Selectone

ANI Systems •Voice Encryption Modules
•Mobile Data •Tone Signaling Boards

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USER'S GUIDE FOR INSTALLATION AND OPERATION

MODEL ST-25AGP
MODEL ST-25AGP P110-5T

Mobilecall® Voice Encryption Module

For use in Motorola GP300, GP88, P110, and
P110-5T (European Version) Transceiver

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GENERAL

The ST-25AGP is a voice encryption device for use with the Motorola Radius Model GP300 Transceivers. It is used to secure two way radio communication systems. The cipher process uses a proprietary microprocessor controlled digital scrambling algorithm. Each unit can be programmed with four User Code Keys, with over 4 billion code keys to choose from. Special factory set master code key groups are reserved to provide extra security for special services. Each master code key group has over 268 million possible code keys. To maintain security, code keys are never transmitted. Audio processing filters provide high quality low distortion recovered audio.

NOTE: The ST-25AGP cannot be used with a DTMF keypad option.

SPECIFICATIONS

Total Code keys:	Over 4 billion
Operating Voltage:	5.2 to 18Vdc
Operating Current:	< 8mA
User Code keys:	Over 268 million
Ciphered Algorithm:	Real time frequency domain
Synchronization:	Initial and maintenance bursts
Delay Before Initial Synchronization:	Programmable 50mS to 1.2S
Input to Output Gain:	LESS THAN ± 0.5 dB
Frequency Response:	300 Hz to 2600 Hz.
ST-25AGP Programming:	External Keypad (ST-905 V1.3) PC Programmer (ST-907 VER 3.1)
Memory:	Non-volatile EEPROM
Indicators:	Audible (Spkr. Beep)
Digital Inputs:	Logic Low, less than 1 Vdc Logic High, Greater than 4 Vdc
Temp. Range:	30°C to +70°C
Interface:	18" flying leads terminated at a low profile connector
Size:	1.00"W X 1.50"L X 0.25"H (25.4mm X 38.20mm X 6.35mm)

Specifications are subject to change without notice.

OPERATION

☞**Note:** Operation of radio equipment with encrypted speech capability may be government regulated. You are responsible for compliance with applicable radio regulations regarding operation of this equipment.

Operation is almost transparent to the user. The user may select any one of 4 previously programmed code keys. The user then enables or disables the transmit cipher mode. Once enabled all subsequent transmissions will be ciphered using the selected code key. Ciphered reception is automatic; other units transmitting with the selected code key will be automatically deciphered. Clear transmissions will also be received automatically.

DOUBLE CLICK MODE

The ST-25AGP must be programmed for this mode. This mode of operation is enabled during programming. The Clear/Ciphered line is connected to the option 2 switch. The user can toggle between Clear/Ciphered by operating the switch two times in rapid succession (Double Clicking). The ST-25AGP will then provide a tone output to the radio speaker. A high frequency beep or series of beeps indicate subsequent transmissions will be Ciphered. A low frequency tone for .5 Sec. indicates subsequent transmissions will be in the Clear (NOT Ciphered).

User Code Keys are selected by operating the same switch [option 2] four times in rapid succession (Quad Clicking). Quad Clicking permits switching between User Code Keys when in the transmit Cipher Mode (Double Click selection). Each Quad Click transaction advances the selected User Code Key one step around a loop of possible selections (Primary, Alt #1, Alt #2, Alt #3, Primary...). Following a Quad Click sequence the ST-25AGP responds with speaker beeps to indicate the selection position (Primary: 1 Beep, First Alt: 2 Beeps, Second Alt: 3 Beeps, Third Alt: 4 beeps). When returning to cipher mode from clear mode, the last used User Code Key will be selected and indicated with speaker beeps. Following power-up Cipher operation will select the Primary User Code Key.

INITIAL SYNCHRONIZATION DELAY

All radio systems have an operating delay. This is the time between PTT activation at a transmitter and speaker audio being available at the receiving point. This time may vary considerably from system to system or even from transmission to transmission. For reliable cipher operation the ST-25AGP must wait for this time period before signaling the beginning of a ciphered transmission. System delays must be evaluated and accommodated for with the INITIAL SYNCHRONIZATION DELAY parameter.

For many radio operators it is difficult to reliably know how long to wait before speaking in ciphered mode. This can cause loss of the beginning of a message. The ST-25AGP can be programmed to accommodate this problem. For cipher transmissions the ST-25AGP will provide all the necessary timing and beep the speaker as a "GO AHEAD" and speak indication.

USER CODE KEYS

Of the more than 268 million available code keys, four may be selected and easily accessed as User Code Keys for each unit. These may be used to provide different levels of security within a particular radio system (officers, sergeants, lieutenants, captains).

PROGRAMMING

Field programming is accomplished with either the ST-905 Keypad Programmer or the ST-907 PC based programmer. The ST-905 Keypad Programmer must be Version 1.3 or greater. The version can be found on the bottom of the unit printed on a small white tag. Version 1.3 will read "V1.3". The ST-907 version must be Version 3.1 or greater. Version 3.1 will be displayed as VER 3.1 in the upper right hand corner of the display screen when running the ST-CONFG program. **Older versions of either the ST-905 or ST-907 will not properly program the ST-25AGP**

Whether using the ST-907 or the ST-905 there are 6 parameters to be considered for programming. They are:

1.	Parameter 0	Initial Synchronization Delay
2.	Parameter 1	First Alternate User Code Key
3.	Parameter 2	Second Alternate User Code Key
4.	Parameter *	Third Alternate User Code Key
5.	Parameter 3	Primary User Code Key
6.	Parameter 9	Operating Mode (Switched/Double Click)

The ST-907 uses the DOS program ST-CONFG and provides all necessary hookup and programming information as screen prompts. The program will ask for a password before displaying the programmed setting of an ST-25AGP. The factory default password is "00000000". You should change the password when programming the units.

To use the ST-905 use the following procedure.

1. Connect the Red (+) and Black (-) leads of the ST-905 to a 6 to 18 Vdc power source (a 9 Vdc transistor battery is an acceptable power source).
2. Connect the ST-905 to the ST-25AGP with the supplied cable.
3. Enter the value desired.
4. Press * and # simultaneously [*#].
5. Enter the parameter number.
6. Repeat steps 3 through 5 for each parameter.

INITIAL SYNCHRONIZATION DELAY (Parameter 0)

Nine possible entries are available for this parameter. The value selected determines the delay time the ST-25AGP will use between operation of the PTT and Initial Synchronization. Delays are available in 100mS steps from 50mS to 850mS. The value entered is the 100's digit of the required delay. For example 0 = 50mS, 1 = 150mS, 2 = 250mS etc. Factory default is 2 or 250mS.

If 9 is entered the delay is set to 1.2 Sec. At the end of this time period an audible beep is sent to the speaker. The beep indicates "GO AHEAD" and speak. For most operations the 9 selection will provide the most friendly user interface. However the beep outputs must be connected for this feature to be effective.

USER CODE KEYS (Parameters 3, 1, 2, *)

☞**NOTE:** The security of your system depends on the secrecy of your code keys. For secure operation we recommend changing your code keys often. The ST-905 or ST-907 CAN NOT be used by another party to compromise your code key selections.

Each of the four User Code Keys may be any combination of keypad characters in a seven digit sequence. This seven digit sequence allows for more than 268 million code keys. It is not necessary to program the alternate User Code Keys if they are not used. The default values for the four User Code Keys are as follows.

USER CODE KEY	PARAMETER	DEFAULT CODE KEY
Primary	3	4444444
1st Alternate	1	2222222
2nd Alternate	2	3333333
3rd Alternate	*	1111111

OPERATING MODE (PARAMETER 9)

This parameter has two possible values.

[1] Double Click Mode - default, required setting for correct operation
[2] Switched mode

PROGRAMMING EXAMPLE:	KEY STROKES
INITIAL SYNCHRONIZATION DELAY = 1.2 Sec. w/beep	9[*#] 0
Primary USER CODE KEY = 12345AD	12345AD[*#]3
First ALT. USER CODE KEY = DA54321	DA54321[*#]1
Second ALT. USER CODE KEY = 0987654	0987654[*#]2
Third ALT. USER CODE KEY = ***###6	***###6[*#]*
OPERATING MODE = Double Click	1[*#]9

RADIO PROGRAMMING

You need to check the programming of the radio using Motorola's programmer. The two items of interest are Microphone Gain and Control Button 2.

MICROPHONE GAIN -- FROM THE MAIN MENU:

select F3 GET/SAVE Program Codeplug Data From/To Disk/Codeplug
select F2 READ Data From Radio Codeplug (Requires RIB)
select F10 EXIT/Return to MAIN Menu
select F2 SERVICE Radio Alignment
select F2 Alignment: Transmitter and Receiver
select F2 LEVEL SET Adjustments (Mic Gain, Volume, etc.)
set Microphone Gain to 0 dB
select F10 three times to return to Main Menu

CONTROL BUTTON 2 -- FROM THE MAIN MENU:

select F3 GET/SAVE Program Codeplug Data From/To Disk/Codeplug
select F2 READ Data From Radio Codeplug (Requires RIB)
select F10 EXIT/Return to MAIN Menu
select F4 Change/View Create Radio Codeplug Data
select F2 Radio Wide Configuration: Time Out Timer
set Control Button 2 to NONE
select F10 two times to return to Main Menu

INSTALLATION

1. Program the following for the ST-25AGP - (see the programming section)
   - Tx delay time - third party delay (9)
   - Operating mode - double click (1)
   - 4 cipher codes - your secret codes
2. Open the transceiver.
3. Remove the foam rubber pad from the inside of the front cover.
4. Use the supplied double-stick foam adhesive tape to mount the ST-25 with the cable assembly onto the metal case as shown in FIGURE 1.

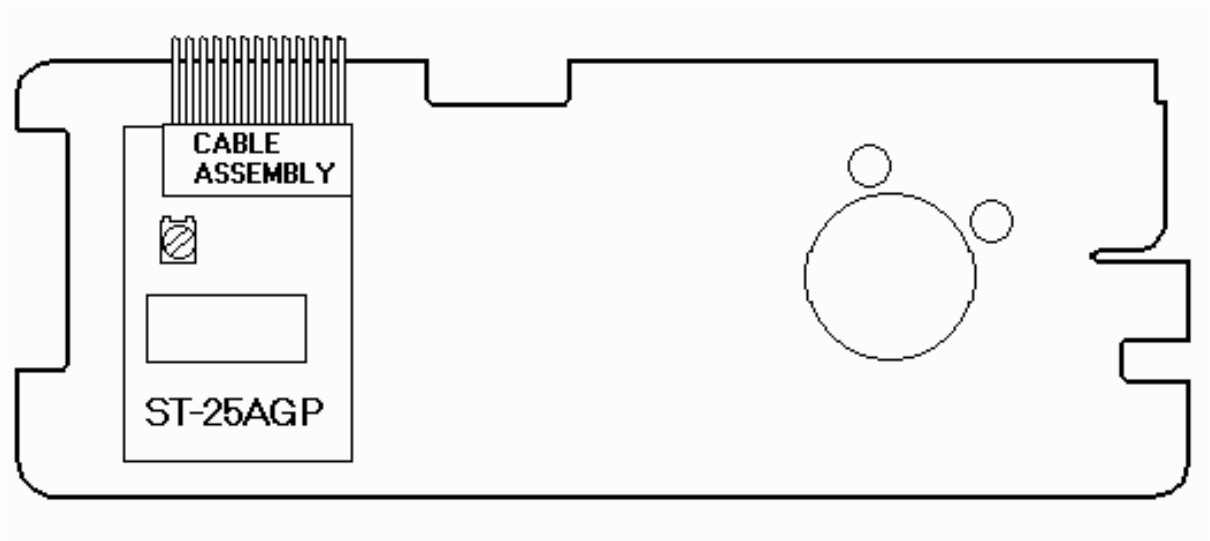
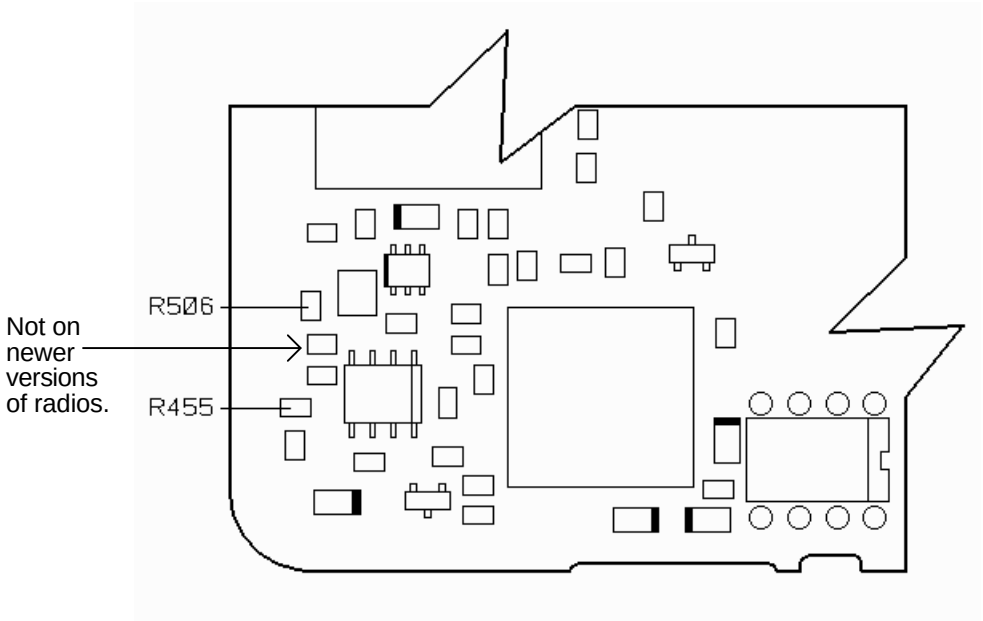


FIGURE 1

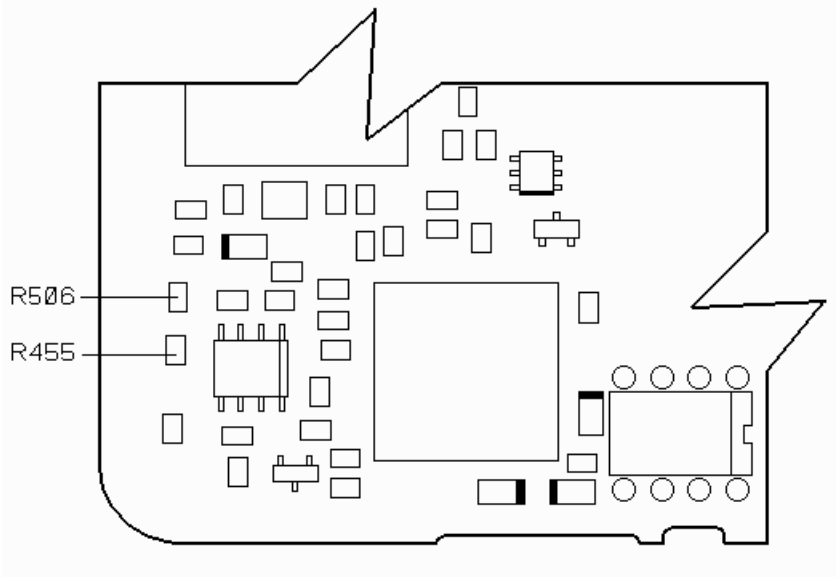
5. Remove the metal case from the transceiver main board by unclipping the four spring clips.

6. On the back side of the transceiver main board (the side towards the battery pack), remove R455 and R506, see FIGURES 2a and 2b.



GP300, P110, **(GP88, P110-5T)

FIGURE 2a (UHF)



GP300, P110, **(GP88, P110-5T)

FIGURE 2b (VHF)

**** May vary slightly

7. Five wires wrap around the end of the metal case and go to points that are normally covered by the metal case. Wrap the five wires around the end of the metal case and attach them to the transceiver main board as shown in FIGURES 3, 4a, and 4b. The wires should pass through the notch of the case.
   - Red
   - Black/Yellow
   - Yellow
   - White/Orange
   - Brown

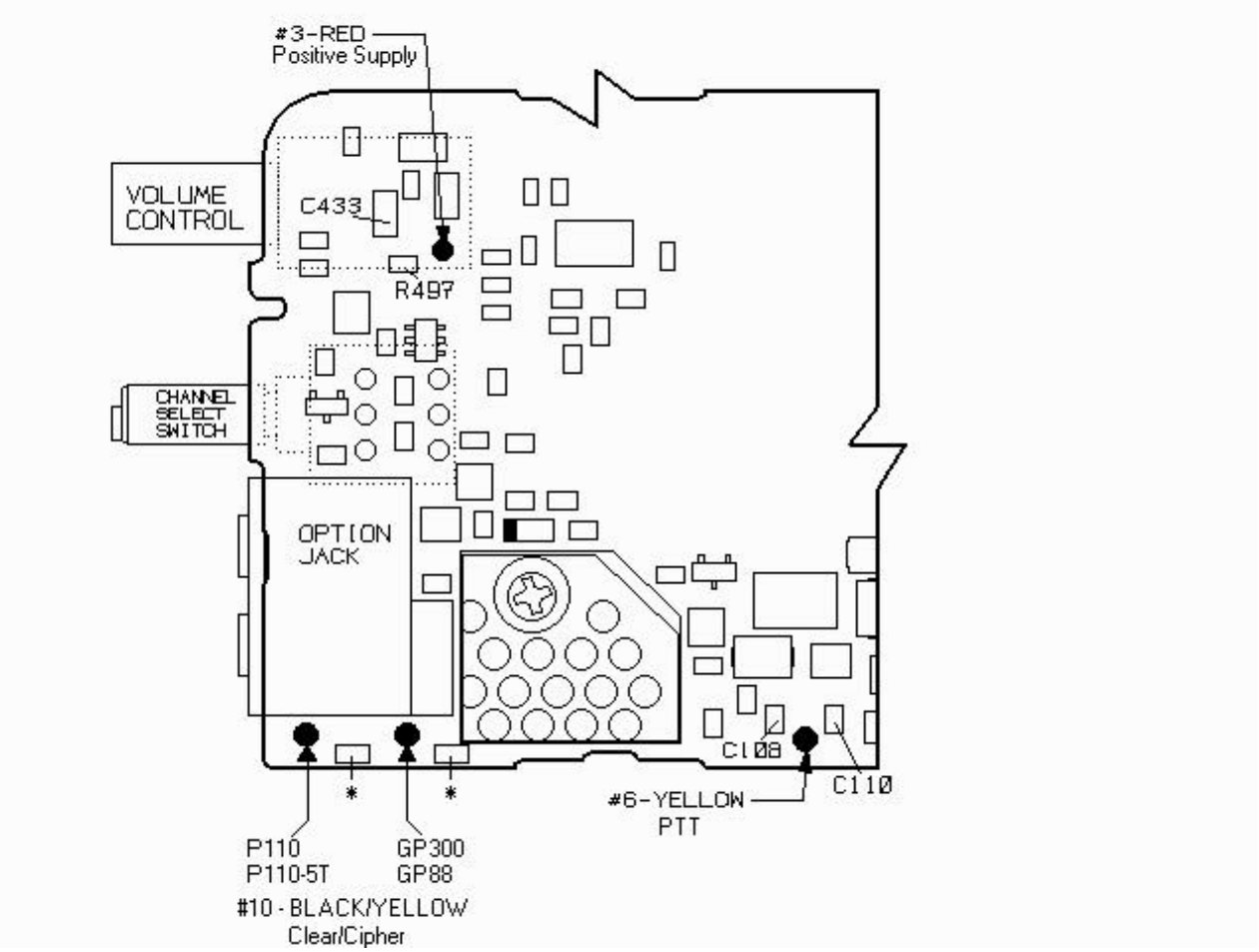
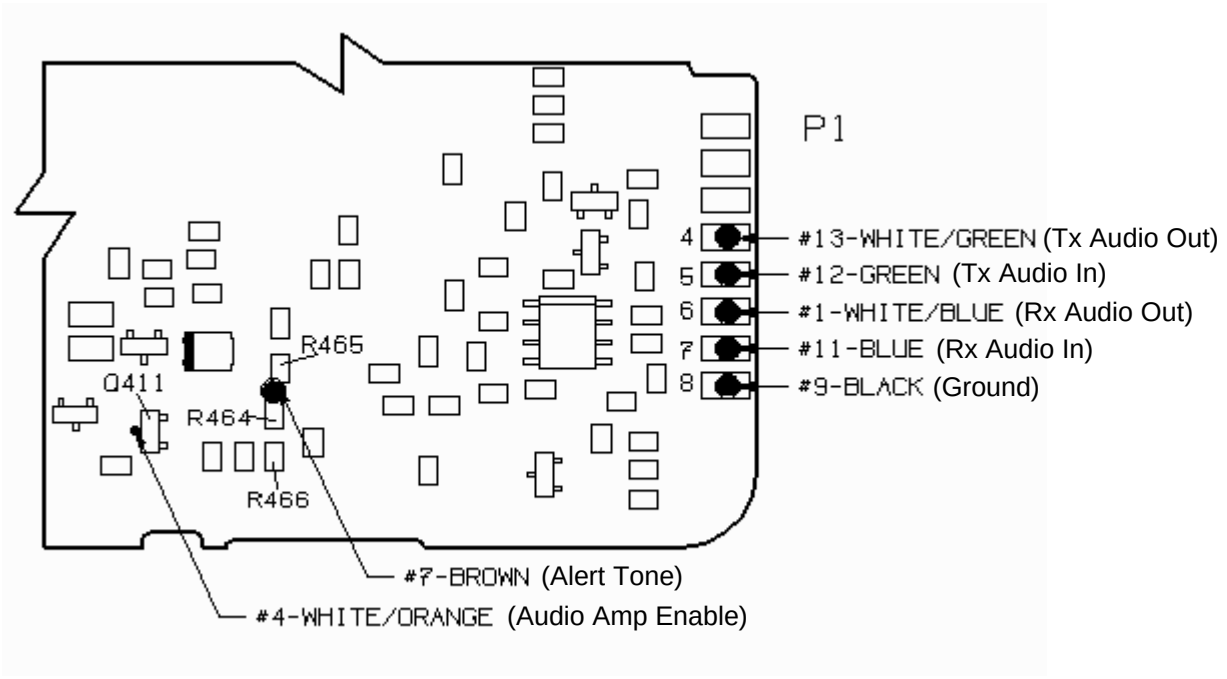


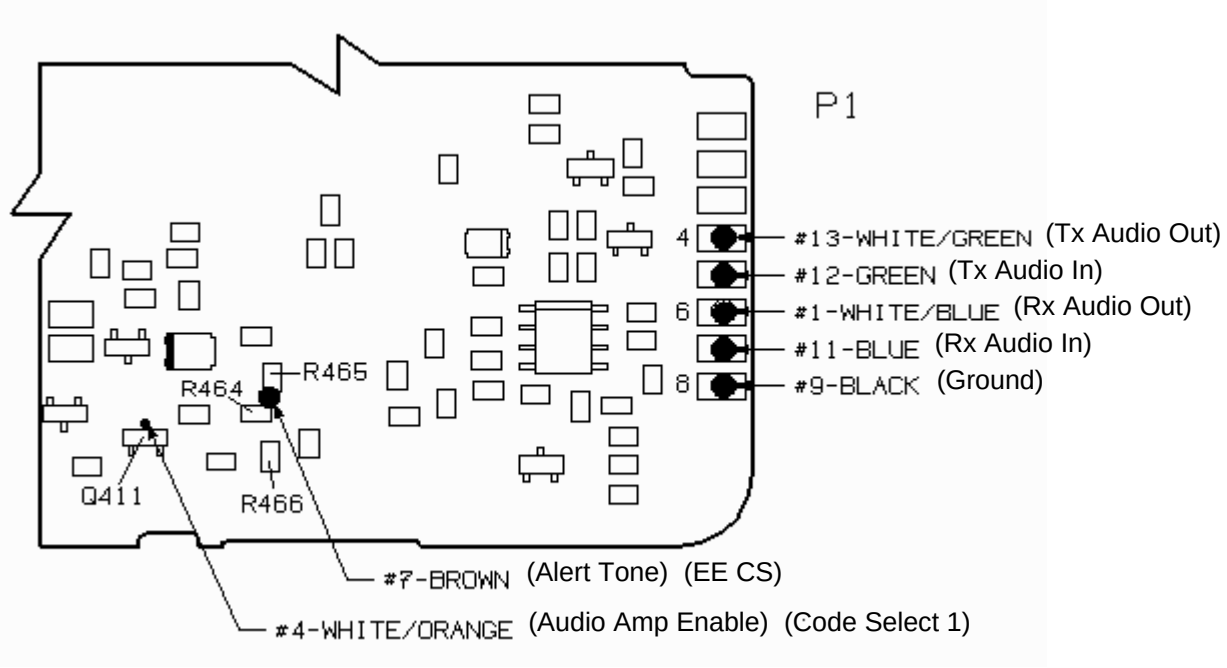
FIGURE 3

* - Capacitors may not be on older version boards, may vary slightly.



GP300, P110, **(GP88, P110-5T)

FIGURE 4a (UHF)



GP300, P110, **(GP88, P110-5T)

FIGURE 4b (VHF)

****** May vary slightly

8. Reattach the metal cover to the transceiver main board.

9. Attach the remaining five wires to P1 as shown in FIGURE 4. The wires should be as short as possible to prevent them from binding as the radio is reassembled.
   - White/Green
   - Green
   - White/Blue
   - Blue
   - Black

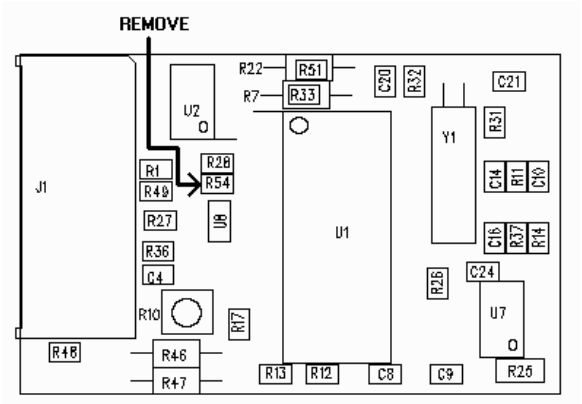
IMPORTANT

10. ST-25AGP MODIFICATION FOR THE P110-5T ONLY:

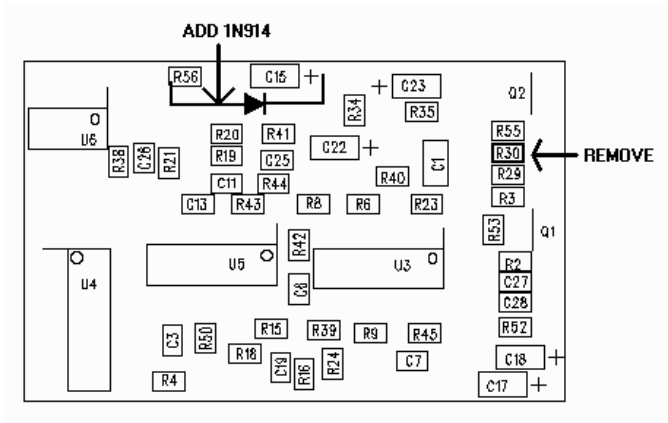
A Special modification of the ST-25AGP is required when using with P110-5T radios.

a. Remove R30, and R54.

b. Add a 1N914 Diode: Anode to junction of U1-22 and R56
Cathode to junction of R22 and U3-2.



TOP SIDE VIEW



BOTTOM SIDE VIEW

This is a recommended installation procedure for Selectone equipment based on the best information available to us at the time of publication. Selectone assumes no responsibility for the accuracy of the information or the damage to equipment resulting from the use of this procedure.

ADJUSTMENTS

General:

During cipher transmissions the ST-25AGP transmits synchronization information approximately twice per second. This signal carries no coding information but is necessary for proper operation. The level is set at the factory but should be verified in the radio.

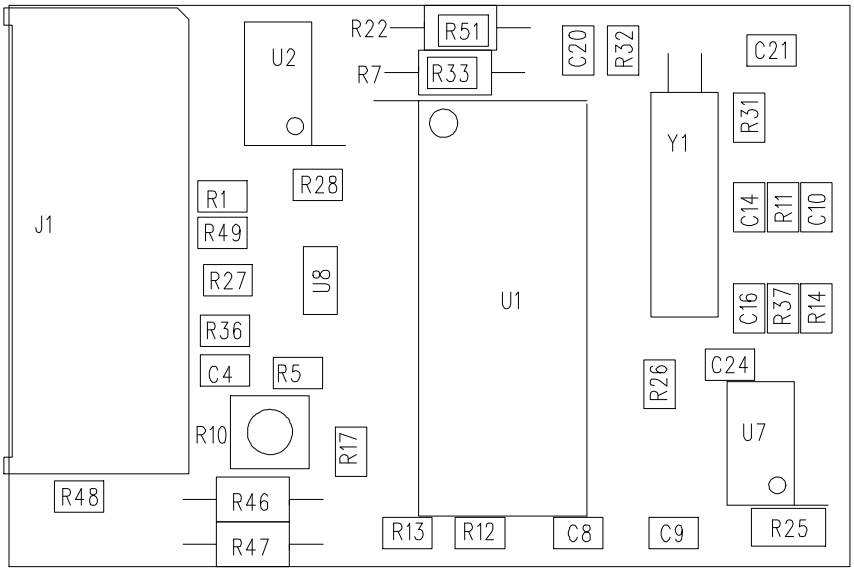
Setting the synchronization level:

1. Attach a fully charged battery to the transceiver assembly.
2. Power on the radio, you should hear a long beep indicating clear mode.
3. Double click the option 2 Control button, you should hear a short beep to indicate cipher mode.
4. Using a service monitor with an oscilloscope display, press PTT and adjust R10 on the ST-25AGP for ½ system deviation (Readings made with a deviation meter may not accurately measure the intermittent synchronization burst signal).
5. Note: Keep the length of transmission as short as possible because there is no antenna.
6. Remove the battery from the transceiver assembly.
7. Close the transceiver covers. Be careful that no wires are pinched as the transceiver assembly is pushed into the case.

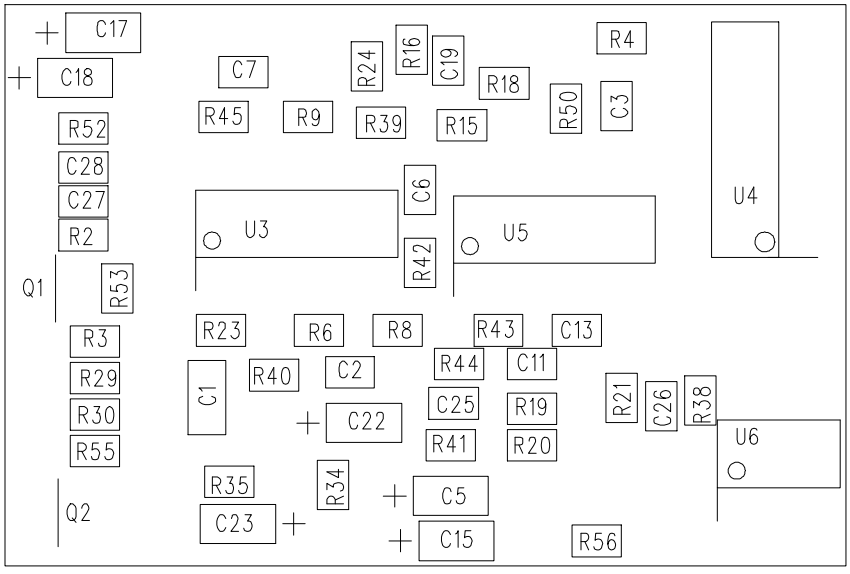
WIRE SIGNAL DESCRIPTIONS

Pin #	Signal Name	Wire Color	Signal Description
11	Rx Audio In	Blue	no RF, noise ~1 Vpp
1	Rx Audio Out	White/Blue	no RF, noise ~0.5 Vpp
12	Tx Audio In	Green	Mic audio, ~0.2 Vpp (PTT pressed)
13	Tx Audio Out	White/Green	Mic audio, ~0.2 Vpp (PTT pressed)
6	PTT	Yellow	+5Vdc, PTT released 0Vdc, PTT pressed
3	Positive Supply	Red	Vcc, ~7.5 volts
9	Negative Supply	Black	Ground, 0Vdc
4	Audio Amp Enable	White/Orange	normally +7Vdc, 0Vdc during alert tone
7	Alert Tone	Brown	normally ground +5 volt square wave during alert tone
10	Clear/Cipher Input	Black/Yellow	+5Vdc with Control button opt 2 released 0Vdc with Control button opt 2 pressed

ST-25AGP ASSEMBLY DRAWING

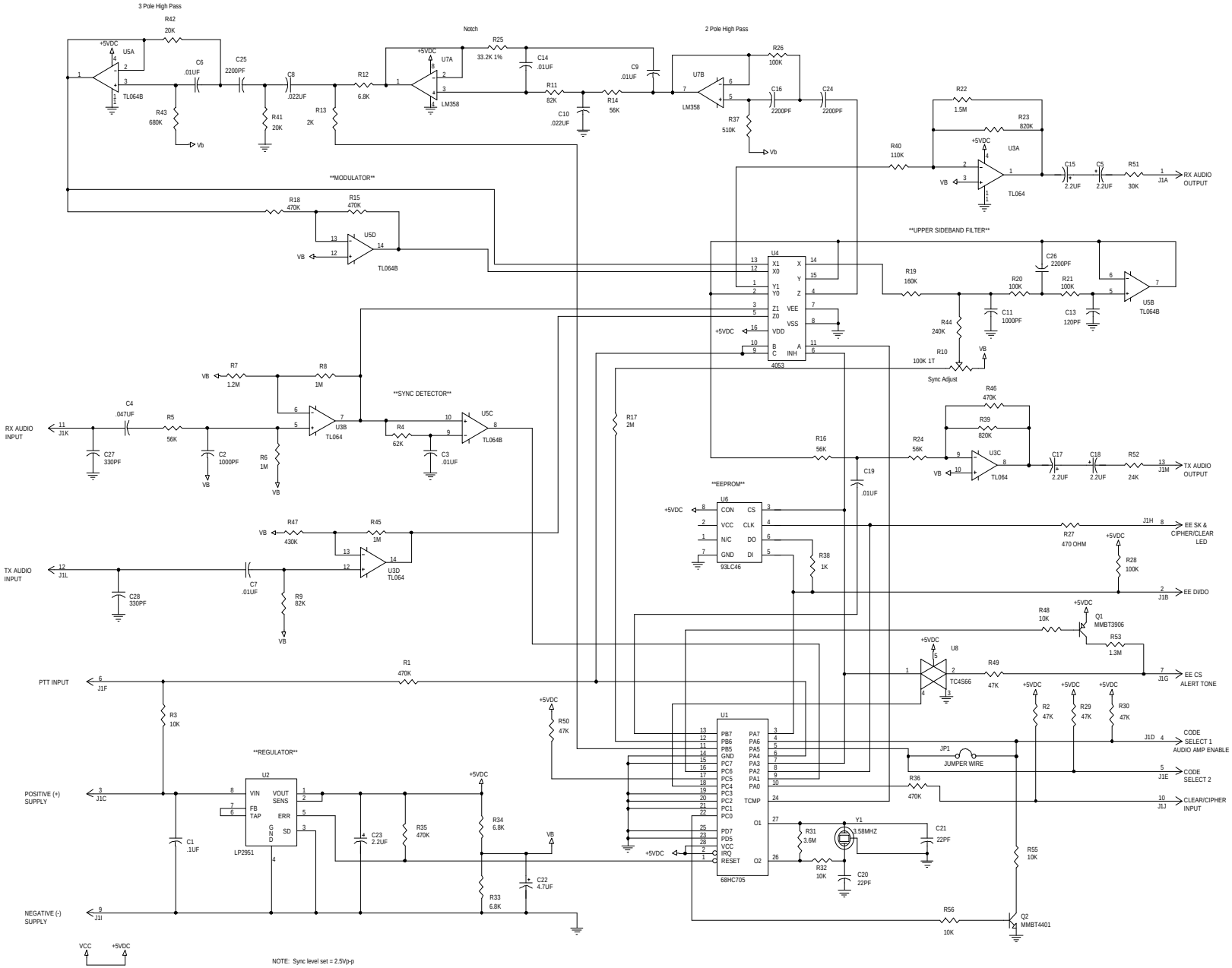


TOP SIDE



BOTTOM SIDE

ST-25AGP SCHEMATIC DIAGRAM



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DISCLAIMER

This is the installation procedure for Selectone equipment based on the best information available to us at the time of publication. Selectone assumes no responsibility for the accuracy of the information or the damage to equipment resulting from the use of this procedure.

WARRANTY POLICY

All standard Selectone products are guaranteed to meet or exceed published performance specifications and are warranted against defects in material and workmanship for a period of five years from the date of purchase. Special configurations and non-standard systems are warranted for a period of one year.

If any standard Selectone product fails to operate within the first 90 days from the date of purchase, Selectone will immediately send a replacement unit post-paid via airmail or UPS Blue Label (air), and will issue full credit, including freight, upon the return of the defective unit(s). For special warranty replacement service , call Selectone Customer Service Department TOLL FREE at 1-800-227-0376. C.O.D. customers must return the defective equipment prior to exchange or will receive the replacement C.O.D. with credit issued only on the return of the defective equipment.

After 90 days, this warranty is specifically limited to correction of the defects by factory or replacement of faulty equipment or parts.

All warranty repairs must be performed at the Selectone factory in Hayward, California. No credit will be given for unauthorized repair work attempted by the customer. Any unauthorized alterations or modification of the equipment , damage external source, or removal or alteration the serial number label or date code, will void the warranty. Specifically exclude from this warrant are batteries, LED's, fuses, lamps, and damage caused by lightning, power surges, or mechanical abuse.

Equipment for repair may be returned to the factory without prior written authorisation: however, a note must be sent with the packing list briefly describing the nature of the defect

For further information or technical assistance, please contact:

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