Selectone

Operating Instructions

MODEL ST-809A Selective Call & Remote Control DTMF Decoder

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GENERAL

The ST-809A is a sub-miniature DTMF Address Decoders designed for Selective Calling and Remote Control applications via radio or wire line. Due to the small size this decoder is especially applicable for installation in hand-held and mobile radios. The devices will respond to an address of 1 to 7 digits in length using any of the 16 DTMF characters. There are no restrictions on the use of repeated digits in the address. This provides greater than 250,000,000 unique addresses. Digit position and address length recognition virtually eliminates the possibility of response to incorrect addresses. Group/All call, Radio Kill, Call Alert Tone, Transpond Acknowledgement and Remote Reset are additional features.

Application information is available or can be developed for most radio models. Many of our application notes are available for instant access on our web site http://www.selectone.com. If you would like application details for a specific radio, please call us TOLL FREE at (800) 227-0376 or request assistance via fax at (510) 781-5454 or E-Mail at techsupport@selectone.com.

OPERATION

The ST-809A is generally set up to monitor DTMF signaling on a radio or wire line circuit. For radio applications, ST-809A outputs are used to mute receiver audio, blocking out unwanted channel traffic. When the correct PRIMARY, SECONDARY, or ALL CALL DTMF address is received, the decoder latches it's DECODE LATCHED OUTPUT to un-mute the host radio. On decode the DECODE MOMENTARY, CALL LAMP and ALERT TONE outputs can be used to activate a multitude of audible or visual alerting devices. Decode of the PRIMARY ADDRESS CODE activates the PTT and TRANSPOND TONE outputs permitting contact acknowledgement to the calling radio operator. All outputs set by a decode function, are reset on any **Monitor/Reset** transition (Decode Latched follows the **HOOKSWITCH** state). Use of PRIMARY, SECONDARY, or ALL RESET permits remote reset of all functions. The ST-809A provides a special RADIO KILL function. When RADIO KILL is decoded the ST-809A will open the PTT circuit and mute the receiver. The condition of this function is stored in EEPROM making it immune to reset by radio power down. Radios that have been "KILLED" may be restored to operation when the ST-809A receives a RESTORE address.

OPERATING SPECIFICATIONS

Parameter	Min	Typ	Max	Unit
Power supply voltage	5.5		25	V DC
Power supply current			7	mA DC
Open collector output (sink current)			80	mA DC
Call Lamp output current (sink or source)			80	mA DC
Temperature range	–30		+60	°C
DTMF input (HI range)	30		850	mV RMS
DTMF input (LO range)	10		280	mV RMS
Signal to noise ratio	12			dB SINAD
DTMF twist			±10	dB
Digit recognition time	20			mS
Interdigit time	50		5000	mS
Decode time	0		1	Interdigit time
Decode Momentary time	0.050		9999	Sec.
Transpond/Alert tone level			5	V p-p, no load
Transpond duration		2.34		Sec
Transpond Tone Freq.		874		Hz
Alert Tone Freq.		528		Hz
Call Lamp Flash (50% duty Cycle)	100	500	999	mS
Interconnect type	13 pin miniature low profile connector.			
Size	1.34"L x 0.85"W x 0.21"H (34.0mm x 21.6mm x 5.33mm)			

[1] Measured from the end of the last DTMF character in the sequence.

Specifications are Subject to change without notice.

INSTALLATION

MOUNTING:

Use of a double-sided adhesive pad or an insulating piece of Mylar eliminates hardware requirements. When using the adhesive pad, mount the ST-809A on a clean, dry surface, oriented to allow easy routing of the wiring to the radio. Press firmly after mounting to ensure good adhesive contact. Do not touch the adhesive or attempt to re-position the unit after mounting.

WIRE INTERFACE:

Connector pin numbers are shown in brackets [#]. Wire colors represent the assignment on the mating connector

[9] Negative (-) Supply (BLK): Connect to system (-) Supply (GND).

[3] Positive (+) Supply (RED): Connect to system (+) Supply (5.5 to 25Vdc).

[12] DTMF Signal Input (GRN): Connect to signaling audio source, e.g., discriminator output, volume high, etc. This input will accept levels between 10 and 850 mVrms in two ranges. Factory default input range is 10 mVrms to 280 mVrms. If the input level is > 280 mVrms and less than 850 mVrms, the HI input level range may be selected in custom configuration. Connection to the speaker output is not recommended due to the extremely wide dynamic range across a speaker.

☞**Note:** This point must not mute while awaiting signaling tones.

[8] Call Lamp #1 (BLK/BRN): Open collector output, to provide a flashing or steady "ON" CALL LAMP. This output remains active until a **HOOKSWITCH** transition or receipt of a remote reset command.

☞**Note:** CALL LAMP #2 must be tied to NEGATIVE (-) SUPPLY when using CALL LAMP #1 as an output.

[11] Call Lamp #2 (BLUE): Open emitter output, to provide a flashing or steady "ON" CALL LAMP. This output remains active until a **HOOKSWITCH** transition or receipt of a remote reset command.

☞**Note:** CALL LAMP #1 must be tied to POSITIVE (+) SUPPLY when using CALL LAMP #2 as an output.

Did You Know…?

Most Call Lamps are LED's which require a series current limiting resistor.

[5] Decode Momentary (ORG/BLK): Open collector output saturates to (-) Supply (GND) for the programmed momentary time following each Primary or Secondary sequence.

[7] Monitor/Reset (BROWN): This is the HOOKSWITCH lead. Connect to the microphone HOOKSWITCH, hang-up button or box. This lead places the DECODE LATCH output in UNMUTE condition when off-hook and resets all other outputs on any transition of this lead. Refer to custom programming to customize the **Monitor/Reset** line for a specific application.

[1] Alert Tone (WHT/BLU): 528Hz tone pulsed 250mS "ON" then 250mS "OFF" for local user alerting applications. This tone remains active until reset.

[6] PTT Input (YELLOW): Used with the RADIO KILL feature. The PTT path between the mic and radio is broken and the ST-809A placed in series. This lead goes to the mic side of PTT. Additionally this line acts as a "set" function to force the radio to un-mute if PTT is activated on a muted radio (eliminates multiple blind transmissions) .

[10] PTT Output (BLK/YEL): Open collector output, saturates to (-) Supply (GND) following the PTT input unless RADIO KILL is activated. Additionally this input is used to key the transmitter after each Primary or Remote Control sequence to permit transpond. This lead goes to the radio side of PTT. When Radio Kill is used the PTT connection is broken.

If "Radio Kill" is **NOT USED**, connect this wire to the same point as the PTT INPUT to permit the ST-809AA to key the transmitter during transpond.

If the "Remote Kill" function is used, the ST-809A must be placed in series between the PTT switch and the transmitter keying circuit. Break the existing connection from the PTT switch and the transmitter. Connect this lead to the transmitter keying circuit and connect the PTT input lead to the actual PTT switch.

☞**Note:** Factory programming sets the PTT input and output to operate from a common connection point. If the Radio Kill feature is used change the programming to operate separate.

[13] Transpond Tone (WHT/GRN): 874 Hz tone active only while PTT OUTPUT is active for transpond.

[4] Decode Latched / RS-232 Output (WHT/ORG): Connect to the muting point in the radio. This output goes to the UNMUTE condition upon decode, if the MONITOR/RESET Line is "ON-HOOK". It may be reset to the MUTE condition by a "OFF-HOOK" then back "ON-HOOK" transition of the MONITOR/RESET line. If the MONITOR/RESET line is "ON-HOOK" this output may be reset remotely with the PRIMARY or SECONDARY RESET address code. This output can be customized with the sink/source and the state programming parameter. See the programming section for customizing details. **This lead is used as the RS-232 output during programming.**

[2] RS-232 IN (VIOLET): The Violet wire should be removed from the connector. (This input is only used during programming of the unit.)

CUSTOM CONFIGURATION

Before use, all ST-809A's must be configured to accommodate the specifics of the application where it is being used, and to its own address codes. ST-809A factory default application parameters accommodate most applications. For unique configurations, the ST-809A permits the installer to customize most outputs and timing to accommodate the specifics of the application. Most applications only require customization of the address codes.

Custom Configuration can be grouped into 4 sets of related sequences.

1. Six (6) decoder address sequences.

☞**Note:** The microprocessor circuit of the ST-809A utilizes an advanced decoding algorithm, which allows all possible combinations of the sixteen standard DTMF tone pairs in codes of one to seven digits in length. The decoder ignores codes of incorrect length, even though they may contain the correct code within them. It is allowable, for example, to install decoders programmed with codes "1', "12," "123," "1234" and "12345" in the same system without improper activation of any of the units.

2. Three (4) timing parameters.
3. Seven (7) application specific parameters.
4. Four (4) operational modes.

In most applications ONLY the primary and secondary address codes need to be programmed. The other programmable parameters can usually be left at the factory default. The programmability is only available to accommodate unique and creative application requirements that occur world wide.

PROGRAMMABLE FEATURES:

The following Parameters may be customized from the ST809 Product Manager.

☞**Note:** Address and Reset/Restore codes programmed as a blank entry are disabled.

OVERLENGTH SEQUENCES:

ACCEPT / REJECT: The ST-809A verifies the length of an incoming DTMF sequence. To insure the sequence length is correct the ST-809A must look for additional digits before and following a valid sequence. This is why the ST-809A does not decode immediately on the release of the final digit in a valid sequence. This application parameter Disables the Sequence Length checking following the final digit in a valid sequence. When set to REJECT, the ST-809A will decode immediately on release of the final digit.

PRIMARY DECODE SEQUENCE [1]:

One to seven digit sequence, user-definable. Reception of this code activates all outputs including the PTT and TRANSPOND TONE outputs, which are generally used to key the radio transmitter momentarily and send an acknowledgement tone. The PRIMARY ADDRESS CODE may be recalled any number of times, setting off the momentary outputs each time, without resetting the decoder. The decoder may be reset locally by the "ON-HOOK" to "OFF-HOOK" transition of the MONITOR/RESET line. Remote reset occurs on receipt of the PRIMARY or SECONDARY RESET addresses. Receipt of the ALL RESET code ([#] for 5 seconds) also produces reset.

SECONDARY DECODE SEQUENCE [2]:

Identical to PRIMARY with the exception that TRANSPOND TONE and PTT do not occur. This address is often used for group call. In Group applications, stations transponding simultaneously would produce radio interference with each other.

RADIO KILL SEQUENCE [3]:

This is used to remotely disable selected radios. PTT and TRANSPOND output activate to acknowledge receipt of these signals.

☞**Note:** Radio Kill status is stored in EEPROM to insure retention during loss of power.

NOTE: The transpond tone is a double beep for RADIO KILL.

PRIMARY RESET SEQUENCE [4]:

SECONDARY RESET SEQUENCE [5]:

RADIO KILL RESET (RESTORE) SEQUENCE [6]:

The Reset and Restore addresses factory default to equal the address code plus a # suffix. When a reset function is programmed as one digit it is inferred to be a suffix to the address code. When reset and restore are programmed to more than one digit, the programmed sequence becomes the reset or restore address.

DIGIT RECOGNITION TIME:

This is the time the decoder requires to recognize a DTMF button has been pressed. If signaling is fast this time should be short. If there is a need to insure the signaling party holds the button down, this time should be increased.

INTERDIGIT RECOGNITION TIME:

This is the time the decoder requires to recognize the release of a DTMF button. The Factory default is intended for normal manual dialing. If an automatic dialer is used, a shorter interdigit time reduces probability of false decodes.

CALL LAMP FLASH RATE :

The CALL LAMP OUTPUT flashes the lamp ON and OFF. This parameter sets the ON and OFF time. The flashing occurs at a 50/50 duty cycle. Where 0 entry for this parameter produces a steady state, no flashing.

MONITOR / RESET (HOOKSWITCH) POLARITY:

The Monitor/Reset lead is normally connected to a radio monitor button or hook switch. This parameter sets the sense polarity.

DECODER RX INPUT SENSITIVITY:

To accommodate the wide range of possible input levels, two sensitivity ranges are available. HIGH (10 - 280 mVrms) and LOW (30 - 850mVrms).

DECODER LATCHED OUTPUT:

SINK/SOURCE: The Decode Latched Output normally connects to the muting point in the radio. SINK refers to transistor Q6 being turned on presenting a low impedance between its collector (J1 pin 4) and (-) Supply.

SOURCE refers to transistor Q5 being turned on presenting a low impedance between its collector and (+) Supply (J1 pin 4) (R15 limits the current output capability). In either mode, when OFF, J1 pin 4 is high impedance (open circuit).

DECODER MUTE:

ACTIVE STATE: The Decode Latched Output normally connects to the muting point in the radio. Active state is the condition this output (J1- pin 4) provides to the host radio to produce Rx Audio Mute. Though SINK is the most common, SINK, SOURCE, and OPEN CIRCUIT are application possibilities. ON refers to the condition of J1 pin 4 as presented to the host radio when J1 pin 4 will SINK or SOURCE to MUTE the radio. OFF refers to the condition of J1 pin 4 as presented to the host radio when J1 pin 4 will SINK or SOURCE to UN-MUTE the radio.

CALL / REMOTE CONTROL OUTPUTS:

The ST-809A has four operational modes. As shipped from the factory, the ST-809A is configured for selective calling applications (MODE #1). By selecting one of three other operational modes 2, 3, or 4, the ST-809A may be used for Remote Control applications. When a Remote Control mode is selected the hook switch is disabled. Three of the outputs are redefined as open collector control outputs. The output associated to the function may be turned ON or OFF individually or interlocked as described in the configuration chart.

CALL LAMP = Function #1 (F1) = Pri. Address and Reset

DECODE MOM = Function #2 (F2) = Sec. Address and Reset

DECODE LATCHED = Function #3 (F3) = Kill and Restore

☞ **Note:** Interlocked functions do not have individual reset addresses. Activation of interlocked functions resets the associated function(s).

NOTE: Remote control output states are stored in EEPROM to insure retention during loss of power.

Example: In MODE 3, reception of the Primary Address sets F1 to ON and resets F2 to OFF. Reception of the Secondary Address sets F2 to ON, and resets the F1 to OFF. F3 is independent.

Example: In MODE 4, reception of any function resets the other two functions.

When any Remote Control function is set or reset, Transpond occurs. Transpond for remote control always consists of three beeps. A high frequency beep indicates ON a low frequency beep indicates OFF. Beeps 1 - 3 represent F1 - F3.

TRANSPOND:

ENABLE/DISABLE: Application parameter that permits the TRANSPOND function to be disabled. This function is needed if TRANSPOND is not desired or legal, but RADIO KILL is required (PTT OUTPUT has to be hooked up).

☞ **Note:** Transpond applies to Primary, Primary Reset and all Remote control functions.

ALL CALL:

ENABLE/DISABLE: Application parameter that permits the ALL CALL and ALL RESET functions (reception of > 5 Sec. of * or #) to be disabled.

MOMENTARY OUTPUT TIME:

Following reception of a valid Primary or Secondary address sequence, this output conducts to (-) Supply (GND) for this time period.

PRODUCT MANAGER

The ST-809 Product Manager is required to configure this product to accommodate the specific application requirement. The Windows based Product Manager Software is for ANI and the DOS Product Manager for ANI, Burst or Two-Tone. The DOS Product Manager may be useful for ANI applications if Windows operation is un-stable.

The Windows based Product manager installs using normal Windows installation procedures.

The DOS based Product Manager is included on a separate disk. The DOS Product Managers may be transferred to the working directory (C:\Select.one), or run directly from the supplied disk.

Many popular Windows programs access serial communications and lock access to COM ports by any other program, Windows or DOS. Before running 809DOS.EXE, shut down the computer and reboot in DOS mode. For DOS operation, press F8 immediately following the report “Starting Windows 95”. Select “Command Prompt Only”.

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 out a replacement unit and will issue full credit, including freight, upon the return of the defective unit(s). All prepay/C.O.D. customers must return the defective equipment prior to exchange, otherwise the customer will be required to prepay for the new unit(s) 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 caused by external sources, or removal or alteration of the serial number label or date code, will void the warranty. Specifically excluded from this warranty are batteries, fuses, lamps, and damage caused by lightning, power surges, or mechanical abuse.

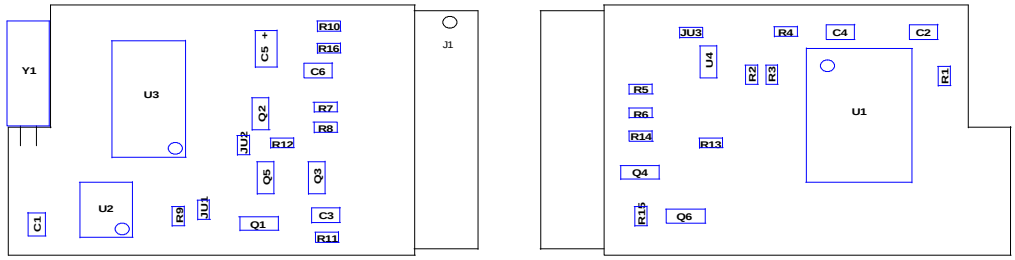
For equipment to be returned to the factory for repair, you must first call and get an RMA# from Customer Service. The RMA# must be written on the outside of the package, otherwise receiving will reject the shipment. In addition, a note must be sent with the packing list briefly describing the nature of the defect.

For special warranty replacement service, of if any other assistance is required, contact Selectone Customer Service Department at (800) 227-0376, FAX (510) 781-5454, E-Mail techsupport@selectone.com, or on the WEB at www.selectone.com.

All repairs and returns are to be sent to:

Selectone

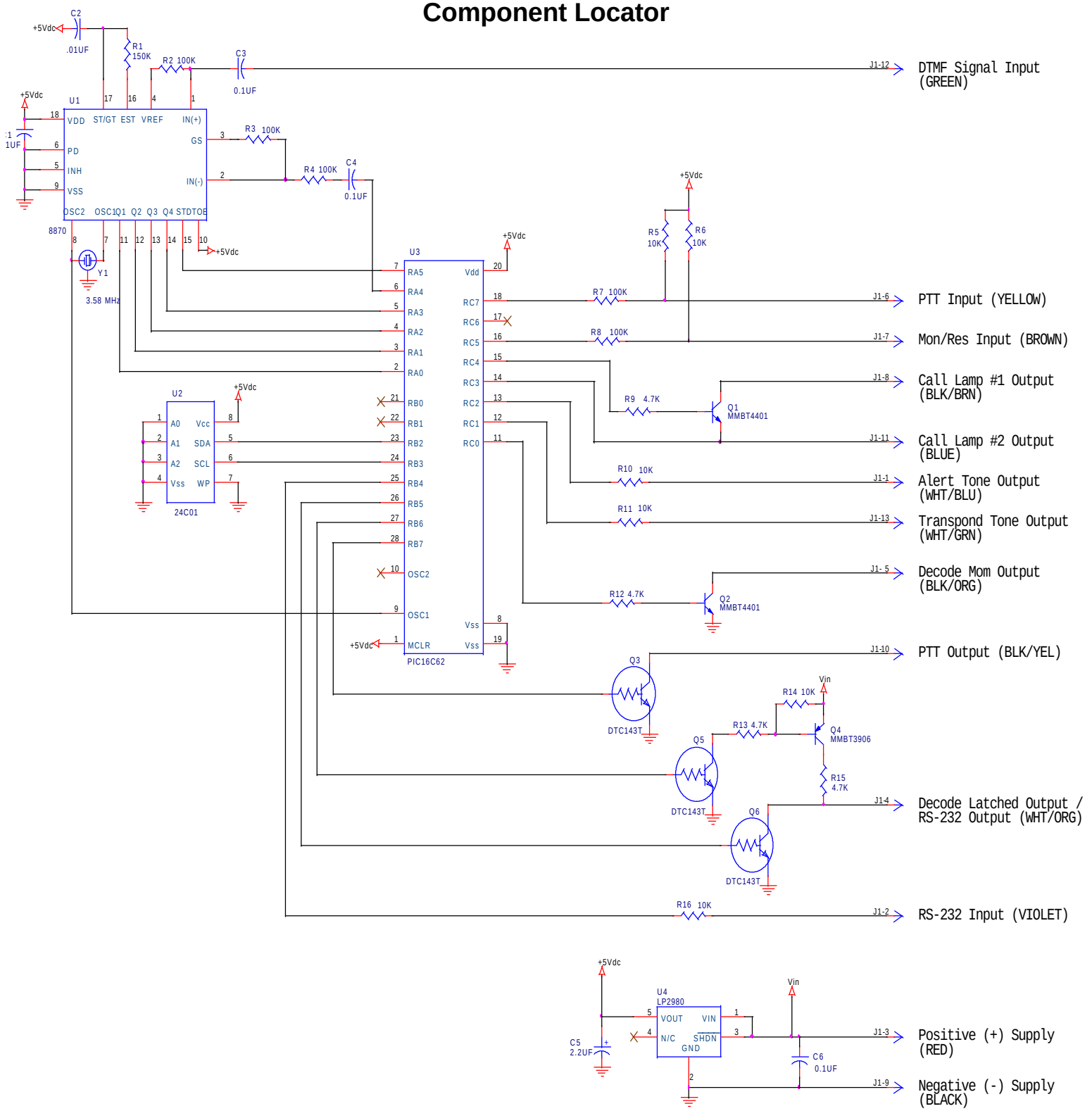
23210 Bernhardt St
Hayward, CA 94545
Attn: Customer Service



TOP SIDE

BOTTOM SIDE

Component Locator



Schematic