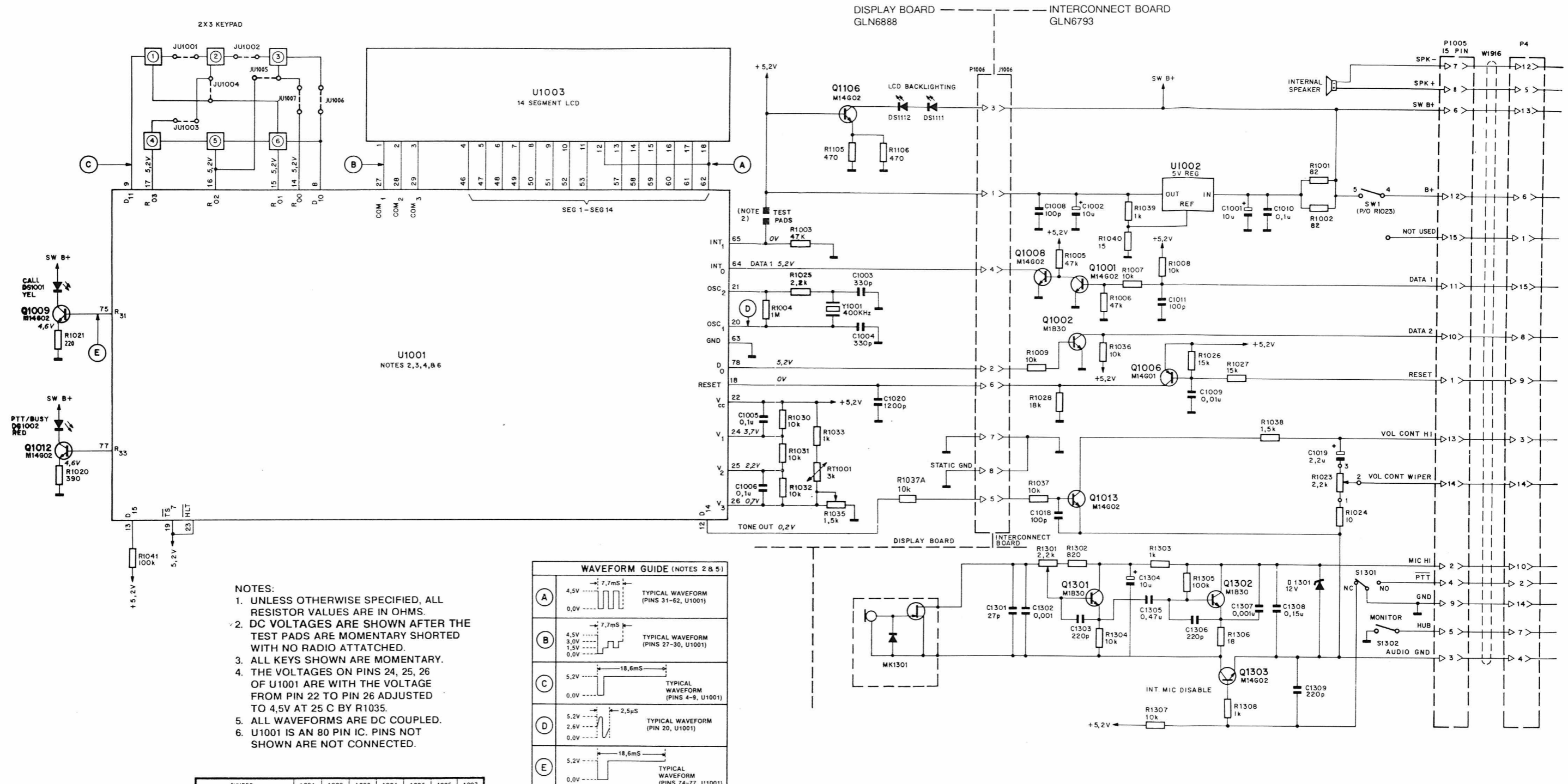
SOLDER SIDE ● GEPD-4047-
 COMPONENT SIDE ● GEPD-4048
 COMPONENT OVERLAY ● GEPD-4049 SHOWN FROM COMPONENT SIDE



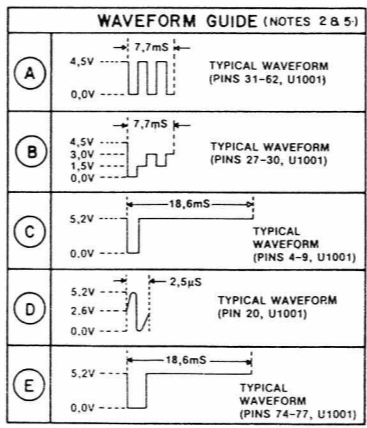
SOLDER SIDE ● GEPD-4061
 COMPONENT SIDE ● GEPD-4062
 COMPONENT OVERLAY ● GEPD-4064 SHOWN FROM COMPONENT SIDE

EXTENDED CONTROL MICROPHONE G1083 COMPONENT LAYOUT

D405.088/3



- NOTES:
1. UNLESS OTHERWISE SPECIFIED, ALL RESISTOR VALUES ARE IN OHMS.
 2. DC VOLTAGES ARE SHOWN AFTER THE TEST PADS ARE MOMENTARY SHORTED WITH NO RADIO ATTACHED.
 3. ALL KEYS SHOWN ARE MOMENTARY.
 4. THE VOLTAGES ON PINS 24, 25, 26 OF U1001 ARE WITH THE VOLTAGE FROM PIN 22 TO PIN 26 ADJUSTED TO 4.5V AT 25 C BY R1035.
 5. ALL WAVEFORMS ARE DC COUPLED.
 6. U1001 IS AN 80 PIN IC. PINS NOT SHOWN ARE NOT CONNECTED.

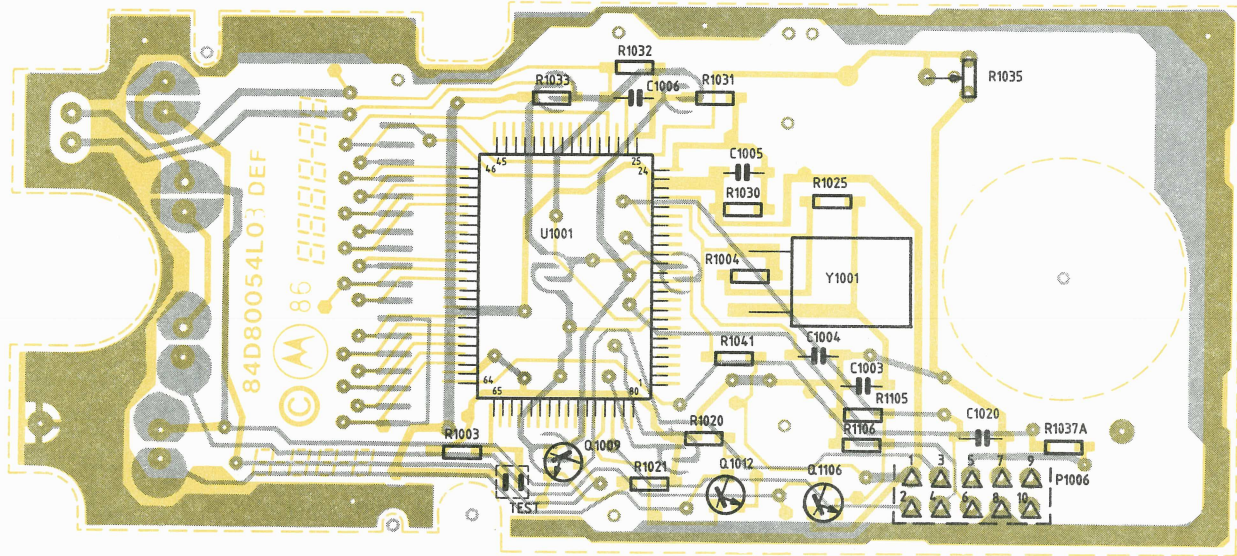


JUMPER	1001	1002	1003	1004	1005	1006	1007
STANDARD & ALL OPTIONS WITHOUT MAB116 & MAB300	IN	IN	IN	OUT	IN	OUT	OUT
MAB116 AND MAB300	IN	OUT	IN	OUT	OUT	IN	IN

EXTENDED CONTROL MICROPHONE G1083
(SELECT 5 - HIGH - TIER)

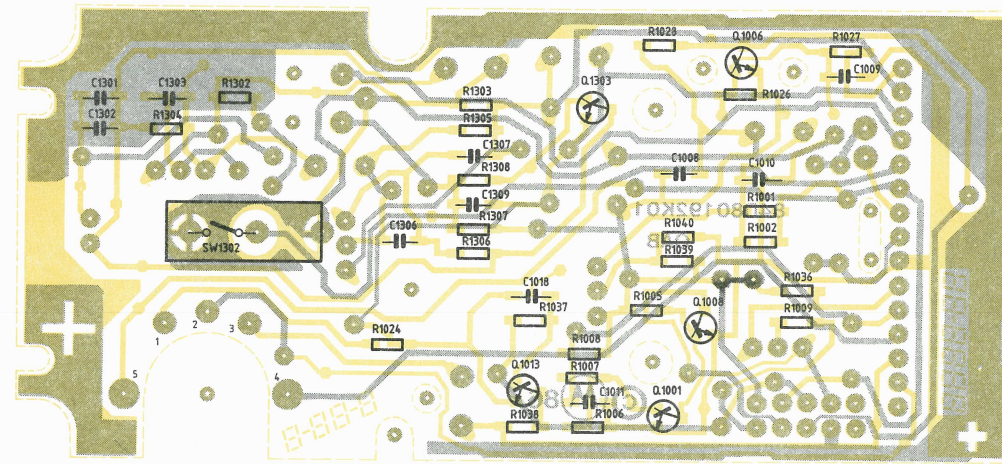
D405.152/2

DISPLAY BOARD GLN6888

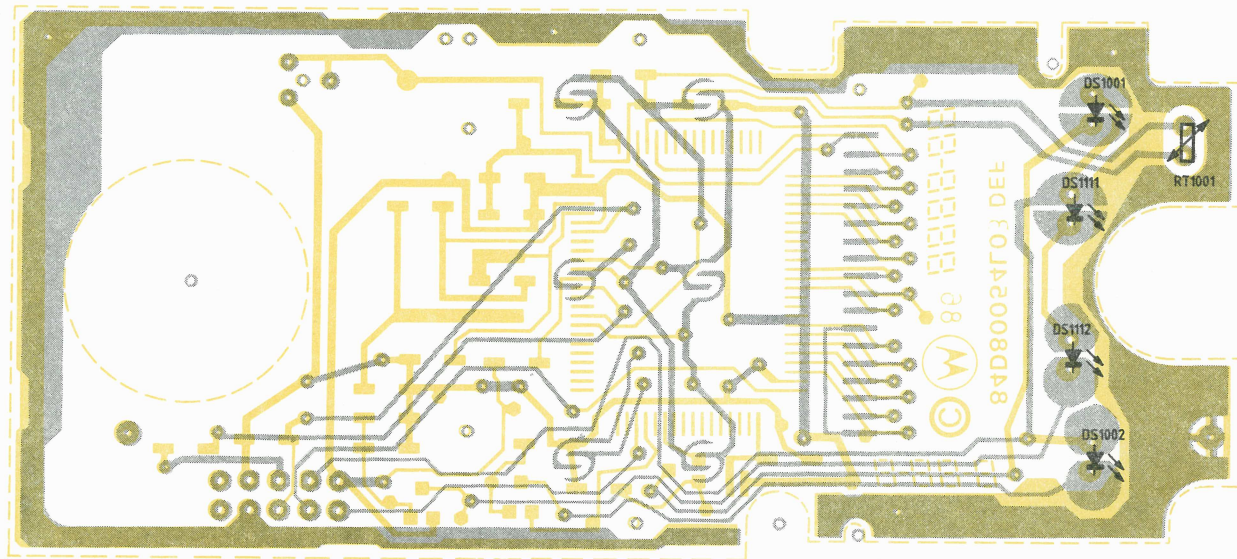


SOLDER SIDE ● GEPD 4067-1
 COMPONENT SIDE ● GEPD 4068-1
 COMPONENT OVERLAY ● GEPD 4069-1

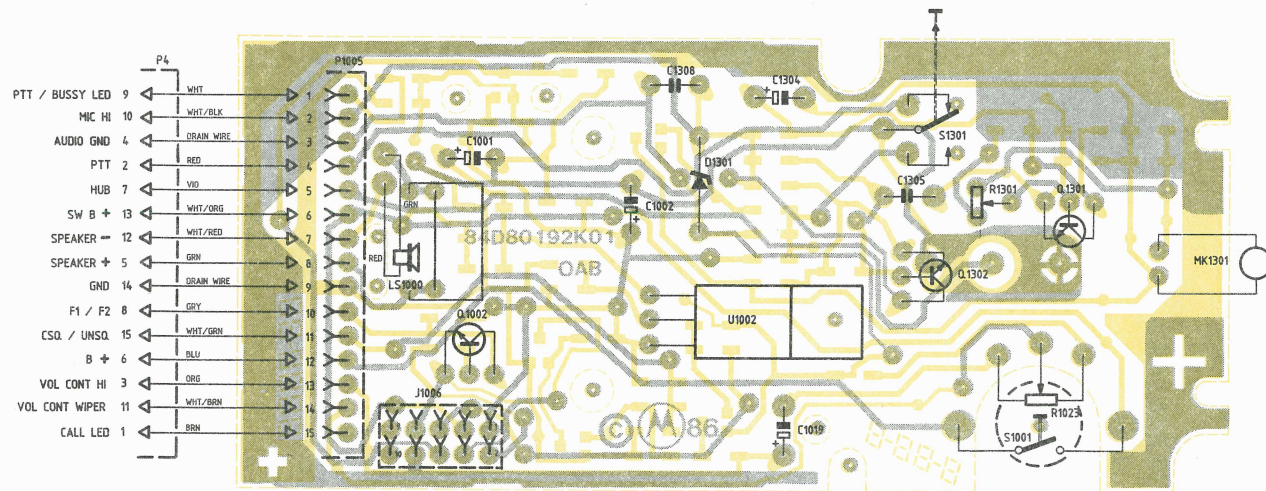
INTERCONNECT BOARD GLN6793



SOLDER SIDE ● GEPD-4061
 COMPONENT SIDE ● GEPD-4062
 COMPONENT OVERLAY ● GEPD-4063 SHOWN FROM SOLDER SIDE



SOLDER SIDE ● GEPD-4067
 COMPONENT SIDE ● GEPD-4068
 COMPONENT OVERLAY ● GEPD-4070 SHOWN FROM COMPONENT SIDE

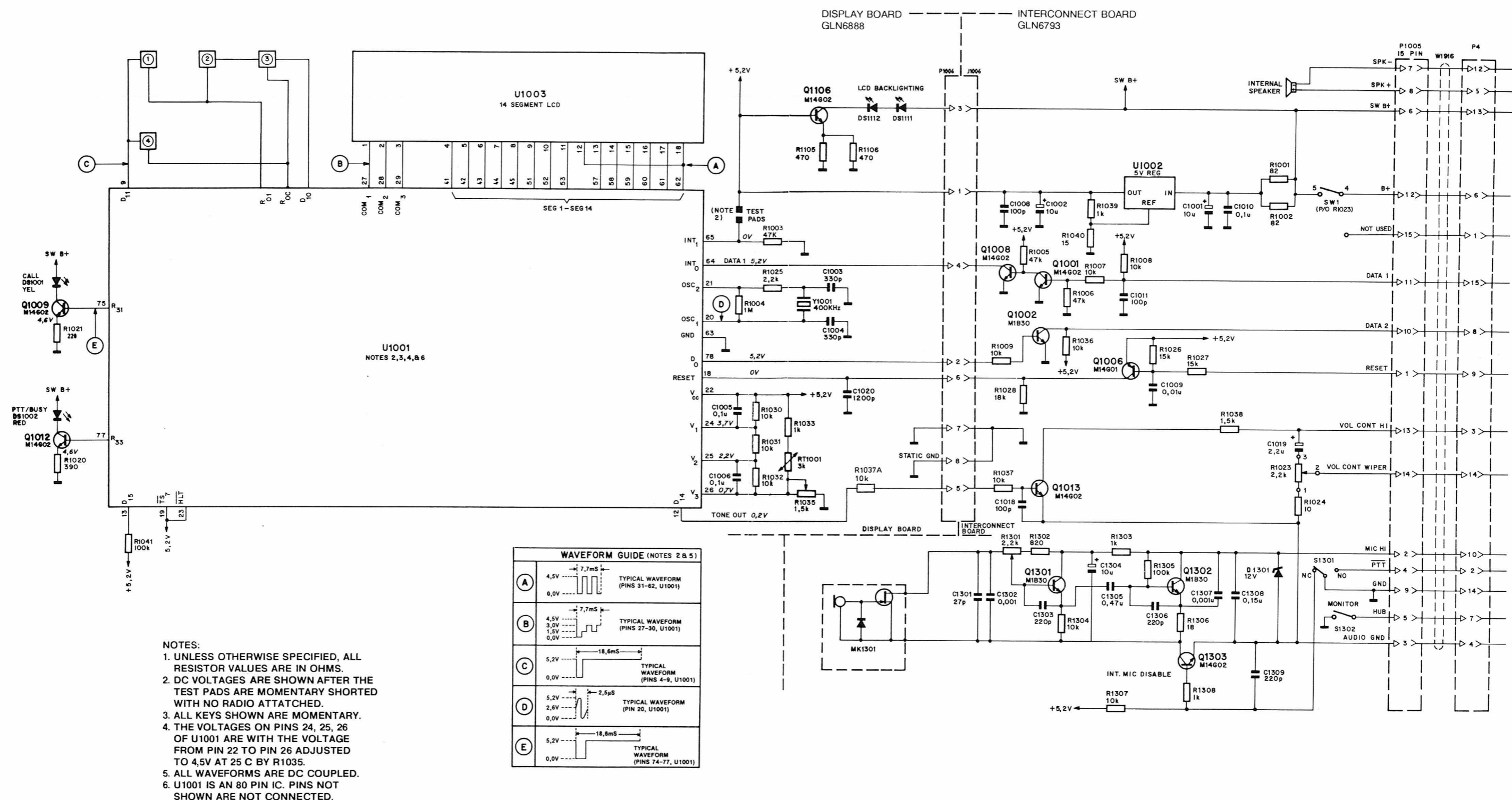


Signal	Wire Color	Pin
PTT / BUSSY LED	WHT	1
MIC HI	WHT/BLK	2
AUDIO GND	STRN WIRE	3
PTT	RED	4
HUB	YLO	5
SW B +	WHT/GRN	6
SPEAKER -	WHT/RED	7
SPEAKER +	GRN	8
GND	STRN WIRE	9
F1 / F2	GRY	10
CSQ / UNSQ	WHT/GRN	11
B +	BLU	12
VOL CONT HI	GRN	13
VOL CONT WIPER	WHT/GRN	14
CALL LED	BRN	15

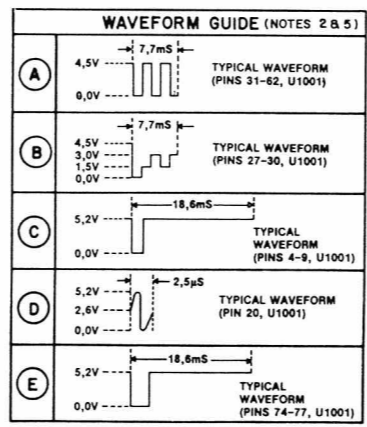
SOLDER SIDE ● GEPD-4061
 COMPONENT SIDE ● GEPD-4062
 COMPONENT OVERLAY ● GEPD-4064 SHOWN FROM COMPONENT SIDE

EXTENDED CONTROL MICROPHONE G1071, 1082 COMPONENT LAYOUT

D405.089/3



- NOTES:
1. UNLESS OTHERWISE SPECIFIED, ALL RESISTOR VALUES ARE IN OHMS.
 2. DC VOLTAGES ARE SHOWN AFTER THE TEST PADS ARE MOMENTARY SHORTED WITH NO RADIO ATTACHED.
 3. ALL KEYS SHOWN ARE MOMENTARY.
 4. THE VOLTAGES ON PINS 24, 25, 26 OF U1001 ARE WITH THE VOLTAGE FROM PIN 22 TO PIN 26 ADJUSTED TO 4.5V AT 25 C BY R1035.
 5. ALL WAVEFORMS ARE DC COUPLED.
 6. U1001 IS AN 80 PIN IC. PINS NOT SHOWN ARE NOT CONNECTED.



EXTENDED CONTROL MICROPHONE G1071, 1082
(PL / CARRIER SQUELCH)

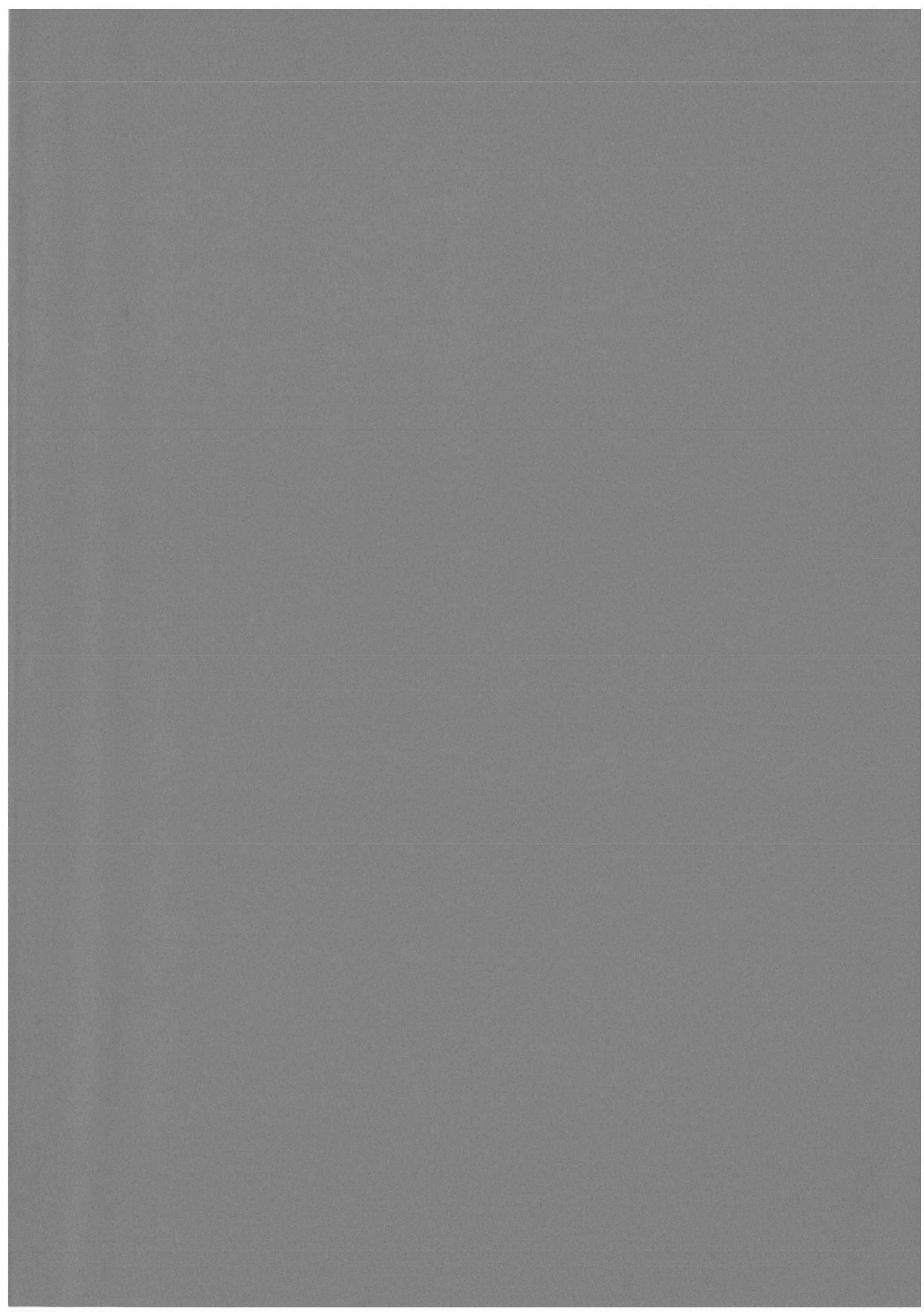
D405.155/2

PARTS LIST FOR EXTENDED CONTROL MICROPHONES G1071/82/83

Pos	Code No.	Description	Qt	Pos	Code No.	Description	Qt
	G1071	Ctr.Mic. Exp. Carrier Squelch		Q			
	G1082	Ctr.Mic. Expanded Private Line		1006	4880214G01	TRST MMBT3906	1
	GLN6888	Display Board		1008	4880214G02	TRST MMBT3904	1
	GLN6793	Interconnect Board		1009	4880214G02	TRST MMBT3904	1
	G1083	Ctr.Mic. Expanded Select 5		1012	4880214G02	TRST MMBT3904	1
	GLN6791	Display Board		1013	4880214G02	TRST MMBT3904	1
	GLN6793	Interconnect Board		1106	4880214G02	TRST MMBT3904	1
	-----	-----	-	1301	4802081B30	TRST M1B30 Auto-Ins. Reel Pack	1
C				1302	4802081B30	TRST M1B30 Auto-Ins. Reel Pack	1
1001	2311048B11	Cap 10uF 20% 35V A/I	1	1303	4880214G02	TRST MMBT3904	1
1002	2311048B13	Cap 10uF 20% 16V A/I	1	R			
1003	2113740B61	Cap 330 pF CL1 ±30% Chip	1	1001	0611077A48	Res 82 5% 0.125W Chip	1
1004	2113740B61	Cap 330 pF CL1 ±30% Chip	1	1002	0611077A48	Res 82 5% 0.125W Chip	1
1005	2113741B69	Cap 0.1uF CL2 ±30% X7R Chip	1	1003	0611077B23	Res 47K 5% 0.125W Chip	1
1006	2113741B69	Cap 0.1uF CL2 ±30% X7R Chip	1	1004	0611077B47	Res 1M 5% 0.125W Chip	1
1008	2113740B49	Cap 100pF CL1 ±30% Chip	1	1005	0611077B15	Res 47K 5% 0.125W Chip	1
1009	2113741B45	Cap 0.01uF CL2 X7R Chip	1	1006	0611077B15	Res 47K 5% 0.125W Chip	1
1010	2113741B69	0.1uF CL2 X7R 50V Chip	1	1007	0611077A98	Res 10K 5% 0.125W Chip	1
1011	2113740B49	100pF 5% CL1 ±30% Chip	1	1008	0611077A98	Res 10K 5% 0.125W Chip	1
1018	2113740B49	100pF 5% CL1 ±30% Chip	1	1009	0611077A98	Res 10K 5% 0.125W Chip	1
1019	2311048B06	2.2uF 20% 50V ALU A/I	1	1020	0611077A64	Res 390 5% 0.125W Chip	1
1020	2113740B74	1200pF CL1 ±30% Chip	1	1021	0611077A58	Res 220 5% 0.125W Chip	1
1301	2113740B35	27pF 5% CL1 ±30% Chip	1	1023	1880093K01	Res 2.2K Variable	1
1302	2113741B21	1000pF CL2 X7R Chip	1	1024	0611077A26	Res 10 5% 0.125W Chip	1
1303	2113740B57	220pF CL1 ±30% Chip	1	1025	0611077A82	Res 2.2K 5% 0.125W Chip	1
1304	2311048B13	10uF 20% 16V A/I	1	1026	0611077B03	Res 15K 5% 0.125W Chip	1
1305	0811051A17	MTLZ Polyest 0.47uF 5% 63V	1	1027	0611077B03	Res 15K 5% 0.125W Chip	1
1306	2111031B57	220 pF CL1 ±30% Chip	1	1028	0611077B05	Res 18K 5% 0.125W Chip	1
1307	2113741B21	1000pF CL2 X7R Chip	1	1030	0611077A98	Res 10K 5% 0.125W Chip	1
1308	0811051A14	MTLZ Polyest 0.15uF 5% 63V	1	1031	0611077A98	Res 10K 5% 0.125W Chip	1
1309	2113740B57	220pF CL1 ±30% Chip	1	1032	0611077A98	Res 10K 5% 0.125W Chip	1
DS				1033	0611077A74	Res 1K 5% 0.125W Chip	1
1001	4802243M01	LED Yellow	1	1035	1805500L17	Res 1.5K 5% Var 20%	1
1002	4802434M03	LED Red	1	1036	0611077A98	Res 10K 5% 0.125W Chip	1
1111	4802668M01	LED	1	1037	0611077A98	Res 10K 5% 0.125W Chip	1
1112	4802668M01	LED	1	1037	0611077A98	Res 10K 5% 0.125W Chip	1
J				1038	0611077A78	Res 1.5K 55 0.125W Chip	1
1006	0980027J01	Receptacle 10 Postn	1	1039	0611077A74	Res 1K 5% 0.125W Chip	1
JU				1040	0611077A30	Res 15 5% 0.125W Chip	1
1001	0611077A01	Jumper Chip G1083 Only	1	1041	0611077B23	Res 100K 5% 0.125W Cip	1
1003	0611077A01	Jumper Chip G1083 Only	1	1105	0611077A66	Res 470 55 0.125W Chip	1
1006	0602455B99	Jumper G1083 Only	1	1106	0611077A66	Res 470 5% 0.125W Chip	1
1007	0602455B99	Jumper G1083 Only	1	1301	1805500L04	Res 2.2K 20% 100V POT BD CKT	1
MK				1302	0611077A72	Res 820 5% 0.125W Chip	1
1301	5080258E04	Cartridge Mic	1	1303	0611077A74	Res 1K 5% 0.125W Chip	1
P				1304	0611077A98	Res 10K 5% 0.125W Chip	1
1005	2880162G15	Plug Side Entry	1	1305	0611077B23	Res 100K 5% 0.125W Chip	1
1006	2880026J01	Conn Header 10P	1	1306	0611077A32	Res 18 5% 0.125W Chip	1
1007	2880019J02	Connector Elastomeric	1	1307	0611077A98	Res 10K 5% 0.125W Chip	1
Q				1308	0611077A74	Res 1K 5% 0.125W Chip	1
1001	4880214G02	TRST MMBT3904	1	RT			
1002	4802081B30	TRST M1B30 Auto-Ins. Reel Pack	1	1001	0683600K11	Thermistor 3.5K	1
				S			
				1301	4080094K01	Switch PTT	1
				1302	4080252E03	Switch Ctr (Part 1, Cont.Spr.)	1
				1302	4080252E04	Switch Ctr (Part 2, Cont.Butt.)	1

PARTS LIST FOR EXTENDED CONTROL MICROPHONES G1071/82/83

Pos	Code No.	Description	Qt	Pos	Code No.	Description	Qt
U							
1001	5197020C01	IC HD44790	1				
1002	5180068C02	Voltage Regulator MC7805CT	1				
1003	7280176K01	Display LCD	1				
VR							
1301	4880007E02	Diode SLCN Zener 12V 5% 400MW	1				
Y							
1001	4805705G02	Ceramic Resonator 400kHz	1				
		NON REFERENCED ITEMS					
	0502676M01	RIVET NYLON	1				



GRAPHICAL SYMBOLS USED IN CIRCUIT DIAGRAMS

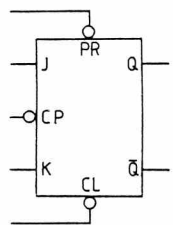
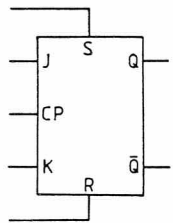
<p>Resistors(R)</p> <ul style="list-style-type: none"> Resistor Resistor with fixed tap Variable resistor Resistor with movable tap (Potentiometer). Varistor (voltage-dependent resistor) Temperature-dependent resistor with negative temperature coefficient Light-emitting diode (photosensitive resistor) Temperature dependent resistor with positive temperature-coefficient. Resistor with preset adjustment 	<p>Diodes(D)</p> <ul style="list-style-type: none"> Diode Bridge rectifier Series-connected stabilizer diodes within one case Light-emitting diode Zener diode (uni-directional) Zener diode (bidirectional) Tunnel diode Backward diode Varactor diode Controlled rectifier, PNP (N-thyristor) Controlled rectifier, NPNP (P-thyristor) Zener diode-programmable. 	<ul style="list-style-type: none"> P-channel IGFET (MOS) N-channel dual gate IGFET (MOS) P-channel dual gate IGFET (MOS)
<p>Capacitors(C)</p> <ul style="list-style-type: none"> Capacitor Variable capacitor Trimmer capacitor Feedthrough capacitor Electrolytic capacitor polarized Polarized capacitor general Electrolytic capacitor non-polarized 	<p>Transistors(Q)</p> <ul style="list-style-type: none"> Transistor, PNP Transistor, NPN Light-sensitive transistor PNP Unipolar transistor with N-type base 	<p>Integrated Circuits (U)</p> <p>Several integrated circuits contained within one case are designated by one common number followed by an identifying letter (a, b, c, etc.). Thus, circuits U1A, U1B and U1C are contained within one case.</p>
<p>Coils(L)</p> <ul style="list-style-type: none"> RF coil, air core Coupled RF coils, air core RF coil with adjustable core Coil with tap. Helical-coil. 	<p>Junction Field Effect Transistors (JFET)</p> <ul style="list-style-type: none"> N-channel JFET P-channel JFET N-channel dual gate JFET P-channel dual gate JFET 	<p>Gates</p> <ul style="list-style-type: none"> AND gate. OR gate. NAND gate. NOR gate. Exclusive OR gate. <p>Wired OR (combined OR outputs) (presentation at top is used in detailed diagrams; presentation below is used in functional diagrams)</p>
<p>Transformers(T)</p> <ul style="list-style-type: none"> Transformer with iron core Transformer with adjustable RF cores 	<p>Insulated Gate Field Effect Transistors (IGFET or MOS)</p> <ul style="list-style-type: none"> N-channel IGFET (MOS) 	

GRAPHICAL SYMBOLS USED IN CIRCUIT DIAGRAMS

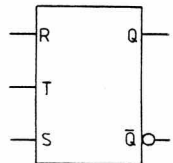
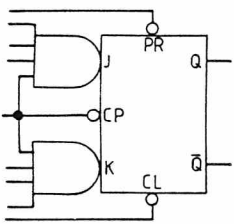
Flip-flops

Abbreviations used:

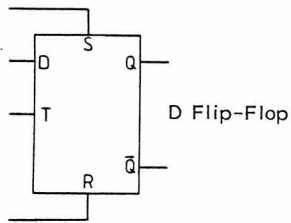
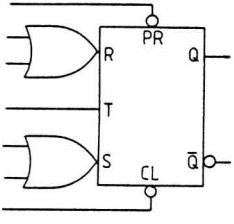
S =Set
R =Reset
CP=Clock pulse
PR=Preset
CL=Clear
T =Toggle



J-K Flip-Flops



R-S Flip-Flops

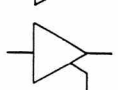


D Flip-Flop

Inverters

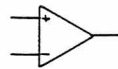


Inverter

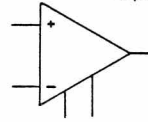


Three-state driver

Operational Amplifiers



Operational amplifiers.



Relays(K)



Single-coil relay



Dual-coil relay



Polarized relay



Slow-acting relay



Slow-release relay



Relay with change-over contacts

Contacts



Open contact (make)



Closed contact (break)



Change-over contact



Change-over contact centre off

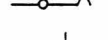
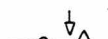


Make-before-break

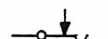
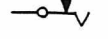
Switches and Keys (S)



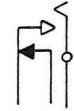
On/Off switch



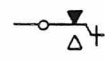
Locking keys or switches:
push on, push off



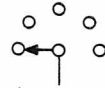
Non-Locking self-releasing
keys or switches



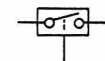
Make-before-break



Locking mutually releasing
keys or switches (In row
of push-buttons etc.)

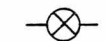


Rotary switch.

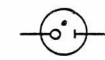


ON/OFF switch electrically
controlled.
(Not a relay)

Lamps(V)

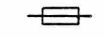


Indicator Lamp.



Neon Lamp

Fuses and Cut-outs(F)

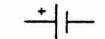


Fuse

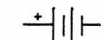


Circuit breaker

Batteries(B)



Battery one cell



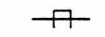
Battery multi cell

Feedthrough Filters(Z)



Feedthrough filter

Ferrite Beads(FB)



Ferrite bead

Crystals(Y)

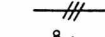


Crystal

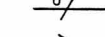
Cables and Wires(W)



Usual conductor.



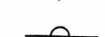
Three conductors



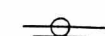
Eight conductors.



Shift from multiple-line to
single-line presentation.



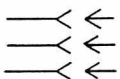








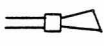






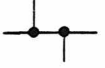











Screened cable.



Coaxial cable.

GRAPHICAL SYMBOLS USED IN CIRCUIT DIAGRAMS

<p>Connectors(J and P)</p> <p> Female (socket) connector.</p> <p> Male (plug) connector</p> <p> Multi-wire connector.</p> <p> Coaxial plug.</p> <p> Coaxial socket.</p>	<p>Replaceable Connections(W)</p> <p> Cross-field connection. (jumper).</p> <p> Strap.</p>	
<p>Loudspeakers(LS)</p> <p> Loudspeaker.</p> <p> Loudspeaker-Microphone.</p>	<p>Miscellaneous</p> <p> Antenna</p> <p> Buzzer.</p> <p> Horn.</p> <p> Directional Coupler.</p> <p> Circulator.</p> <p> Multiconductor bus (used in logic diagrams) * = Identifying bus label e.g. DATA, ADDRESS....</p> <p> Chassis or frame connection</p> <p> Grouping of leads.</p> <p> Crossing of wires.</p> <p> Junction of connected wires</p>	
<p>Telephones(TEL)</p> <p> Telephone.</p> <p> Single headphone. (Earphone).</p> <p> Double headphone.</p>		
<p>Microphones (M)</p> <p> Microphone.</p>		
<p>Meters etc.</p> <p> Indicating instrument.</p> <p> Balancing instrument. (Galvanometer).</p> <p> Basic letters see DESIGN STANDARD 10.02.3.1 section 12.</p>		
<p>Test Points</p> <p> DC test point.</p> <p> AC test point.</p>		

**COLOUR CODE/
CODE DES COULEURS/
FARBKODE**

0	BK/BLK	BLACK	NOIR	SCHWARZ
1	BN/BRN	BROWN	MARRON	BRAUN
2	RD/RED	RED	ROUGE	ROT
3	OR/ORG	ORANGE	ORANGE	ORANGE
4	YW/YEL	YELLOW	JAUNE	GELB
5	GN/GRN	GREEN	VERT	GRÜN
6	BL/BLU	BLUE	BLEU	BLAU
7	VT/VIO	VIOLET	VIOLET	VIOLET
8	GY/GRY	GREY	GRIS	GRAU
9	WH/WHT	WHITE	BLANC	WEIß