GENERAL

The ST-104 Econotone is a low cost version of our popular
ST-101 CTCSS Encoder/Decoder. Cost of purchase and installa-
tion have been primary design considerations. Our extensive ap-
plications experience has provided insight for design modifications
to simplify field installation. Although these modifications have
resulted in a slight increase in board size over the ST-101, the
ST-104 will be significantly less expensive for most mobile applica-
tions.

Like the ST-101 and ST-102, the ST-104 is fully compatible with
all major CTCSS systems, including Motorola "Private Line",
General Electric "Channel Guard", and RCA "Quiet Channel".

Because of our comprehensive warranty policy, you should prob-
ably not have to consider any field repair; however, if repair is
unavoidable, all parts are clearly labeled on our diagram and should
be generally available through component distributors.

Application notes are available for over 100 different radio
models. These notes provide mounting details, connection points,
and radio modifications required (if any). If you would like applica-
tion details for a specific radio, please call us TOLL FREE at (800)
227-0376, or in California call (415) 887-1950. Together we
may be able to save you some time and money.

OPERATING SPECIFICATIONS

OPERATING VOLTAGE: 10.5Vdc to 30Vdc (reverse polarity protected), or 5Vdc to 16Vdc
(for use on regulated supply)

OPERATING CURRENT: Less than 7mA 10.5Vdc to
30Vdc; or less than 5mA 5Vdc to
16Vdc [with voltage regulator removed]

FREQUENCY RANGE: 67Hz to 250.3Hz (Continuously
Tunable)

OPERATING TEMP. RANGE: Exceeds EIA RS220A [-30°C to +80°C]

FREQUENCY STABILITY: Exceeds EIA RS220A (less than
±.5%); typically less than ±.2%

ENCODER OUTPUT LEVEL: Adjustable 0 to 1Vrms (10.5 Vdc
to 30Vdc supply)

ENCODE OUTPUT LEVEL STABILITY: Less than ±1dB change 67Hz to
250.3Hz

SINE WAVE OUTPUT PURITY: Less than 1% THD

DECODER INPUT LEVEL: 20mVrms to 2Vrms

IMPEDANCE: Greater than 100K

HIGH PASS FILTER:

DECODER ACTIVATE:

DECODER OUTPUT:

INTERFACE: 18" flying leads terminated to
Molex plug on ST-104; or specific
application interface harness

SIZE: 2" L x 1.5" W x .38" top of com-
ponents [.5" top of plug]

MOUNTING: Double sided pressure sensitive

INSTALLATION

We have attempted to configure the ST-104 to require minimum
installation time for most radios. If you do not have application in-
formation for your particular radio call us at (800) 227-0376 out-
side California or (415) 887-1950 in California. We want your
ST-104 application to be as inexpensive for you as possible.

The following (5) leads supplied connected to the Molex plug will
generally be used for all applications.

[15] [-] Supply [Black]: Connect to system [-] [ground]

[12] Tone Output [Wht/Orn]: Connection should be similar to
figure A or B. RA is to avoid modulator loading. Cut R41 or R42 to
to make RA larger.

[10] Tone Input [Green]: Jumped to Hi Pass Filter Input by
JU1. Connect directly to FM receiver detector audio output.

[8] Hi Pass Filter Output [Wht/Blu]: Connect to place Hi Pass
Filter in series with receiver audio path.

[2] Control 1 Monitor [Brown]: Primary control of En-
coder/Decoder functions. Connect to [-] supply [ground] through
monitor/hookswitch to mute the radio. Open from [-] supply [ground] to encode and monitor. If your monitor switch closes to
ground to monitor, connect control 1 directly to [-] supply [ground]
and refer to [1]control 1A for switch hook-up.

The remaining leads must be added to the ST-104 connector to
fill specific applications requirements. Insert Molex pins in the ap-
propriate connector position according to your application.

[14] (+) Supply 10.5Vdc to 30Vdc

[13] (+) Supply 5Vdc to 16Vdc

(Connect [Red]
regulated [clip JU3]) to (+) supply

[Green] can not be used for H.P. filter input. Cut JU1. For applica-
tions where breaking the audio path at the FM receiver detector is
not practical. Hi Pass Filter input audio should be taken at the most
convenient point. NOTE: Will not work in Hi Level audio stages
[Speaker Leads].

[7] Decode/Mute [-]: For applications where the radio mute point must be held at [-]:

Connect [wht/org] until decode or monitor.

[7] Decode/Mute [-]: JU 2 Cut: For applica-
tions where the radio mute point must be
connected to [-] supply [ground] upon
decode or monitor.

[5] Decode/Mute [+]: For applications
where the radio mute point must be held [+]
until decode or monitor.

[5] Decode/Mute [+]: JU2 Cut: For applica-
tions where [+2] must be applied
upon decode or monitor.

[7] Decode/Mute [-] Jumped


Use the small [wht/org] jumper
if none of the above conditions
apply. This will mute the Hi
Pass filter until decode or
monitor.

NOTE: Installation continued on back page.
NOTES: UNLESS OTHERWISE INDICATED
1. ALL RESISTORS ARE 1/8W, ± 5%
2. ALL DIODES ARE IN4148
3. ALL ICS ARE LM324
Installation continued.

[1] Control 1A-Monitor [Bkl/Bra]: If your monitor switch closes to [-] supply [ground] to monitor, then control 1-monitor must be tied to [-] supply [ground.] Use this lead for close to [-] supply [ground] to monitor/encode.

[3] Control 2 (PTT): For applications with close to [-] supply [ground] for PTT [transmit]

[4] Control 2 (PTT): For applications where a keyed [+] is available during transmit.

MOUNTING

Use of a double-sided adhesive pad eliminates hardware requirements. Mount the ST-104 on a clean, dry surface oriented to allow future adjustments should they be necessary. Press firmly after mounting to insure good adhesive contact. Do not touch the adhesive or attempt to reposition the unit after mounting.

The ST-104 has been designed for maximum immunity to RF interference; however, an effort should be made to locate the unit as far as possible from the radio's RF power stages. To further minimize RF problems, twist the power leads together and maintain all leads at a minimum length.

ADJUSTMENTS

The ST-104 is continuously tunable over the standard CTCSS frequency range from 67HZ to 250.3HZ. To set frequency, apply power and connect the white/green [tone output] lead to a frequency counter. Adjust R10 for desired CTCSS frequency. You may find the use of a lasajure figure with a known on frequency reference the quickest frequency set up procedure, or as an alternative if a counter is not available. The output level of the ST-104 is set with R33. Adjust R33 for approximately .75 kHz deviation.

WARRANTY POLICY

All standard Selectone products are guaranteed to meet or exceed published performance specifications and are warranted against defects in materials and workmanship for a period of five years from date of purchase. Special configurations and nonstandard 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 postpaid via airmail or UPS Blue label [air], and will issue full credit, including freight, upon receipt of defective unit(s). For this special warranty replacement service, call the Selectone customer service department TOLL FREE at (800) 227-0376 [In California call (415) 887-1950].

After 90 days, this warranty is specifically limited to correction of the defects by factory repair or replacement of the faulty equipment or parts. Any unauthorized alteration or modification of the equipment or damage caused by external sources will void the warranty.

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.

Equipment for repair may be returned to the factory without prior written authorization; however, it is requested that a note be sent with the packing list briefly describing the nature of the defect.

CALL SELECTONE TOLL FREE! (800) 227-0376

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