DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

OPERATION OF MANEUVER CONTROL SYSTEM (MCS) WITH SINCGARS GROUND RADIO SETS

Headquarters, Department of the Army, Washington, DC
1 APRIL 1993

REPORTING OF ERRORS AND RECOMMENDING IMPROVEMENTS

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1. **Purpose.** This technical bulletin provides the information and procedures for operating the Maneuver Control System (MCS) with the SINCGARS family of ground radios. It is necessary that the operator be properly trained in the operation of the MCS and SINCGARS. This technical bulletin is a supplement for the purpose of interoperability.

2. **Application - Radio Sets**. The radio sets covered by this technical bulletin are ANNVRC-87, ANNVRC-87A, ANRC-88, ANRC-88A, ANN/VRC-89, ANNRC-89A, ANNRC-90, ANNRC-90A, ANNRC-91, ANNRC-91A, ANNRC-92 and ANNRC-92A.

3. **References**. Refer to the following technical publications for normal operation and maintenance of the equipment:

PUBLICATION NUMBER	DATE	TTLE
TM 11-5895-1348-12-1	15 April 1989	Operator's Manual, Tactical Computer Processor AN/UYQ-43(V) 1
TM 11-5820-890-10-1	1 September 1992	SINCGARS ICOM Ground Combat Net Radio
TM 11-5820-890-10-3 Radio	1 September 1992	SINCGARS NON-ICOM Ground Combat Net

4. Equipment Setup Operation. Assemble and install the radio set and MCS individually per applicable technical manuals. Perform Preventive Maintenance Checks and Services (PMCS) and/or Built-In-Test (BIT) functions. Load all frequencies, hopsets, and variables into the radio set and establish voice communications before connecting the MCS to the radio set. Once voice communication has been established, connect the MCS as described in the following paragraph.

5. **Cable Instructions**. The following figure illustrates the typical configuration for the connection between the radio set and the MCS.

   - Connect MCS Interface cable from PCIU KY-57 connector to RT AUD/DATA connector. DO NOT connect interface cable to mounting adapter.
   - Connect W4 cable from RT AUD/FILL to J5 on mounting adapter.
   - Connect handset H-250/U to mounting adapter J3 (AUD/DATA) connector.
   - Make sure that MCS and the RT (in vehicular mount) are grounded (on parallel) to each other.
   - Figure shows the MCS connected to lower radio (RT-A).
   - MCS may be connected to upper radio (RT-B) if desired.

CAUTION

DO NOT CONNECT INTERFACE CABLE TO PCIU KY48 CONNECTOR AS EQUIPMENT DAMAGE MAY RESULT.

NOTE

THE RT MAY BE MOUNTED IN A VEHICULAR MOUNT OR IN A MANPACK. THE INTERFACE CABLE IS CONNECTED TO RT AUD/DATA CONNECTOR FOR BOTH CONFIGURATIONS.

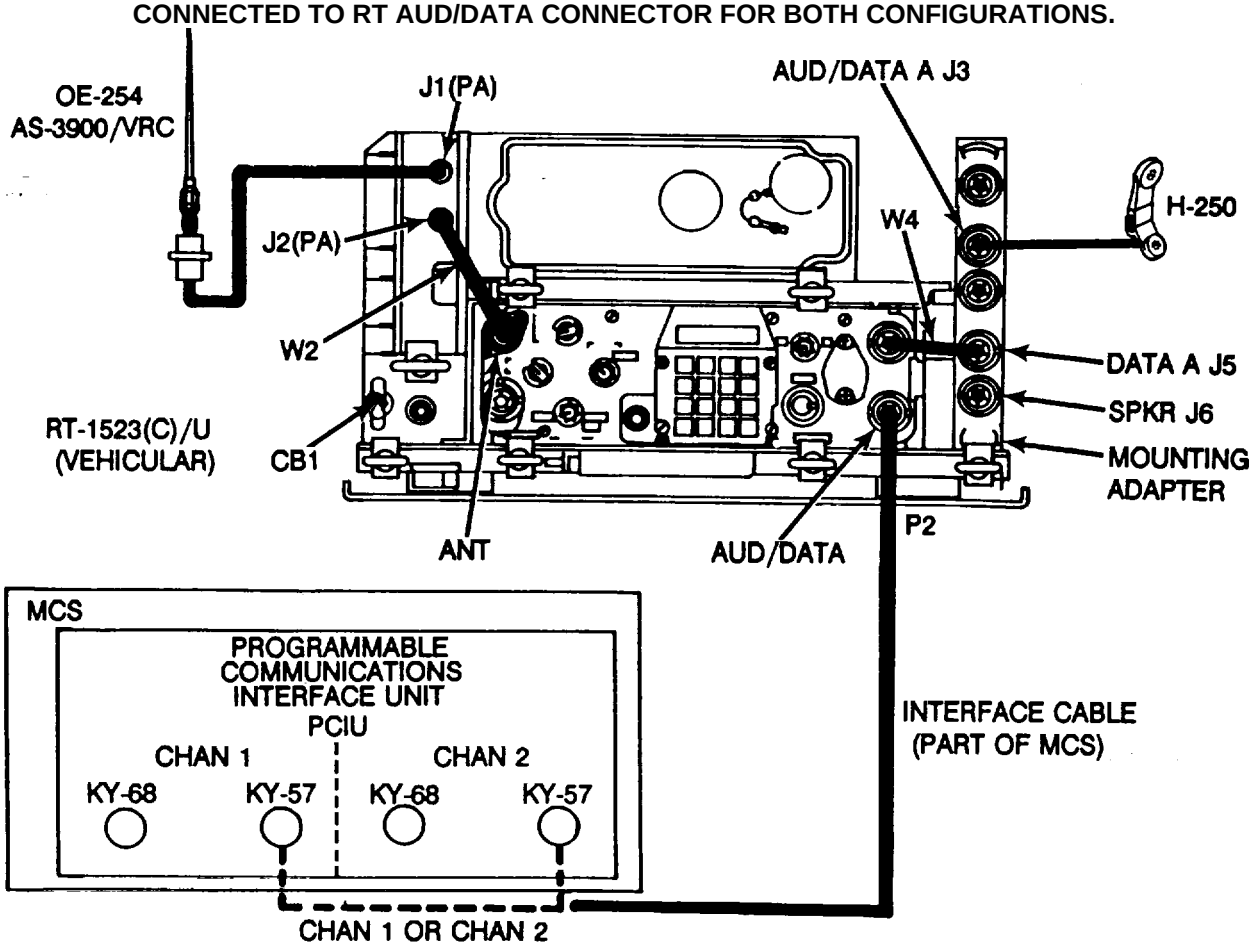

Figure 1. Cabling for MCS to SINCGARS Radio Set

6. **Switch Settings and Initialization**. The following tables provide the necessary switch settings and communication parameters for interoperability. Initialize the MCS for communication as shown In Table 6-2 Verify the switch settings for both the radio and the MCS; then establish communication on the net.

- For a SINCGARS/VRC-12 net, select channel code 13.
- In a hostile or noisy environment, and long communications distances, a data rate slower than 16 kbps is required. Choose 4800, 2400, or 1200 bps as conditions permit. This Is accomplished by modifying channel code 13 (KY-57 SINCGARS NRZ 16k) as shown in Table 6-2 and saving Initialization as a new channel code 19 called 'SINCGARS LOW SPEED DATA .
- Place radio to standby when doing a system initialization or channel reconfiguration. Turn function switch to SQ ON after Initialization is complete.
- You must clear the COMSEC alarm with a double PTT before proceeding.

SWITCH	**ICOM RADIO**		**NON-ICOM RADIO**	
	CH 13	CH 19	CH 13	CH 19
FUNCTION	SQ ON	SQ ON	SQ ON	SQ ON
MODE	SC OR FH	SC OR FH	SC OR FH	SC OR FH
DATA	16K	1.2K	16K	1.2K
COMSEC	CT	CT	TSEC/ON	TSEC/ON
			KY-57CT	KY-57CT
*	OFF	OFF	N/A	N/A

Table 6-1. SINCGARS Radio Set

	(Channel Code 13) KY-57 SINCGARS NRZ 16K	(Channel Code 19) SINCGARS LOW SPEED
DEVICE	KY-57 (SINCGARS)	KY-57 (SINCGARS)
MODULATION	NRZ	NRZ
DATA RATE	16000 BPS	EXT
OUTPUT LEVEL	0 dB	0 dB
KEY LENGTH	0.1 seconds	0.1 seconds
PARITY	-	-
STOP BITS	-	-
LINE TYPE	-	-
DATA SENSE	NORMAL	NORMAL
COMM MODE SELECTOR CONTROL	CMSC EMULATED	NONE
WAIT CLEAR CHANNEL	YES	YES
DELAY AFTER CLEAR	1.0 seconds	1.0 seconds
PROTOCOL	MCS	MCS
CIPHER MODE	-	-
ERROR CONTROL	EDC and TDC	EDC and TDC
NUMBER OF RETRIES	2	2
RETRY INTERVAL	15 seconds	15 seconds
TRANSMISSION FORM	ABRIDGED	ABRIDGED

Table 6-2. Channel Codes

7. **System Troubleshooting Procedures**. These steps will assist you In Isolating faulty system components when you have a problem communicating in a net using data transmission. These procedures assume that the net and secure FH voice communication has been established. If you are unable to communicate using data transmission, do the following troubleshooting steps in the order provided.

   - **CHECK LOCAL RADIO**. Use the data on the FH voice net to determine that the radio net Is operating.

   - **CHECK WITH OTHER NET MEMBERS**. Do you have data communication with some stations but not others? The other station may be out of range, temporarily off the air, or has not checked into the net. If data communication can be established with another station, your system is probably O.K and the problem may be at the distant net station.

   - **CHECK SYSTEM CONFIGURATION**. Verify proper cabling, Initialization and subscriber parameters, radio set and MCS switch settings, etc.

   - **NOTIFY MAINTENANCE**. If the problem cannot be isolated, notify unit maintenance personnel and Inform your NCS of your communication problem.

8. **Remote Control Operations**. The Remote Control Unit (RCU) C-11561 may be used In place of the RT In a SINCGARS radio system to allow the radio set and antenna to be placed at distances up to 4 km from the local system. Interoperability between the MCS and the RCU is the same when the MCS Is connected to an RT. Table 8-1 provides the switch settings for the radio set and the RCU for remote control operation.

SWITCH	**RCU**	**RADIO SET**
FUNCTION	SQ ON	REM
MODE	SC or FH	N/A
DATA	TF	N/A
COMSEC	CT	PT
*	OFF	N/A

Table 8-1. RCU Settings for Remote Operation

By Order of the Secretary of the Army:

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***US GOVERNMENT PRINTING OFFICE: 1995 - 388-421/40196**

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