SmarTrunk Systems, Inc.

SmarTrunk II®

DIGITAL TRUNKING SYSTEM

ST-853 SmarTrunk II®
DIGITAL TRUNKING CONTROLLER

POWER   TELCO   TRANSMIT   SQUELCH   CONNECT   LINE 2

THE WORLD'S MOST POPULAR VHF/UHF RADIO TRUNKING PROTOCOL

- Proprietary digital signalling prevents unauthorized mobile users

- Supports PTT (Push-to-Talk) dispatch, private calling, radiotelephone, and conventional operation

- Operates in environments with co-channel users

- May be installed in parallel with a conventional repeater system

- Up to 16 trunked channels per system

- Over 4,000 ID's for group or individual calling

- Remote "Radio Kill" to disable illegal or non-paying customers

- Store and forward dialing, just like cellular phones

- Last number re-dial; Automatic 10 number speed-dial

- Affordable alternative to cellular, PCS, and other radio trunking formats (Smartnet®, LTR®, MPT, etc.)

SmarTrunk II® is a registered trademark of SmarTrunk Systems, Inc. Smartnet® is a registered trademark of Motorola, Inc. LTR is a registered trademark of E.F. Johnson.

A WORLD STANDARD TRUNKING SYSTEM

The SmarTrunk II Digital Trunking System is designed to provide sophisticated trunking and telephone interconnect features using low cost two-way radio equipment at frequencies below 800 MHz. First introduced in 1994, the SmarTrunk II trunking protocol is now offered by most of the world's leading radio manufacturers, including Alinco, Icom, Kenwood, Motorola, Standard, and Yaesu/Vertex. There are now over 5,000 SmarTrunk II systems operating in over 90 countries worldwide.

The proprietary SmarTrunk II trunking protocol provides automatic channel acquisition and call privacy for systems of up to 16 channels and 4,000 subscribers. Many types of calls are supported, including mobile to landline, mobile to mobile, landline to mobile, group calling, emergency calls, as well as conventional operation. Best of all is the relatively low cost of both the base and mobile radio equipment, making SmarTrunk II the system of choice for trunking applications below 800 MHz.

THE SMARTRUNK II CONTROLLER

The heart of the SmarTrunk II System is the Digital Trunking Controller which performs all the signaling and trunking functions, including subscriber validation and call record accounting. The controller can be connected to any full duplex base station or repeater (one controller per channel), and may also be installed in parallel with a conventional tone panel.
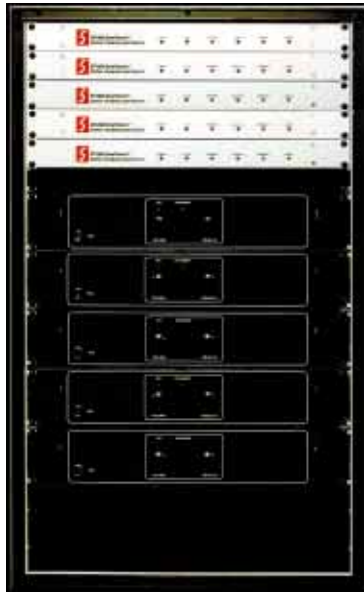
For systems offering telephone interconnect, the ST-853 provides the interface between the base radio and the telephone system or PABX, making SmarTrunk II an ideal solution for in-plant paging systems.

- Capacity for over 4,000 subscribers per system
- Over 300,000 paging codes available
- Over 4,000 call accounting records per channel
- Two subscriber telephone line inputs
- Proprietary signalling protocol highly immune to hackers and pirates
- User friendly PC programming, locally or remotely via modem
- Single access point for programming and system management
- Serial databus linking all controllers at a single site
- Multi-level password scheme for control of system access
- Versatile array of telephone interconnect features
- Priority and emergency call override feature
- Compatible with most radio base stations and repeaters

VERSATILE DESIGN PROVIDES A WIDE
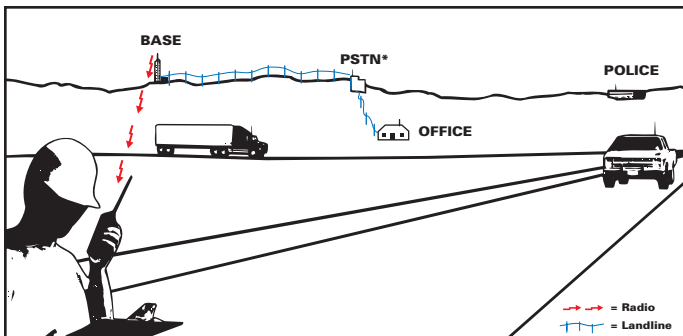
*Public Switch Telephone Network

LANDLINE TO MOBILE
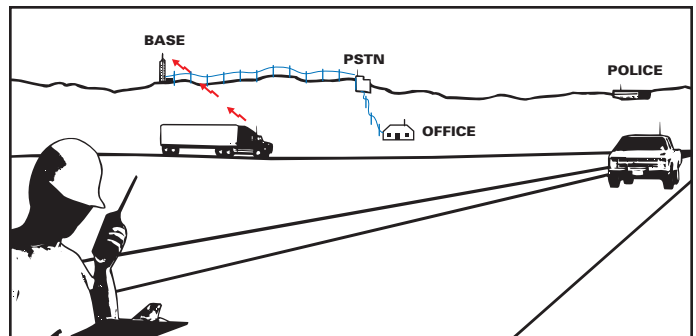
MOBILE TO LANDLINE

Portable Radio   **Modem**   **Telephone**   **FAX**
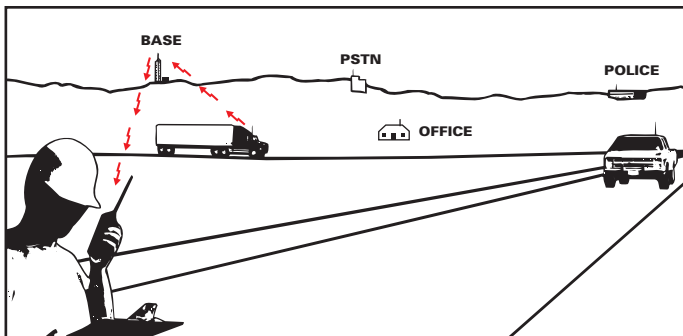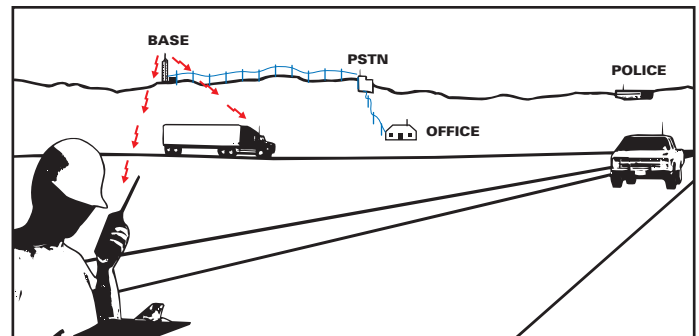
A SmarTrunk II system with mobile, portable, and fixed site users. Offering a wide range of flexibility, SmarTrunk II can support any combination of PTT dispatch, private calling, and radiotelephone applications.

VARIETY OF COMMUNICATIONS OPTIONS

BASE   PSTN   POLICE   OFFICE

MOBILE TO MOBILE

BASE   PSTN   POLICE   OFFICE

GROUP CALLING

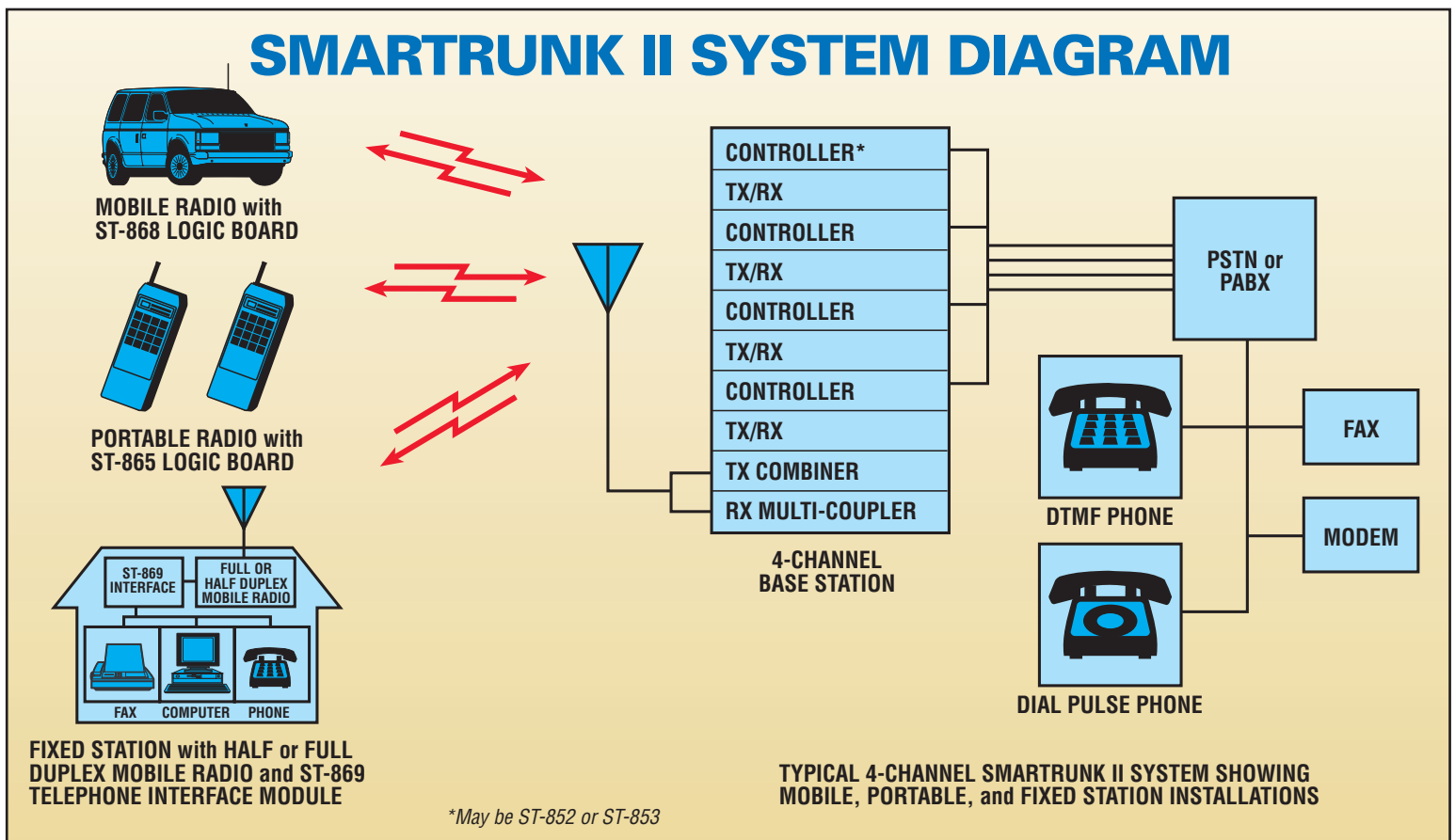# ALSO AVAILABLE: SPECIAL RADIO/TELEPHONE INTERFACE MODULE

The ST-869 SmarTrunk II Radio/Telephone Interface Module provides the complete interface circuitry between a half or full duplex RF transceiver and fixed station telephone equipment (telephone, fax machine or computer modem). When used with a full duplex transceiver, the ST-869 provides "POTS" (Plain Old Telephone System) service to remote locations where it is either impractical or uneconomical to run copper wire to subscriber sites.

Common applications for this type of WLL (Wireless Local Loop) service include pay phones, public calling offices in small towns and villages, remote industrial sites such as mines and oil fields and rural homes, offices or vacation retreats. Features include:

- Connects directly to a standard telephone, fax machine, or computer modem

- Built-in VOX (Voice Operated Transmit) circuit for use with half-duplex radios

- 48V talk battery and 4.0 REN output rings up to four extensions

- Includes SmarTrunk II logic

- Works with the same SmarTrunk II base station as mobile and portable units
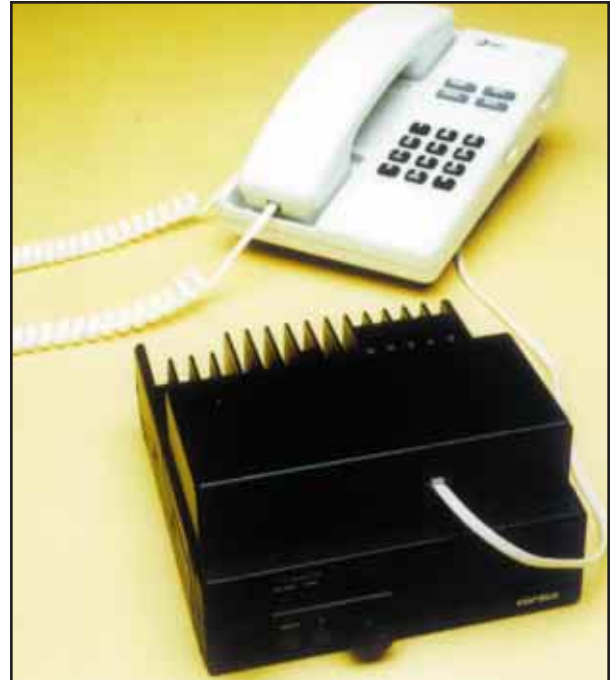
The ST-869 can connect directly to any telephone, fax machine, or computer modem. Compact size allows easy installation on many mobile transceivers.

SMARTRUNK II SYSTEM DIAGRAM

MOBILE RADIO with ST-868 LOGIC BOARD

PORTABLE RADIO with ST-865 LOGIC BOARD

ST-869 INTERFACE — FULL OR HALF DUPLEX MOBILE RADIO

FAX   COMPUTER   PHONE

CONTROLLER*
TX/RX
CONTROLLER
TX/RX
CONTROLLER
TX/RX
CONTROLLER
TX/RX
TX COMBINER
RX MULTI-COUPLER

4-CHANNEL BASE STATION

PSTN or PABX

DTMF PHONE

DIAL PULSE PHONE

FAX

MODEM

FIXED STATION with HALF or FULL DUPLEX MOBILE RADIO and ST-869 TELEPHONE INTERFACE MODULE

May be ST-852 or ST-853

TYPICAL 4-CHANNEL SMARTRUNK II SYSTEM SHOWING MOBILE, PORTABLE, and FIXED STATION INSTALLATIONS

SMARTRUNK II LOGIC BOARDS

A key component of the SmarTrunk II system is a miniature logic board which installs inside the mobile or portable radio equipment. Specified as the ST-865XX or the ST-868-XX, these logic boards are custom-designed for each radio and control all the signaling and trunking functions, including scan, PTT, and monitor.

SmarTrunk II logic boards are available from SmarTrunk distributors or directly from the radio manufacturer or dealer. In most cases, the logic boards are designed to plug into the host radio equipment for a simple field installation. In some cases, solder connections are required. Detailed installation and programming instructions are provided for each logic board.
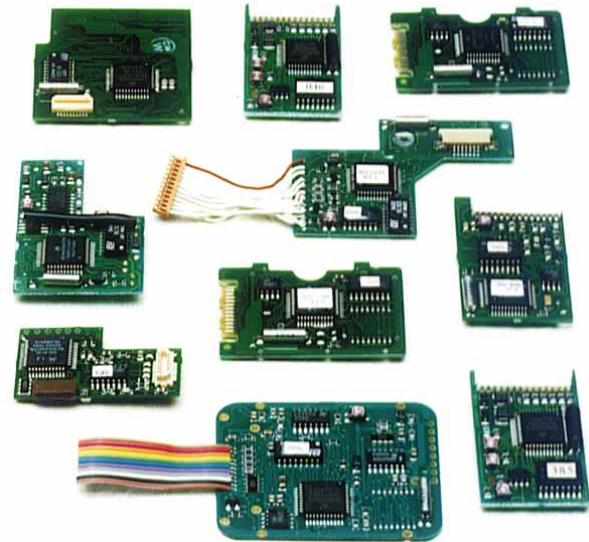
NEW "OMNI" FEATURE SET FOR SMARTRUNK II LOGIC BOARDS

Logic boards for newer radio models offer the latest SmarTrunk II Omni Feature Set with new capabilities found only in more expensive trunking systems:

- **Multiple channel banks**—for roaming and wide area applications. Allows user to easily select different banks of radio frequencies or different talk groups with the turn of a switch or press of a button.

- **Multiple PTT groups**—up to 16 different talk groups selected with channel select switch or function button. Ideal for users who frequently change work assignments.

- **Multiple receive groups**—allows user to receive several different pre-programmed talk groups. Useful for supervisory monitoring and control.

- **SmartScan**—remembers open channels on each scan cycle. Provides faster channel access, especially on larger systems.

- **Positive Radio Kill**—allows a system operator to remotely disable a lost or stolen radio.

- **PC Programming**—integrated with radio software for easy programming of logic board parameters.

Note: Actual features may vary from model to model.
Contact factory for details.

LOGIC BOARDS ARE AVAILABLE FOR MANY POPULAR RADIO MODELS

Portable Radios

Alinco DJ-191/680
Alinco DJ-195/196**
Icom IC-F3/F4 Series**
Icom IC-F30/F40 Series**
Kenwood TK-270/278
Kenwood TK-370/378
Kenwood TK-270/278G**
Kenwood TK-370/378G**
Motorola GP68
Motorola GP88
Motorola GP300
Motorola GP350

Motorola P1225**
Motorola Pro Series**#
Motorola ELP Series**
Standard HX270
Standard HX290**
Yaesu/Vertex VX10**
Yaesu/Vertex VX210**
Yaesu/Vertex VX400**
Yaesu/Vertex VX500
Yaesu/Vertex VX800**

Mobile Radios

Alinco DR-108/130/140/430
Alinco DR-135**
Alinco DR-605*
Icom IC-F310/410**
Icom IC-F320/420**
Icom IC-F1010/F2010**
Icom IC-F1020/F2020**
Kenwood TK-760/768
Kenwood TK-860/868
Kenwood TK-760/768G**
Kenwood TK-860/868G**

Motorola GM300
Motorola GM350
Motorola M216
Motorola Pro Series**
Motorola SM50
Motorola SM120
Motorola M1225**
Ranger SM-1630-US*
Ranger SM-1645-HS*
Standard GX1608
Tait T-2000 series
Telemobile TM-MTD25*
Yaesu/Vertex FTL-2011/7011

* Full duplex models   ** Omni Feature Set   # Not available for European 5-tone models

SMARTRUNK II SYSTEM SPECIFICATIONS

Subscriber Database

Number of subscribers..............Up to 4,096

Call records database ....4,500 per channel, storage programmable by call type, saved as ASCII text file

Call record ....Contains subscriber number, time/date, number dialed, call duration, call type, channel used

Time-date stamp........................Recorded by internal real time clock

File transfer...............................Site data is uploaded or downloaded from one controller

Programmable Subscriber Features

Subscriber Number...................1 to 5 digits

Subscriber Paging Code ....6 digits (320,000 combinations)

Type ....Half duplex, full duplex, or group

Call limit timer ....30 seconds to 60 minutes

Mobile activity timer.................1 to 255 seconds

Mobile to mobile calls...............Enabled or disabled

Courtesy beep...........................Enabled or disabled

Telephone line access...............Enabled or disabled on a per line basis

Toll restriction...........................Up to 8 restricted prefixes and 8 override prefixes

Signalling Specifications

Paging codes.............................Digital BPSK (SmarTrunk II)

Busy channel indicator ....CTCSS tone or carrier

Repeater Interface

PTT..2 form C relay contact

Transmit audio...........................0–3.0V P to P adjustable

CTCSS output............................0–3.0V P to P adjustable

Receiver audio...........................200mV RMS to 2.0V RMS

Squelch ....By internal squelch circuit or by external control

Telephone PSTN Interface

Interface type............................Loop start (local loop) or 4 wire E&M (optional)

Number of lines........................2 telephone line inputs

Connection.................................Via RJ-11C modular

Protection...................................MOV

Ringer equivalence ....0.4 REN

Regeneration.............................By DTMF or dial pulse

Telco decoding..........................By DTMF or rotary dial click detector

Overdial completion ....By overdial length parameter or DTMF (*) detection

Call progress tones....................Ringback, busy, go-ahead beep

Disconnect ....Upon busy, dialtone, or DTMF (#) detection; by timer

Regulatory approvals.................U.S. FCC Part 68 and 15 Class A; Canada DOC; Russia MOC; Australia/New Zealand AUSTEL

Controller Programming

Software ....User friendly, PC-based DOS application

Local programming ....By RS-232 serial port at 9600 Baud

Remote programming ....Via external 9600 baud modem

Mobile answer timer ....1–255 seconds

Custom sign-on message ....Up to 20 characters

Programming security ....Two-level password scheme, up to 8 characters each

Morse Code Station ID..............Up to 20 characters

Line 2 priority override ....Enabled or disabled

Emergency telephone # ....Up to 16 digits

Telephone line options............Incoming and outgoing calls enabled or disabled on a per line basis, programmable auto routing

Other Specifications

Call types ....1. Mobile to landline
2. Landline to Mobile
3. Mobile to mobile
4. Group dispatch call
5. Operator call
6. Emergency call
7. Priority override

Data retention............................Nonvolatile RAM with battery back-up

Controller communication ....Serial databus

Front panel indicators ....Power, Carrier, Transmit, Connect, Telco, Line 2

Rear panel connectors...............DB-9 serial port, DB-25 repeater connector, two 4 wire modular databus connectors, two RJ-11C telephone line connectors

Operating voltage......................13.6VDC ±20%

Operating current......................100mA average, 250mA max

Operating temperature..............−25°C to +65°C

Housing size ....19.0" x 6.25" x 1.75" rack mount

ST-869 Radio/Telephone Interface Module

Telephone handset interface ....Standard RJ-11C jack which supplies talk battery to a standard telephone set; supports manual or fully automatic operation

PTT switching...........................Built in VOX (Voice Operated Switching) for half duplex operation, continuous for full duplex operation

Signalling ....SmarTrunk II Digital Signalling

Talk battery................................48VDC

Ringer equivalence....................4.0 REN

Ringing voltage.........................90VAC at 20Hz

Specifications and descriptions subject to change without notice.

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