TELECONTROL SYSTEM

MODEL TCS-1

Bulletin 258

INDEPENDENT COMMAND AND STATUS

COMMAND TERMINAL. Command input switches are to the right on the front panel and status LED displays to the left.

REMOTE TERMINAL. LED displays provided to indicate activated command channels as well as status channel condition.

Fully independent command and status reporting capability is provided by the Model TCS-1 Telecontrol System. Applications for the TCS-1 include command and status (tally-back) from broadcast transmitters, electronic news-gathering or similar antenna systems, microwave transmitters and receivers, remotely-located television cameras, or industrial applications. Consisting of a Command Terminal and Remote Terminal, the TCS-1 provides eight command and eight status functions. The TCS-1 is designed such that two systems may be combined on a single interconnecting path to provide a total of 16 command and 16 status functions. Operation is normally from AC power sources, but the TCS-1 may be optionally ordered for all common DC power sources. A block diagram of the TCS-1 appears on the rear of this product bulletin.

COMMAND

Eight fully independent command functions are provided by each TCS-1 system. No channel select, or similar operation is required. Simple depression of the "Command" switch on the Command Terminal will activate the appropriate relay in the Remote Terminal. Each "Command" switch will function as either a momentary switch or a latching switch. As the relay output follows the switch function, command outputs thus can be momentary or latching. In addition to the front panel switches, a connector mounted on the rear apron of the Command Terminal enables external initiation of all channels. Command outputs from the Remote Terminal are dry contact closures. Each output is independently programmed to function in either a normally-open (NO) or normally-closed (NC) configuration. For those applications requiring interlocked channels, the Command Terminal can be optionally ordered with the interlocking of any combination of the front-panel switches.

STATUS

Eight independent status (go/no-go) indicating functions are provided to convey information from the remote location to the control point. These functions are displayed on front-panel mounted, light-emitting diode (LED) displays on both the Command Terminal and the Remote Terminal. Each channel may be pre-programmed to select either normally-open or normally-closed dry contacts to activate or illuminate a given channel. Additionally, TTL-level logic may also be used as an input. On the Command Terminal, an external output is provided allowing remote display or alarming of each status channel. Each of these outputs is a transistor sink to ground capable of switching an external load of up to 24V 100 ma.

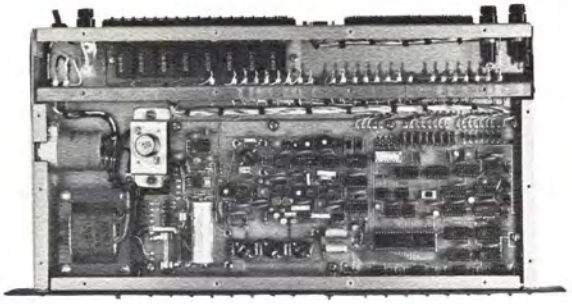
INTERCONNECTION REQUIREMENTS

The TCS-1 is designed to operate over a two-wire 3 kHz voice-grade-type data circuit or equivalent radio circuits. Command and status data are transmitted in the form of serial digital information through the use of pulse-code modulation (PCM) techniques. This PCM data is conveyed through the use of frequency-shift keyed (FSK) audio tones. Parity, framing, and other security techniques, are used to insure reliable data transmission. To facilitate this form of data transmission, modems are contained within the TCS-1. Audio frequencies have been carefully selected for the FSK signals utilized for command information and for status return to permit two TCS-1 systems to operate on a single 3 kHz circuit. In addition to the two-wire connection provided for telephone circuit operation, unbalanced inputs and outputs are provided for command and status signals to permit interconnection via radio circuits.

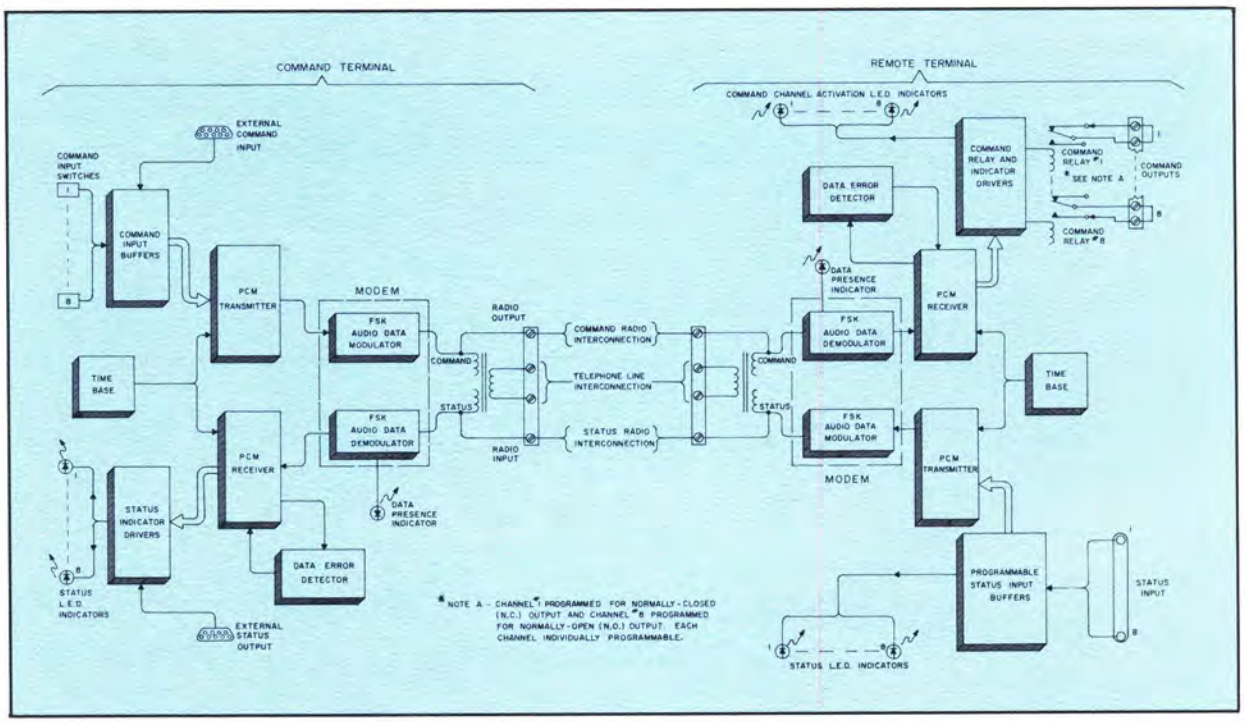
ORDERING INFORMATION

The standard TCS-1 consists of one Remote Terminal and one Command Terminal. For 16 command and 16 status functions, two systems can be provided on a single interconnecting circuit. Stipulate at time of order that these two systems are to function on a single interconnecting circuit. Operation from DC sources is available on special order. Interlock capability of command functions can also be supplied on special order. Contact Moseley Associates' Marketing Department for further information on these options.

TCS-1 TELECONTROL SYSTEM



Interior View—REMOTE TERMINAL. Command outputs appear at the left and status inputs at the center on the rear apron. Individual command relays, including their programming pins for selecting NC or NO outputs, are mounted on a printed circuit module just inside the rear of the chassis. A full RF shield with bulkhead-mount feedthrough filters isolates all active circuitry. Color-coded test points and switchable internal testing features are included in the TCS-1.



SPECIFICATIONS

Status Capability	Eight channels
Status Input	External (user-supplied) dry contacts or TTL-level logic-level signal for each channel. Each channel programmable to accept normally-open (Logic 0) or normally-closed (Logic 1) contacts for activation of that channel.
Status Input Connector	Multi-pin connector on rear apron of Remote Terminal. Mating plug supplied.
Status Display	Light-emitting diode (LED), one per channel. Displays are provided on both Remote and Command Terminals.
External Status Output	Each status channel provided with transistor-type sink to ground capable of switching external 24 VDC 100 ma source. Outputs accessible at multipin connector on rear apron of Command Terminal. Mating plug optional.
Status Response Time	Less than 200 milliseconds
Command Capability	Eight Channels
Command Input	Individual channel front-panel switches on Command Terminal. Switches function in momentary or latching configuration. Mechanical interlocking available on special order. External input for each channel also accessible at multi-pin connector on rear apron of Command Terminal. Mating plug optional.
Command Output	Individual isolated, floating, dry relay contacts programmable as normally-open (NO) or normally-closed (NC) with channel activation. Contacts rated for 1A at 120 VAC/VDC, noninductive load.
Command Output Connector	Screw barrier strip on rear apron of Remote Terminal.
Command Response Time	Less than 200 milliseconds
Data Transmission	Modems provided within Command and Remote Terminals. Frequency-shift keyed (FSK) audio signals used for transmission of command and status information in pulse-code modulation (PCM) format. Command and status transmission speed 155 baud.
Interconnection Requirements	
Telephone	Two-wire, unconditioned, half-duplex 600 ohm, balanced, data circuit (Reference Bell Series 3002). Maximum allowable attenuation 30 dB, send level 0 dBm.
Radio	Full-duplex radio circuit. Unbalanced input and output provided on both terminals for FSK signals. Radio output 0 dB, 2200 ohms, unbalanced, adjustable. Radio input -10 dB, 2200 ohms, unbalanced.
Operating Temperature Range	-20°C to +50°C
Power Requirements	120/240 VAC, ±10%, 50/60 Hz, nominal 15 watts per terminal. Operation from DC power sources available on special order.
Physical Size	
Command Terminal	4.5 cm x 48.4 cm x 28 cm (1¾ H x 19" W x 11" D)
Remote Terminal	4.5 cm x 48.4 cm x 28 cm (1¾ H x 19" W x 11" D)
System Shipping Weight	11.4 kg. (25 lbs.), approximate

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TELECONTROL SYSTEM

MODEL TCS-2A

Bulletin 263A

INDEPENDENT COMMAND, STATUS AND TELEMETRY

COMMAND TERMINAL. Command input switches are to the right, telemetry channel selector/display center, status LED displays and modem adjustments to the left.

REMOTE TERMINAL. Command and status activity LED indicators and modem adjustments are to the left, telemetry channel selector/display center and telemetry calibration to the right.

Fully independent command, status reporting and telemetry capability is provided by the Model TCS-2A Telecontrol System. Applications for the TCS-2A include command, status (tally-back) and telemetry of broadcast transmitters, electronic news-gathering systems, earth stations or industrial applications. Telemetry and fail-safe capabilities enable full compliance with FCC Rules and Regulations for AM and FM broadcast transmitter remote control. Consisting of a Command Terminal and Remote Terminal, the TCS-2A provides eight command, eight status and eight telemetry functions. A Remote Terminal digital telemetry display affords one-man calibration. As detailed, via the system block diagram on the back of this brochure, the Model TCS-2A is microprocessor-based. The Motorola 6802 Microprocessor, together with customized Moseley Associates' software, enables ideal capabilities for remote command, status and telemetry operation. Facilities are also included to allow multi-site capabilities as well.

COMMAND

Eight fully independent command functions are provided by the TCS-2A System. No channel select or similar operation is required. Simple depression of the "Command" switch on the Command Terminal will activate the appropriate relay in the Remote Terminal. Each command switch will function as either a momentary or latching switch. As the relay output follows the switch function, command outputs thus can be momentary or latching. In addition to the front-panel switches, a connector mounted on the rear apron of the Command Terminal enables external initiation of all channels. Command outputs from the Remote Terminal are dry contact closures. Each output is provided as a full form "C" contact. Yellow LED indicators are provided at the Remote Terminal to display command channel activation. For those applications requiring exclusively interlocking channels, the TCS-2A can be optionally ordered with the interlocking of any combination of adjacent front-panel switches. Loss of interconnect relaxes a form "C" fail-safe relay contact. A command enable strap can be coordinated with this fail-safe relay to relax all command relay outputs. Otherwise, command functions will remain in memory upon disconnect. Selecting a telemetry channel other than "0" at the remote site disables any remote commands arriving from the Command Terminal. A status lamp labeled "Maintenance Override" indicates such at the Command Terminal.

STATUS

Eight fully independent status (go/no-go) indicator functions are provided to convey information from a remote location to the control point. These functions are displayed on the front-panel mounted light-emitting diode (LED) displays on both terminals. Each channel may be pre-programmed to select either a normally-open or normally-closed dry contact to activate or illuminate a given channel. Additionally, TTL-level logic may also be used as an input. On the Command Terminal, an external output is provided allowing remote display or alarming of each status channel. Each of these outputs is a transistor sink to ground capable of switching an external load of up to 24 VDC, 100 ma. These transistor sinks may also be used to drive common alarms (perhaps aural) from several channels.

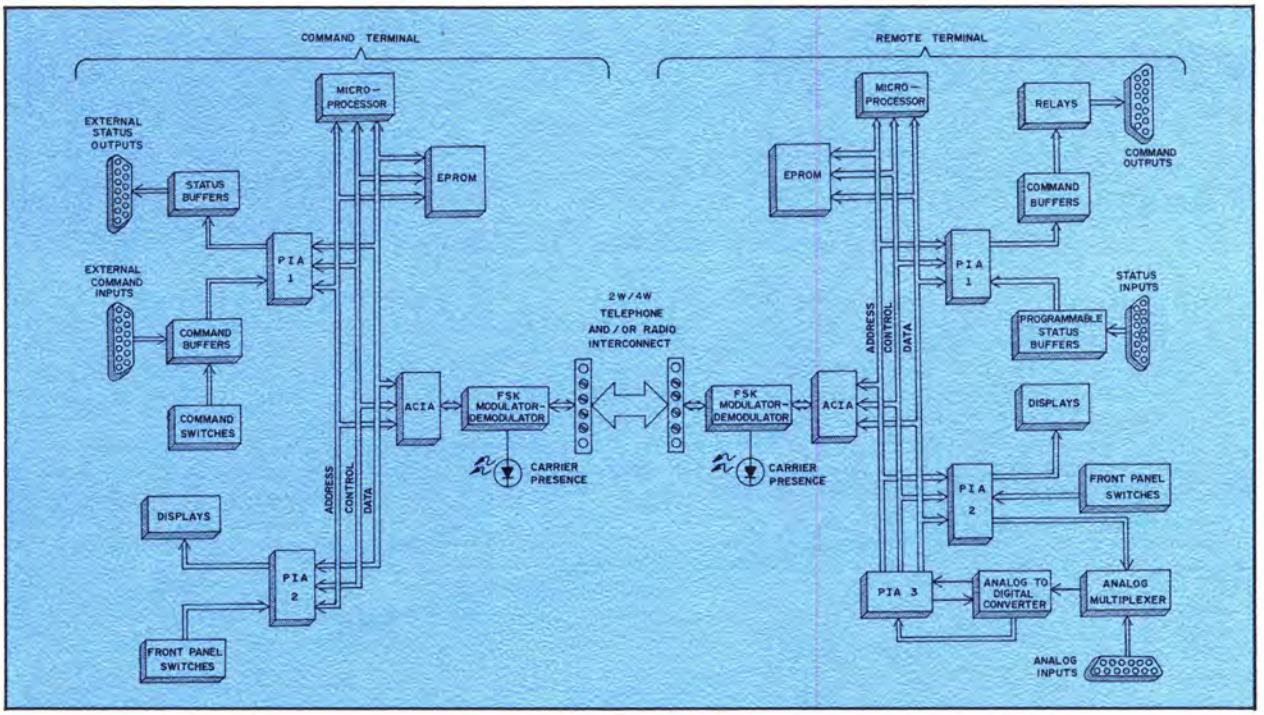
TELEMETRY

Eight fully independent telemetry channels are provided to convey digitally converted analog inputs from a Remote Terminal to the Command Terminal. The bipolar, 3-3/4 digital display (3999 max.) is selected by a push-button switch at each terminal. When the Remote Terminal selects a telemetry channel (1 through 8), the remote display is enabled and a "Maintenance Override" LED indicator is activated at the Command Terminal. Returning to channel "0" enables Command Terminal command entry. The DC analog inputs are ±1 to 10 VDC, high impedance.

INTERCONNECTION REQUIREMENTS

The TCS-2A is designed to operate over a two-wire or four-wire, 3 kHz voice-grade type data circuit or equivalent radio circuits. Command, status and telemetry data is transmitted in the form of serial digital information appearing as FSK audio tones. Interconnect is via two-way, non-simultaneous transmission, 1200 baud.

TCS-2A TELECONTROL SYSTEM



SPECIFICATIONS

Command Capability	Eight channels
Command Input	Individual channel front-panel switches on Command Terminal. Switches function in momentary or latching configuration. Mechanical interlocking available on special order.
Command Input Connector	Each channel accessible at multipin connector on rear apron of Command Terminal. Mating plug optional.
Command Output	Individual isolated, floating, dry relay contacts. Form "C" (SPDT), 50 watts non-inductive maximum load.
Command Display	Light-emitting diode (LED), yellow, one per channel at Remote Terminal. "Shadow" switches indicate activity at Command Terminal.
Command Output Connector	Multipin connector, mating plug supplied.
Control Enable	Strapped screw barrier terminals at Remote Terminal. Lifting strap relaxes all relays.
Maintenance Override	In effect when Remote Terminal telemetry selector is in channel other than "0." Indicated by active value display at Remote Terminal and "Maintenance Override" LED at Command Terminal.
Command Response Time	125 milliseconds, nominal
Status Capability	Eight channels
Status Input	External (user-supplied) dry contacts or TTL-level logic-level signal for each channel. Each channel programmable to accept normally-open (Logic 0) or normally-closed (Logic 1) contacts for activation of that channel.
Status Display	Light-emitting diode (LED), red, one per channel. Displays are provided on both Remote and Command Terminals.
Status Input Connector	Multipin connector on rear apron of Remote Terminal. Mating plug supplied.
External Status Output	Each channel provided with transistor sink to ground capable of switching external 24 VDC, 100 ma source.
External Status Output Connector	Multipin connector on rear apron of Command Terminal. Mating plug optional.
Status Response Time	125 milliseconds, nominal
Telemetry Capability	Eight channels
Telemetry Input	4 VDC (nominal) for full-scale (4096) display, bipolar against chassis common. Individual channel calibration potentiometers enable inputs of 1 to 10 VDC. Input impedance, 1MΩ.
Telemetry Display	Digital LED display, both panels 3-3/4 digit, bipolar (-4096 to 4096).
Telemetry Accuracy	0.5% of full scale
Telemetry Input Connector	Multipin connector on rear apron of Remote Terminal. Mating connector supplied.
Telemetry Response Time	250 milliseconds, nominal
Data Transmission	Seven-bit ASCII with parity plus LRC. 1200 baud each direction, two-way non-simultaneous.
Interconnect Requirements Wire	Two-wire or four-wire, 600 ohm, balanced. Series 3002 (unconditioned) data channel per Bell System Technical Reference PUB-41004. Two-way non-simultaneous. Nominal send level 0 dBm, receive level -30 dBm minimum.
Radio	Full-duplex radio circuit. Unbalanced input and output provided on both terminals for FSK signals. Radio output 1V p-p, 2200Ω, unbalanced, adjustable. Radio input .025V p-p, 2200Ω, unbalanced, minimum. Model SCM-1 Subcarrier Main Frame provides companion FM subcarrier system for aural studio-transmitter link, or other radio link systems. When ordering the SCM-1, please specify exact radio link system model number and subcarrier operating frequency.
Operating Temperature Range	0°C to +50°C
Power Requirements	120/240 VAC, ±10%, 50/60 Hz.
Physical Size Command Terminal	4.5 cm H x 48.4 cm W x 35.5 cm D (1.75" H x 19" W x 14" D)
Remote Terminal	4.5 cm H x 48.4 cm W x 35.5 cm D (1.75" H x 19" W x 14" D)
System Shipping Weight	16 kg. (35 lbs.), approximate

Contact any Moseley Associates Sales Representative for further details.

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