Selectone
PRODUCT GROUP

OPERATING INSTRUCTIONS
Model ST-804A SUB-MINIATURE DTMF ANI/BURST/TWO-TONE ENCODER

Manual # 600-2201
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GENERAL

The ST-804A is a microprocessor controlled, sub-miniature, ANI (Automatic Number Identification), Burst and Two-Tone Sequential encoder. The DTMF (Dual Tone Multi-Frequency) signaling format is intended for use with the Selectone Model ST-822 or ST-888 ANI decoder or a similar device. The Burst Tone encoder is intended for use with the ST-120 or similar decoders. The Two-Tone encoder is intended for use with the ST-200A/B or similar decoder.

Though the ST-804A is intended for use as a unit identification device or a paging encoder for two-way radio applications, its small size and user programmability provide flexibility that allow it to be used in a multitude of other applications including remote control and remote equipment status reporting.

The device is field programmable using a PC and the Windows based Product Manager Software for DTMF ANI and the DOS Product Manager Software for programming Burst and Two-Tone. The DOS product Manager also functions for programming ANI applications when Windows operation is un-stable. Product Manager is available on disk from Selectone at a nominal price, or it is available at no charge on the Selectone web page **www.selectone.com.**

OPERATING SPECIFICATIONS

Specification	Detail
Operating Voltage:	5.2 Vdc to 16.3 Vdc
Operating Current:	< 6mAdc
Open Collector Output:	40mAdc
Limit Timer Alert Tone:	CMOS logic , 10K series resistor
Tone Output Level:	Adjustable 0 to > 3 V p-p composite DTMF signal with < ±1dB twist; Burst Tone and Two-Tone from 300-3000 Hz
Temperature Range:	-30^{0}C to +60^{0}C
Tone Output Impedance:	
Non Signaling:	> 500K
Signaling:	< 30 Ohms
Input Logic Levels (All):	Logic HI =3.4Vdc Logic LO =.9Vdc
Interface:	18" flying leads terminated in a 13 pin low profile connector
Size:	0.84" W X 1.15" L X 0.15" H (21.3mm X 29.3mm X 3.8mm)

OPERATION

ANI - AUTOMATIC NUMBER IDENTIFICATION

When Programmed for DTMF ANI the ST-804A is triggered by the operation of the PTT (Push-To-Talk) switch of a host two-way radio transmitter. The ST-804A responds by sending a sequence of DTMF digits. Triggering of the ANI sequence may be programmed for activation upon closure and/or release of the PTT switch. The ST-804A connection to the host radio PTT circuit is used to insure transmitter keying is maintained to permit full ANI signaling even if the operator quickly releases PTT.

ENI - EMERGENCY NUMBER IDENTIFICATION

When The ST-804A is programmed for DTMF ANI and triggered by an input signal separate from the ANI trigger, the ST-804A keys the host transmitter and sends a second and independent sequence of DTMF digits. When properly programmed this sequence may be interpreted as an emergency code by the base station decoder. Once triggered, the ENI code is sent from 1 to 255 times or continuously based on setup programming. It is also possible to program the ST-804A to provide a period of "open microphone" transmit time after the first ENI sequence. This feature can be useful to a dispatcher who is trying to determine the nature of the emergency that is being declared.

BURST TONE

When the ST-804A is programmed as a Burst Tone encoder, grounding the ENI activate/ Page Code A wire causes a tone to be generated for the programmed duration or continuously until the Page Code line is released. This is a programmable feature.

TWO-TONE SEQUENTIAL

When the ST-804A is programmed as a Two-Tone Sequential encoder, grounding the ENI activate/ Page Code A wire causes a Two-Tone page of tone 1 then tone 2 for the programmed times and frequencies. If the PTT input/Page Code B is grounded, a Two-Tone page of tone 2 then tone 1is generated. If both the ENI activate/page code A and the PTT input/Page Code b wire are grounded at the same time, an all-call of tone 1 is generated for the programmed all-call duration.

MICROPHONE MUTING

To prevent voice corruption of the ANI or ENI sequence, the ST-804A TX AUDIO OUTPUT is normally high impedance (500K), and switches to a low impedance (30 Ohms) during an ANI/ENI/Burst/Two-Tone sequence. For non-powered microphones this provides a low impedance swamping load to effectively disable the microphone. For powered microphones an open collector output (MIC. MUTE OUTPUT) which conducts to (-)SUPPLY during the ANI/ENI sequence is also provided. This output is used to deprive the microphone element of current disabling the mic during the ANI/ENI sequence.

TIME-OUT TIMER

One of the many uses of the ST-804A is to prevent radio system abuse, not only by identifying abusers, but also by preventing a single user from monopolizing air time. For equipment not equipped with this feature, the time-out timer included in the ST-804A can be programmed to limit the

duration of any single transmission. When the limit time is exceeded, the transmitter is turned off. The ST-804A provides an alert tone which can be coupled to the receive audio section of the radio to notify a user that the transmission has been terminated. (This feature is only available when the ST-804A is programmed for DTMF ANI)

INSTALLATION

While it is possible to program the ST-804A after physical installation in the radio, it is recommended that you program the unit before installation. Refer to the PROGRAMMING section of this manual for programming instructions.

MOUNTING

Use of a double-sided adhesive pad eliminates hardware requirements. Mount the unit 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. If use of the adhesive pad is not practical, we have included a length of polyester tubing which may be used to insulate the unit from contact with other parts of the radio. This product has been designed for maximum immunity to RF interference. However, you should locate the unit as far as possible from the radio's RF power stages. To further minimize RF problems, twist the leads together and maintain all leads at minimum length.

INTERFACE TO THE RADIO

Interface to the host radio is made using a thirteen wire, color coded cable. This cable includes a sub-miniature connector to allow easy field programming or unit replacement as required. The electrical interface of the ST-804A is relatively simple and can be accomplished easily by a two-way radio service technician familiar with the host radio. Selectone also has application notes providing detailed installation instructions for many different radios. Selectone supports this product with application assistance via phone at (800) 227-0376, (510) 781-0376, FAX at (510) 781-5454, E-Mail at techsupport@selectone.com, or on the World Wide Web at **www.selectone.com**

[3] POSITIVE (+) SUPPLY (RED): Connect to (+) supply (5.2 to 16Vdc).

[9] NEGATIVE (-) SUPPLY (BLACK): Connect to system (-) supply (GND).

[13] TX AUDIO OUTPUT (WHT/GRN): Connect in parallel to the microphone at the audio amplifier input.

[6] PTT INPUT/PAGE CODE B (YELLOW): When the ST-804A is Programmed as a DTMF ANI encoder, connect to the transmitter PTT switch. This lead activates ANI and resets ENI.

When the ST-804A is programmed as a Two-Tone Sequential encoder, connect to a separate momentary switch connected to ground. When this line is grounded, a reverse Two-Tone page (tone 2, then tone 1) is generated.

When the ST-804A is programmed as a Burst Tone encoder, connect this wire to the Positive (+) Supply.

Note: *Operation of the ST-804A will be erratic if this input is allowed to float. If this point is open-circuit while not activated, a pull-up resistor to Positive (+) Supply must be added.*

[10] PTT OUTPUT (BLK/YEL): If the ST-804A Is programmed for DTMF ANI and the LIMIT TIMER function is not required, connect this wire to the same point as the PTT INPUT.

If the LIMIT TIMER function is used, the ST-804A must be placed in series between the PTT switch and the transmitter keying circuit. Break the existing connection between 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 limit timer is required change the programming to operate separate.*

If programmed as a Burst Tone encoder: If the Page Code A lead is connected to the PTT circuit, do not connect this lead – remove the wire from the connector. If the Page Code A lead is connected to a switch separate from the PTT circuit, connect this lead to the PTT circuit of the radio.

If programmed as a Two-Tone Sequential encoder, connect this lead to the PTT circuit of the radio.

[5] MICROPHONE MUTE OUTPUT (BLK/ORG): This lead is used to mute powered microphone circuits. Before connection verify the need by speaking into the mic during an ANI sequence. If the ANI is corrupted, this lead is necessary. Replace the mic current limiting resistor with two values in series, totaling to near the original value. Connect this lead to the junction between these resistors.

[12] ENI ACTIVATE INPUT/ PAGE CODE A (GREEN): When the ST-804A is programmed for DTMF ANI, connect to a momentary switch which closes to ground to signal the presence of an emergency situation. An example would be a hidden foot switch for use in case of a robbery.

ENI is activated by a high to low transition followed by a constant low state for the programmed debounce time. Once activated the state of this lead is not a consideration until ENI is reset by a high to low transition on the PTT line.

When the ST-804A is programmed as a Burst Tone encoder, this lead may be connected to the PTT circuit to send a burst or continuous tone each time the transmitter is keyed (the PTT output lead must not be connected). This lead may be connected to a momentary switch which applies ground to initiate generation of the tone. If this is done, the PTT output lead must be connected.

When the ST-804A is programmed as a Two-Tone Sequential encoder, this lead should be connected to a momentary switch which applies ground to initiate a Two-Tone page (tone1, then tone 2).

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

[4] RS-232 OUT / SPEAKER BEEP (WHITE/ORANGE): When the limit timer feature is used, this lead provides a tone output to the radio speaker to indicate transmit limit has been reached. A series resistor is required. The value of the resistor is experimentally determined by consideration of the impedance of the speaker and the required loudness.

If the limit timer is not used, or the ST-804A is programmed for Burst or Two-Tone, the White/Orange wire should be removed from the connector.

[1] NOT USED (WHITE/BLUE): The White/Blue wire should be removed from the connector

[7] NOT USED (BROWN): The Brown wire should be removed from the connector

[8] NOT USED (BLACK/BROWN): The Black/Brown wire should be removed from the connector

[11] NOT USED (BLUE): The Blue wire should be removed from the connector

ADJUSTMENTS & PROGRAMMING

Set R5 to produce ±2/3 system deviation during the transmission of a DTMF sequence. (±2/3 system deviation = ±3.3 KHz when maximum deviation is ±5HKz)

Note: *To ease setting, the ST-804A will encode a DTMF 5 continuously when JU1 is shorted. Remember to open JU1 when setting is completed.*

PREFIX ANI CODE

The ANI CODE that is sent at the beginning of a transmission. Once triggered, the ST-804A holds the transmitter keyed long enough to send the entire ANI sequence even if the activation of the PTT input is only momentary.

ENI CODE

The code that is sent upon activation of the ENI input. The ENI CODE is sent repeatedly until reset by a high to low voltage transition on the PTT input or until the number of reports programmed have been sent.

SUFFIX ANI CODE

Sent at the END of a transmission. This code is may be used together with, or instead of, the PREFIX ANI CODE. It can be the same code as the prefix or a different code according to the system requirements.

IMPORTANT! *If you are using a Selectone ST-822 or ST-888 Desktop ANI/ENI Display Decoder, you must add an ANI PREFIX DIGIT or ENI ALARM PREFIX (ENI) to the beginning of the programmed code. The Display Decoder uses the PREFIX DIGIT, both for validation and to determine the nature of the code sequence, whether ANI or ENI. For the ST-804A and the Display Decoder to work properly together, the ST-804A must be programmed to encode the same PREFIX DIGIT as the Display Decoder is expecting to receive. For example; if you chose * as your PREFIX DIGIT to represent a normal ANI condition for the Display Decoder, and the required ANI code was 1 2 3 4, you would program the ST-804A for * 1 2 3 4.*

TRANSMIT DELAY TIME

This is the duration in milliseconds of the delay from activation of the PTT input until the ST-804A begins encoding the ANI or ENI sequence. This time is used to accommodate the delays of a particular system (repeater attack time, CTCSS decode time, etc.).

TONE-ON TIME

This is the time in milliseconds that each digit is generated. One divided by the duration of TONE-ON plus the duration of TONE-OFF equals the signaling rate in digits per second [1 / (Ton + Toff) = Signaling Rate].

The programmed signaling rate of the ST-804A must not exceed the maximum signaling rate of the decoder that is to be used.

TONE-OFF TIME

This is the time in milliseconds between successive digits in a sequence.

NOTE: *The tone-on and tone-off times must be set in accordance with the requirements of the associated decoder(s).*

ENI REPEAT TIME

This is the delay between each ENI transmission in seconds. After sending the initial ENI sequence, the ST-804A waits for the duration of the REPEAT TIME before another ENI sequence is sent.

ENI TALK WINDOW TIME

Duration in seconds of "open microphone" time following the transmission of the first ENI transmission. This feature allows a dispatcher to listen momentarily to the sounds at the site of the emergency and possibly gain some inkling of what is wrong without the help of the party in distress.

Note: *Microphone wiring may need modification to insure open Mic when PTT operates.*

ANI HOLD-OFF TIME

Time in seconds after an ANI sequence is sent before PTT will initiate another ANI sequence. This feature is used together with ANI HOLD-OFF COUNT to minimize the amount of air time lost to ANI if it is not absolutely necessary to send ANI with every transmission. If a transmission runs longer than the hold-off timer setting, ANI will be sent at the beginning of the next transmission if PREFIX ANI is used and at the end of the current transmission if SUFFIX ANI is used. If all transmissions are short, the ANI HOLD-OFF COUNT will likely elapse before the ANI HOLD-OFF TIME causing a normal suffix or prefix ANI sequence to be sent.

ANI HOLD-OFF COUNT

Maximum number of transmissions to be made before ANI data is again transmitted. This feature is used together with ANI HOLD-OFF TIME to minimize the amount of air time lost to ANI if it is not absolutely necessary to send ANI with every transmission. If a transmission runs longer than the hold-off timer setting, ANI will be sent at the beginning of the next transmission if PREFIX ANI is used and at the end of the current transmission if SUFFIX ANI is used. If all transmissions are short, the ANI HOLD-OFF COUNT will likely elapse before the ANI HOLD-OFF TIME causing a normal suffix or prefix ANI data burst to be sent.

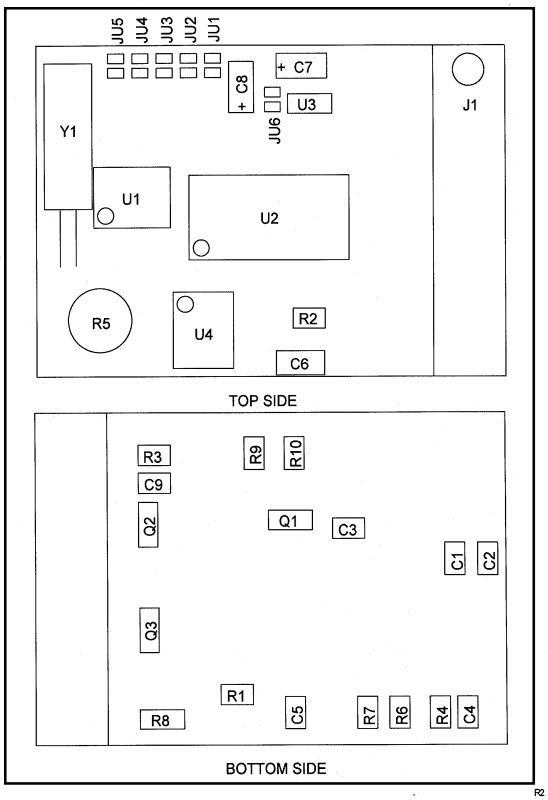
TRANSMIT LIMIT TIME

Duration in seconds the ST-804A will permit for any single transmission. If a microphone gets stuck or the radio system is subject to abuse from long winded users, the ST-804A will terminate any transmission that exceeds the duration of this timer. After the transmission ceases, the ST-804A will encode a warning from the TIME-OUT TIMER ALARM OUTPUT to signal the user that his transmission has ceased. Release of the PTT signal will reset the timer and permit another transmission.

PRODUCT MANAGER™ SOFTWARE

The ST-804A 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 804DOS.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".



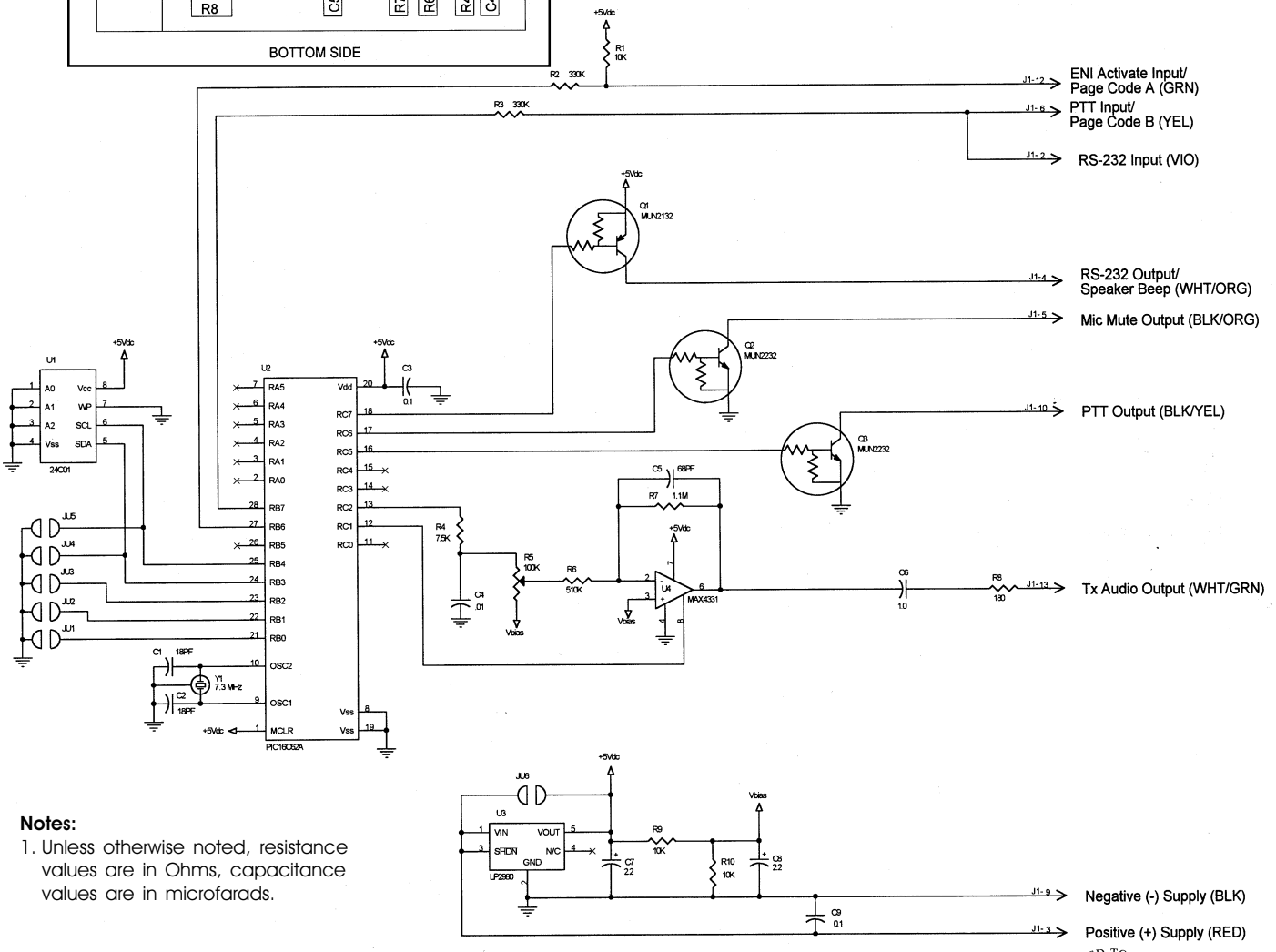
WARRANTY POLICY

All Selectone products are guaranteed to meet or exceed published performance specifications and are warranted against defects in material and workmanship for a period of two (2) years from date of purchase. Third party equipment such as radios, power supplies, antennas, etc., carry the factory warranty of their respective manufacturers.

All warranty repairs must be performed at the SmarTrunk factory in Hayward, California, or other factory authorized repair depot. Any unauthorized repair attempted by the customer, alteration or modification of the equipment, damage 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.

Equipment for repair may be returned to the factory without prior written authorization; however, a note must be sent with the packing list briefly describing the nature of the defect. Repairs must be shipped freight prepaid and will be returned freight prepaid. Shipments should be directed to:

SmarTrunk Systems, Inc.
Attn: Repair Department
23278 Bernhardt Street
Hayward CA 94545, U.S.A.



Notes:

1. Unless otherwise noted, resistance values are in Ohms, capacitance values are in microfarads.

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