1A1 KEY TELEPHONE SYSTEM

CENTRAL OFFICE OR PBX LINE CIRCUITS AND COMMON EQUIPMENT

202C/D, 230A/B, 238A, 239A, 232A/B, 209A, 212A

KEY TELEPHONE UNITS

CONNECTIONS

1.00 INTRODUCTION

1.01 This section is reissued to:

- Add connections for the 232B, 238A, and 239A key telephone units.
- Provide an arrangement for the line circuit drawings (202C/D, 230A/B, 238A, and 239A) to match common equipment circuit drawings (238A, 232A/B, 209A, and 212A).

(a) For maintenance, Fig. 3 or 4 matches with Fig. 5, 6, or 7.

(b) For connections, Fig. 8 matches with Fig. 9, 10, or 11.

1.02 Similarity of the line circuits lends itself to consolidation of information as follows:

- Circuit Description
- Circuit Drawings
- Connection Charts

1.03 Tables A, B, C, D, and E identify the terminals and grouping arrangements of the line circuit with which they are associated.

1.04 Index of Figures, Circuit Drawings, Connection Charts

- Figures

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  Fig. 2 - Typical 1A1 System Combinations

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  Fig. 3 - Line Circuit 202C or 230A KTU
  Fig. 4 - Line Circuit 202D, 230B, 238A, or 239A KTU
  Fig. 5 - Common Equipment 238A KTU
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  Fig. 10 - Common Equipment 232A/B KTU
  Fig. 11 - Common Equipment 209A or 212A KTU

1.05 Due to extensive changes marginal arrows have been omitted.

2.00 GENERAL

2.01 The line circuits are so designed that they may be used in place of or in addition to existing components of the 1A1 key telephone system. The power failure feature is internally wired for each line.

2.02 The ringing circuit for each line is arranged for either metallic or grounded ringing. Use grounded ringing options when adding 202C/D and 230A/B key telephone units to existing systems of 202A and/or B and/or 212A key telephone units.

All line circuits in a given system should connect to the same type of common equipment. This avoids confusion of visual and audible signals having different timing intervals within the same system.

2.03 The R (ringup) relay of each line circuit can be modified to provide a nonlocking arrangement. For this modification move the upper wire-spring contact from its guide in contact position 4 to the lower guide of contact position 5. Move the lower wire-spring contact from its guide in contact position 4 to the upper guide of contact position 3. Contact positions 3 and 5 are unequipped and the stationary contacts are unwired. (See Fig. 1.)

2.04 The 238A KTU consists of nine central office or PBX line circuits and common equipment on a 23-inch mounting. The common equipment consists of a time-out circuit and an electromechanical interrupter which provides flashing, winking, ringing, and busy-tone signal interruptions. For time-out purposes, the nine line circuits are internally wired in groups of four, four, and one, with the first group of four internally wired to the common equipment. The remaining two groups (four and one) are connected to the common equipment by means of removable metal straps. This arrangement permits these groups to be connected to different common equipment or to an auxiliary time-out circuit. The auxiliary time-out circuit requires the use of a 30A KTU or equivalent and is shown in Fig. 3, 4, or 8.

2.05 The 239A KTU consists of eleven central office or PBX line circuits on a 23-inch mounting. For time-out purposes, the eleven line circuits are internally wired in groups of four, four, and three. These groups are externally interwired at the factory by means of removable metal straps. This arrangement permits these groups to be connected to:

- Same common equipment
- Different common equipment
- Auxiliary time-out circuits

2.06 The 238A and 239A key telephone units are designed for large capacity centralized installations of 1A1 system equipment. The grouping capability of the line circuits for time-out purposes permits wide latitude in installation flexibility. Fig. 2 shows some of the typical application combinations offered by the two units.

2.07 Battery supply, lamp supply, LF and LW leads for both the 238A and 239A key telephone units are arranged in pairs for fusing of two lines each plus a single line. This permits connections to individual battery and lamp signaling supplies for each group, as required. On the 238A KTU separate groupings of the LF and LW leads are externally wired at the factory to the common equipment by means of removable metal straps.

3.00 POWER SUPPLY

3.01 When 101G power plants are used to power the system, relay-operating battery and ground shall be from the 20-volt dc TALK (filtered) supply. This minimizes objectionable line noises which sometimes occur when 20-volt dc SIGNAL (unfiltered) supply is used.

3.02 When 10 volts ac is used for lamps, power for running the KS-15900, List 1 interrupter motor can also be supplied from the same source. When computing the total simultaneous load that might be imposed on the power plant in such circumstances, consider the 0.30-amp motor load as equivalent to about eight 51A lamps.

3.03 When a 101A power plant arranged for charge control furnishes power to the system, additional wiring is required under the following conditions:

- When 202C/D, 230A/B, 238A, and 239A key telephone units are used with the 232A/B or 238A key telephone units as common equipment.
- When 202C/D, 230A/B, and 239A key telephone units are used without common equipment.

3.04 When conditions in 3.03 apply, a switching relay (17B KTU or

equivalent) must be provided to control the operation of the CC relay in the charging circuit. Proceed as follows:

1. Connect battery to the winding of the switching relay. Connect the other side of the winding to the terminal for grouped CO leads of all associated line circuits.

2. Connect the CC lead from the CC relay in the charge control circuit through normally closed contacts of the switching relay to ground.

3. When a 101A power plant arranged for charge control furnishes power to more than one system, connect a 400A diode in series with each system lead connected to the relay controlling operation of the CC relay.

The switching relay operates whenever a line in the system is in use. The operation of this relay releases the CC relay, which in turn shunts the resistance regulating the low-charge rate.

4.00 DESCRIPTION OF OPERATION

INCOMING CALL

Signaling

4.01 When ringing voltage is applied to the ring side of the line on an incoming call, the R relay operates on the first half-cycle as alternating current flows through contacts B4 of relay AH, R resistor, R capacitor, R thermistor, and secondary winding of R relay to:

- Tip side of line (X option)

  or

- Ground (V option)

  or

- ST lead (W option).

On the other half-cycle, current flows from the tip side of line or ground through the R diode, bypassing the R relay.

The R relay operated:

- Locks operated under control of A relay (202C and 230A), or AH relay (202D, 230B, 238A, and 239A), over LK lead through the thermometal contacts of the TO relay in the time-out circuit.

- Connects ground to:

  (a) Heater winding of TO relay to start time-out.

  (b) Operate the ST relay which starts the KS-15900, List 1 interrupter (when using 232A/B or 238A KTU).

  (c) Lamp flashing circuit (when using the 209A KTU).

- Connects lamp lead to flashing circuit.

- Closes common audible signal circuit.

4.02 A shunt on the winding of the H relay serves to bypass ringing current on incoming calls, preventing it from operating falsely. This might otherwise occur when ringers are bridged on the station side of the line circuit. In the 202D, 230B, 238A, and 239A key telephone units, contacts B4 of relay AH and B9 of relay A shunt the winding of the H relay. In the 202 C and 230A key telephone units, contacts B4 and B5 of relay AH shunt the windings of the H relay.

4.03 The 317A varistor R1 protects diode R and thermistor R from transient currents. On the newer line circuits (202D, 230B, 238A, and 239A key telephone units), a resistor was added in series with the 317A varistor for additional protection.

4.04 Use of the metallic ringing circuit reduces noise on the line due to cooling off of thermistor R and/or ground potential differences.

Answering an Incoming Call

4.05 When an incoming call is answered, ground is connected through the

switchhook contacts of the telephone set to the A lead, operating the A relay.

The A relay operated:

- Opens locking path of R relay, releasing it (202C and 230A).
- Transfers lamp lead from flashing to steady.
- Opens operate path of H relay (202D, 230B, 238A, and 239A) or shunts H relay windings (202C and 230A).
- Operates AH relay.

The AH relay operated:

- Opens operate path of R relay.
- Opens locking path of R relay (202D, 230B, 238A, and 239A).
- Operates TO relay in time-out circuit.

The TO relay operated:

- Opens heater winding of thermal unit.
- Operates PF relay (209A or 212A).

OUTGOING CALL

4.06 The procedure for originating an outgoing call is the same as for answering an incoming call except for the R relay functions.

HOLDING

4.07 Operating the hold key in the telephone set will open ground on A lead and release relay A.

The A relay released:

- Operates H relay through transmitter circuit.
- Transfers lamp lead, through operated EBM2 contact of AH relay, to wink-hold circuit, if provided, or to steady hold.

The H relay operated:

- Locks operated across the line as a holding bridge.
- Holds the slow-releasing AH relay operated.
- Grounds HA lead to operate either the ST relay of the 232A/B or 238A KTU or the WS relay of the 210A KTU when the wink-hold circuit is provided.

Release of Holding Bridge

4.08 When a station picks up the line being held, the A relay operates as previously described. The A relay operated releases the H relay, reconnecting the central office or PBX line to the station loop.

4.09 A permanent signal, caused by the hold circuit not being released by a station, can be released from the central office or PBX by opening the line momentarily. This allows the H relay to release and restores the circuit to normal.

DISCONNECTION

4.10 When a station disconnects on either incoming or outcoming calls, the A and AH relays release and the circuit restores to normal.

4.11 A 317B varistor is connected in parallel with the winding of the H relay in the 202D, 230B, 238A, and 239A key telephone units. It shunts the excess currents applied to the H relay winding, preventing false operation which might be caused by either of two conditions:

- Charging of capacitors in bridged ringers on the station side of the line circuit.
- Switchhook bounce or handset fumbling at a station connected to the circuit.

4.12 The 317B varistor prevents cross-talk. It passes voice frequencies, shunting them around the H relay winding.

POWER FAILURE

4.13 Except for the loss of locally powered visual and audible signals, during power failure conditions incoming and outgoing calls can be made through the power failure circuit provision. Incoming calls will operate bridged ringers on the

line. A talking path is provided through the contacts of the released A and AH relays of the line circuit.

4.14 If the ringing supply is still operative (such as when central office or PBX generator is used), the common audible signal will operate when option Z or W is provided and will follow ringing on the line. Y option may or may not operate depending upon the position of the interrupter contacts when the power fails.

ELECTROMECHANICAL INTERRUPTER 232A/B OR COMMON EQUIPMENT PORTION OF 238A KTU

CONTACT 1

4.15 This contact is always open when interrupter is in its starting position. When closed, it completes an auxiliary operating path for the motor. If the ST relay releases before completion of a cycle, the motor continues to operate until the interrupter again reaches its starting position.

Note: Under power failure conditions (blown fuse or interruption of commercial supply), recycling to start takes place on power restoral.

CONTACT 2

4.16 This contact furnishes an interrupted audible signal voltage to connected circuits. The contact is closed at the starting position and remains closed for approximately one second after initial start of the interrupter. The contact is then open for 3 seconds. This cycle is repeated until operation of interrupter ceases.

CONTACT 3

4.17 Operation of this contact closes ringing audible tone, when provided, to the circuits which require it. Its sequence of operation is the same as contact 2.

CONTACTS 4 AND 5

4.18 These contacts operate approximately 0.5 second on and 0.5 second off. They control frequency of the flashing lamps indicating incoming calls. Current limitation is 2.5 amp per contact.

CONTACT 6

4.19 This contact is used for circuits requiring busy tone. Contacts 4, 5, and 6 have the same frequency of closure.

CONTACTS 7 AND 8

4.20 These contacts control the station lamp wink circuit indicating a hold condition on the line. These contacts operate at a frequency of approximately 0.475 second on, and approximately 0.025 second off.

References:
SD-69203-01
SD-69270-01
SD-69288-01
SD-69294-01

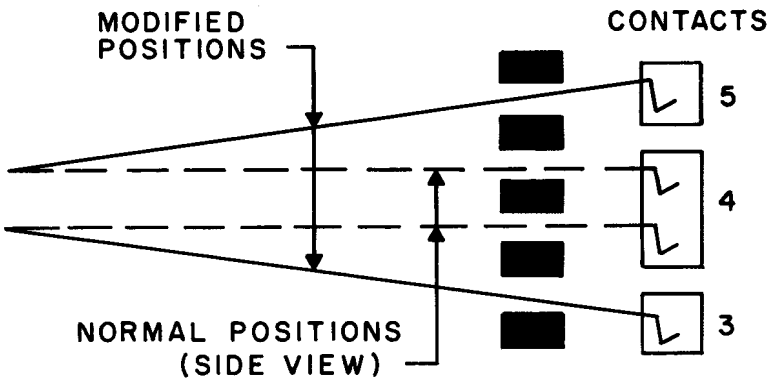


Fig. 1 - R Relay Contacts

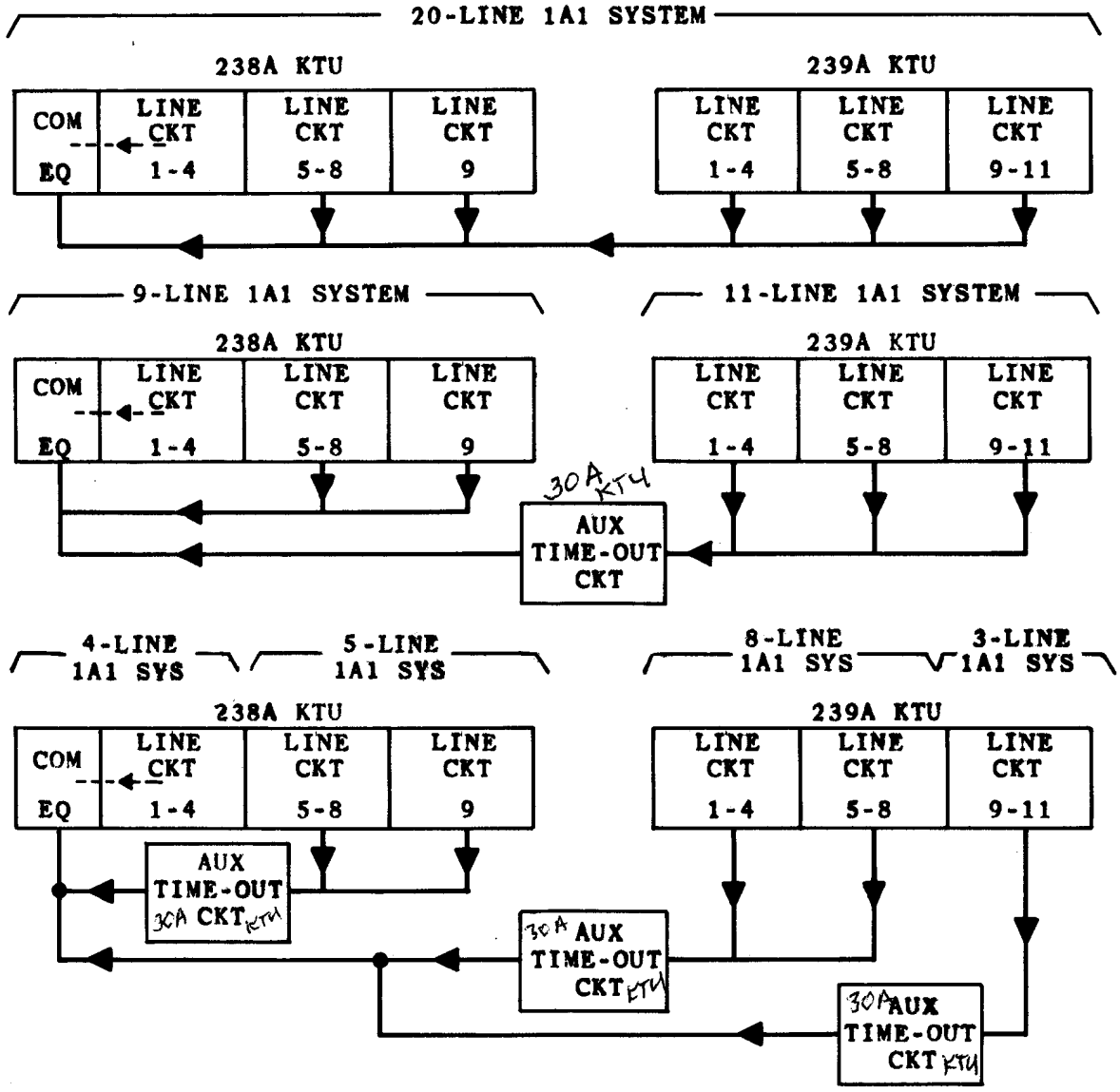
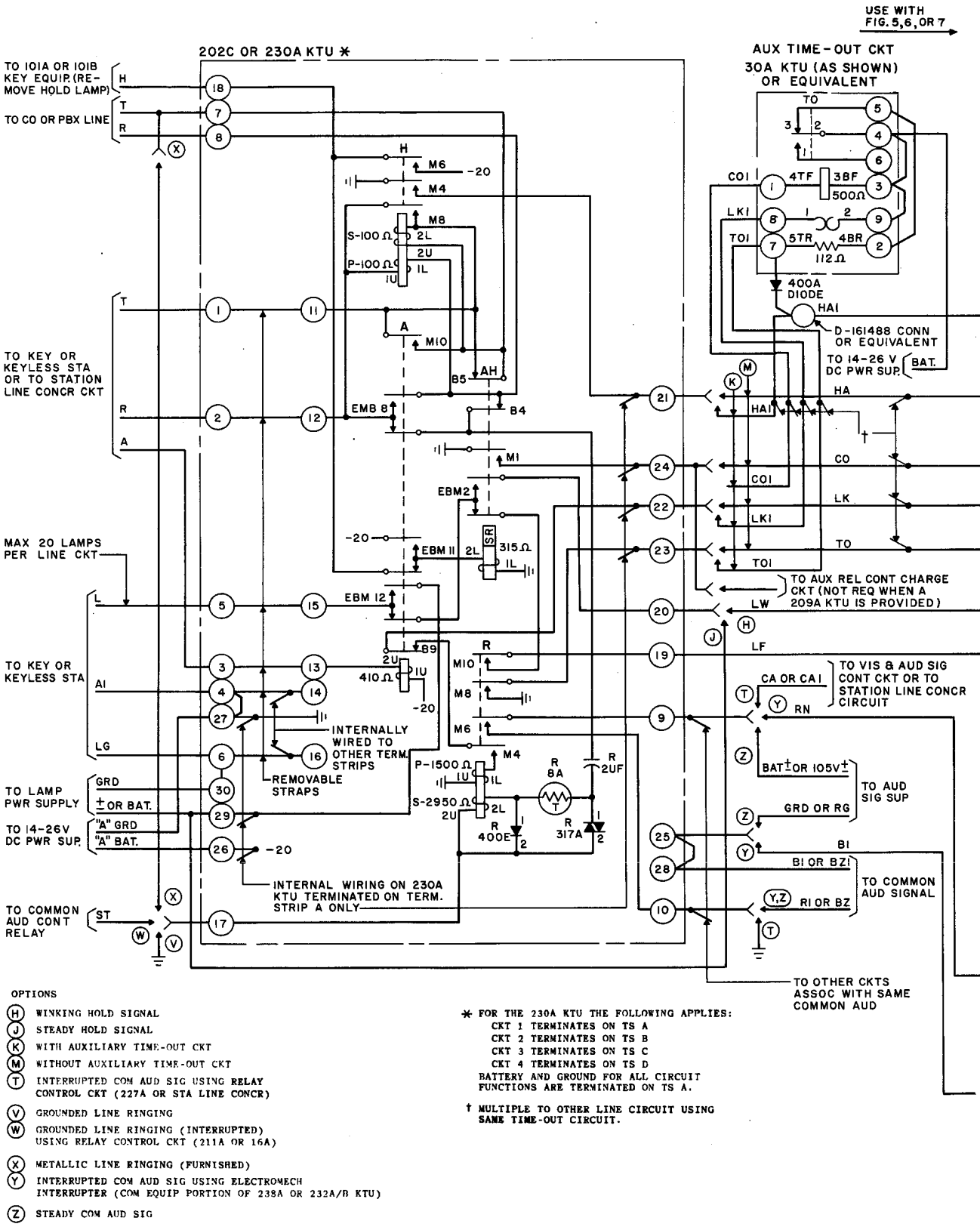


Fig. 2 - Typical 1A1 System Combinations



OPTIONS

- (H) WINKING HOLD SIGNAL
- (J) STEADY HOLD SIGNAL
- (K) WITH AUXILIARY TIME-OUT CKT
- (M) WITHOUT AUXILIARY TIME-OUT CKT
- (T) INTERRUPTED COM AUD SIG USING RELAY CONTROL CKT (227A OR STA LINE CONCR)
- (V) GROUNDED LINE RINGING
- (W) GROUNDED LINE RINGING (INTERRUPTED) USING RELAY CONTROL CKT (211A OR 16A)
- (X) METALLIC LINE RINGING (FURNISHED)
- (Y) INTERRUPTED COM AUD SIG USING ELECTROMECH INTERRUPTER (COM EQUIP PORTION OF 238A OR 232A/B KTU)
- (Z) STEADY COM AUD SIG

* FOR THE 230A KTU THE FOLLOWING APPLIES:
CKT 1 TERMINATES ON TS A
CKT 2 TERMINATES ON TS B
CKT 3 TERMINATES ON TS C
CKT 4 TERMINATES ON TS D
BATTERY AND GROUND FOR ALL CIRCUIT FUNCTIONS ARE TERMINATED ON TS A.

† MULTIPLE TO OTHER LINE CIRCUIT USING SAME TIME-OUT CIRCUIT.

Fig. 3 - Line Circuit 202C or 230A KTU

TABLE A
202D OR 230B KTU *

o——o INDICATES REMOVABLE STRAPS

REF DESIG	TERMINAL CKT 1	TERMINAL CKT 2	TERMINAL CKT 3	TERMINAL CKT 4	LEAD DESIGNATION	
A	7A	7B	7C	7D	T	CO OR PBX LINE
B	8A	8B	8C	8D	R	
C	17A	17B	17C	17D	LINE RINGING	
D	18A	18B	18C	18D	H	
E	1A 11A	1B 11B	1C 11C	1D 11D	T	STATION
F	2A 12A	2B 12B	2C 12C	2D 12D	R	
G	5A 15A	5B 15B	5C 15C	5D 15D	L	
H	3A 13A	3B 13B	3C 13C	3D 13D	A	
J	9A	9B	9C	9D	AUDIBLE SIGNAL	
K	25A					
L	10A	10B	10C	10D		
M	20A	20B	20C	20D	LAMP WINK	
N	19A	19B	19C	19D	LAMP FLASH	
P	14A				GRD	RELAY POWER SUPPLY
Y	26A				BAT.	
Q	4A	4B	4C	4D	A1	STATION
R	6A	6B	6C	6D	LG	
S	16A				GRD	LAMP POWER SUPPLY
T	29A o——o 28A				± OR LB	
U	21A				HA/HA1	TIME-OUT
V	23A				TO/TO1	
W	24A				CO/CO1	
X	22A				LK/LK1	

* FOR 202D KTU USE TERMINATIONS FOR CKT 1.

TABLE B
238A OR 239A KTU

WHERE DIFFERENT ( ) = 238A
[ ] = 239A
o——o INDICATES REMOVABLE STRAPS

REF DESIG	TERMINAL ON 239A / TERMINAL ON 238A CKT 1	CKT 2	CKT 3	CKT 4	CKT 5	CKT 6	CKT 7	CKT 8	CKT 9	CKT 10	CKT 11	LEAD DESIGNATION	
A	7A	27A	7B	27B	7C	27C	7D	27D	7E	27E	7F	T	CO OR PBX LINE
B	8A	28A	8B	28B	8C	28C	8D	28D	8E	28E	8F	R	
C	17A	37A	17B	37B	17C	37C	17D	37D	17E	37E	17F	LINE RINGING	
D	(21E) [21F]	(22E) [22F]	(23E) [23F]	(24E) [24F]	(25E) [25F]	(31E) [31F]	(32E) [32F]	(33E) [33F]	(34E) [34F]	35F	36F	H	
E	1A 11A	21A 31A	1B 11B	21B 31B	1C 11C	21C 31C	1D 11D	21D 31D	1E 11E	21E 31E	1F 11F	T	STATION
F	2A 12A	22A 32A	2B 12B	22B 32B	2C 12C	22C 32C	2D 12D	22D 32D	2E 12E	22E 32E	2F 12F	R	
G	5A 15A	25A 35A	5B 15B	25B 35B	5C 15C	25C 35C	5D 15D	25D 35D	5E 15E	25E 35E	5F 15F	L	
H	3A 13A	23A 33A	3B 13B	23B 33B	3C 13C	23C 33C	3D 13D	23D 33D	3E 13E	23E 33E	3F 13F	A	
J	20A	40A	20B	40B	20C	40C	20D	40D	20E	40E	20F	AUDIBLE SIGNAL	
K	18A	38A	18B	38B	18C	38C	18D	38D	18E	38E	18F		
L	19A	39A	19B	39B	19C	39C	19D	39D	19E	39E	19F		
M	(6F) [15G]		(7F) [16G]		(8F) [17G]		(9F) [18G]		(10F) [19G]		20G	LAMP WINK	
N	(36E) [5G]		(37E) [6G]		(38E) [7G]		(39E) [8G]		(40E) [9G]		10G	LAMP FLASH	
P	9A		9B		9C		9D		9E		9F	GRD	RELAY POWER SUPPLY
Y	10A		10B		10C		10D		10E		10F	BAT.	
Q	4A 14A 24A 34A		4B 14B 24B 34B		4C 14C 24C 34C		4D 14D 24D 34D		4E 14E [24E] [34E]		4F 14F	A1	STATION
R	6A 16A 26A 36A		6B 16B 26B 36B		6C 16C 26C 36C		6D 16D 26D 36D		6E 16E [26E] [36E]		6F 16F	LG	
S	29A		29B		29C		29D		29E		29F	GRD	LAMP POWER SUPPLY
T	30A, (16F) [25G]		30B, (17F) [26G]		30C, (18F) [27G]		30D, (19F) [28G]		30E, (20F) [29G]		30F, 30G	± OR LB	
U*	1G				11G				21G			HA/HA1	TIME-OUT
V*	2G				12G				22G			TO/TO1	
W*	3G				13G				23G			CO/CO1	
X*	4G				14G				24G			LK/LK1	

* STRAPS MAY BE REMOVED AND TERMINALS BYPASSED AS NECESSARY WHEN A GROUP OF CIRCUITS CONNECTS TO AN AUXILIARY TIME-OUT CIRCUIT OR OTHER COMMON EQUIPMENT.

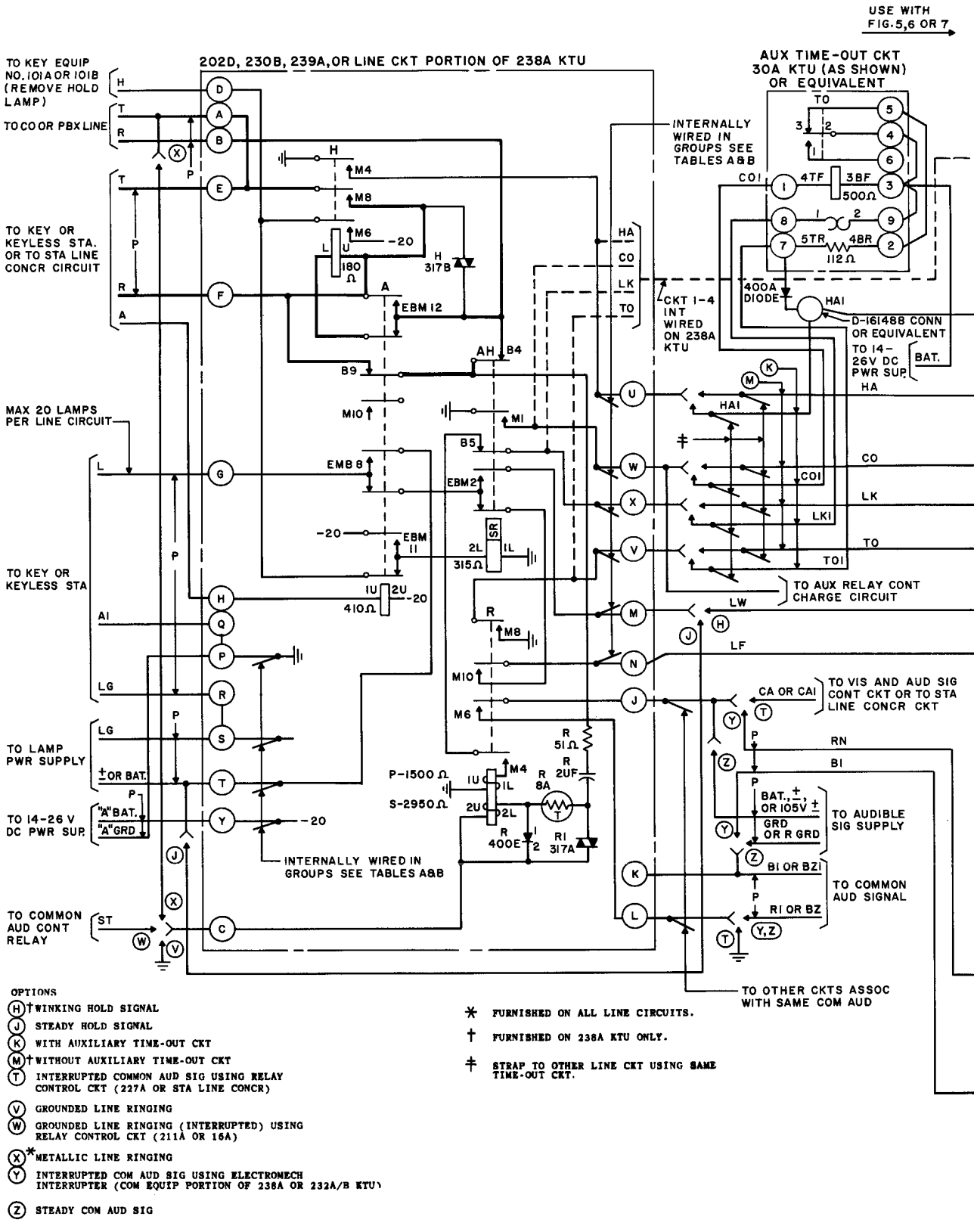


Fig. 4 - Line Circuit 202D, 230B, 238A, or 239A KTU

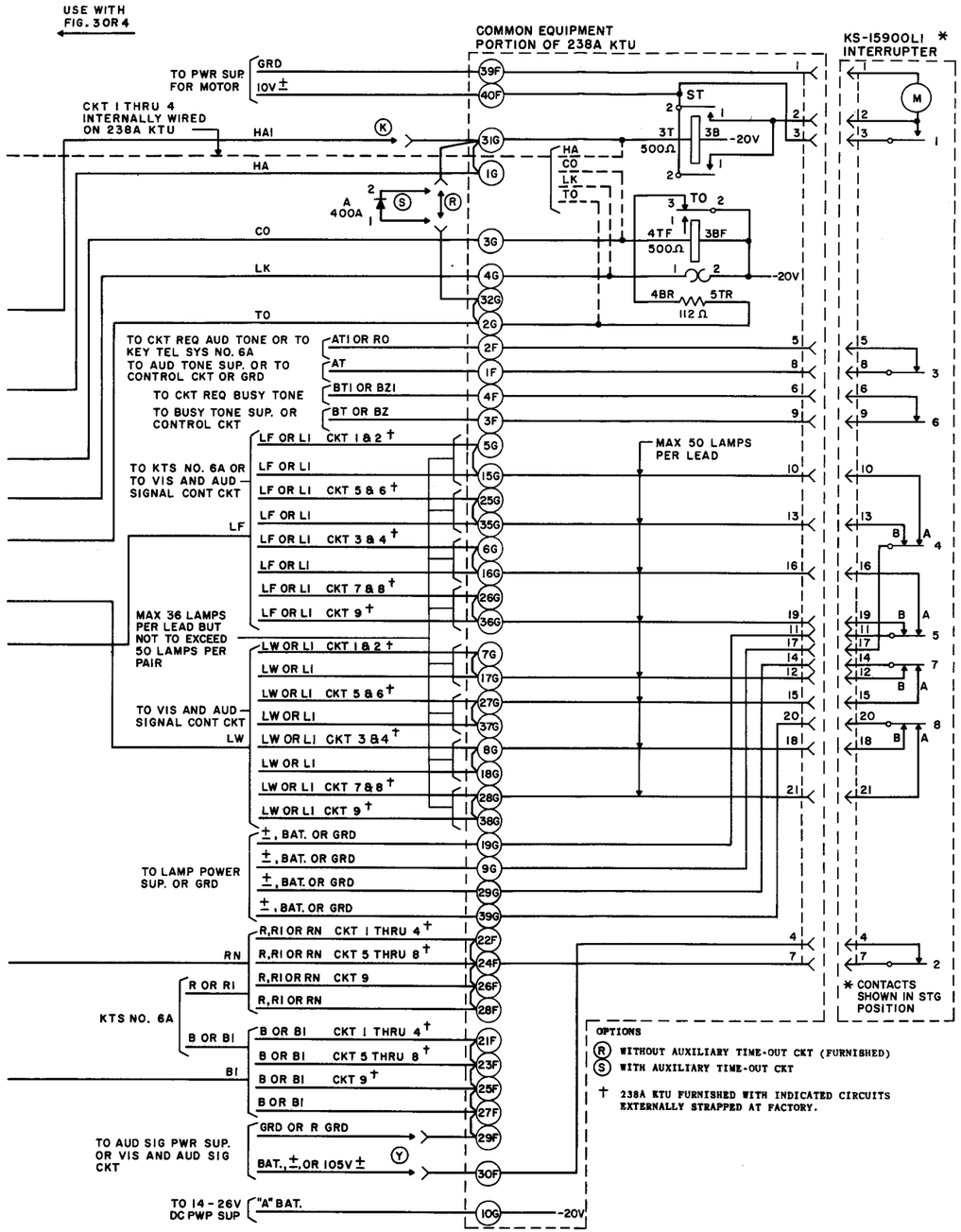


Fig. 5 - Common Equipment 238A KTU

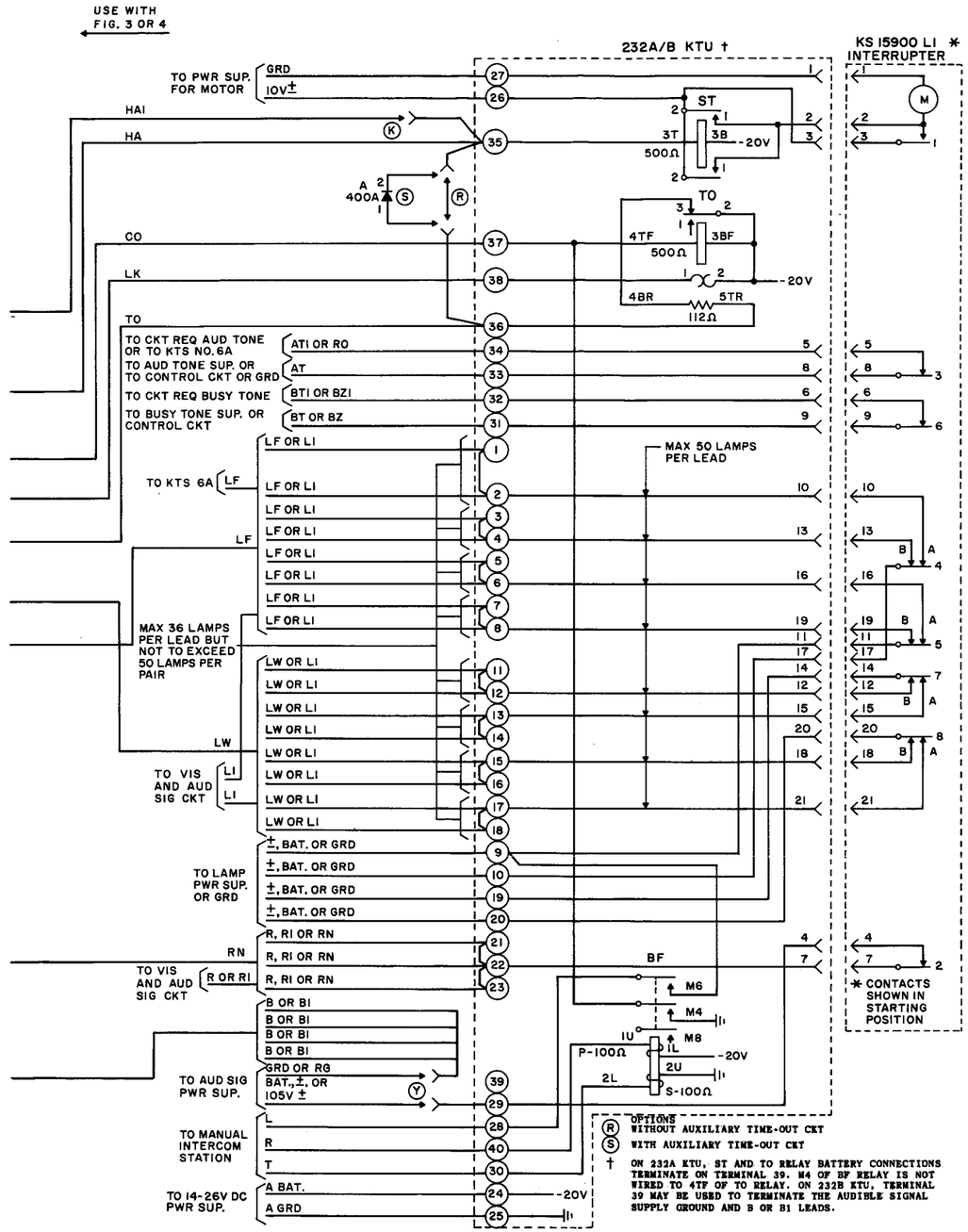
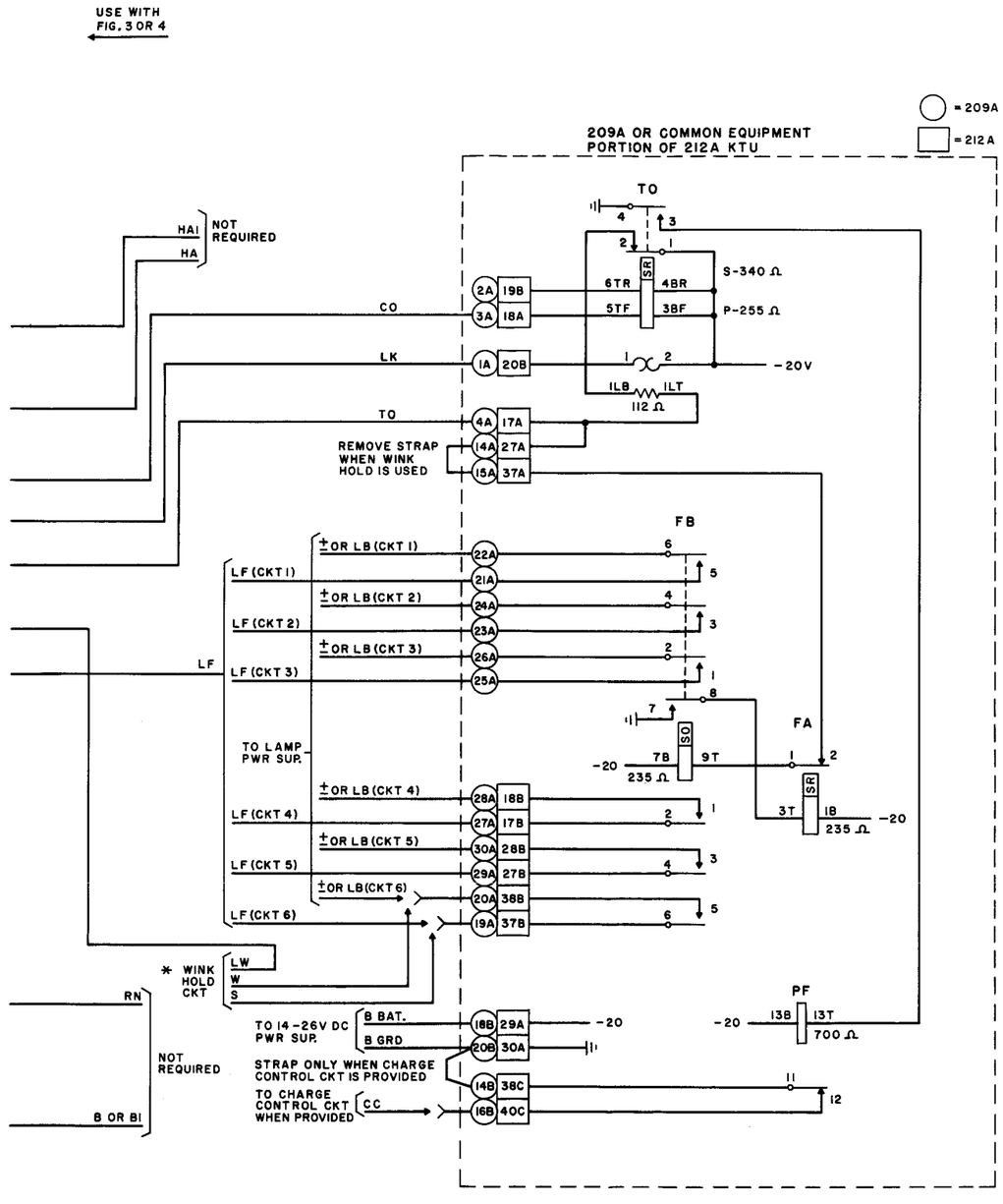


Fig. 6 - Common Equipment 232A/B KTU



* FOR CONNECTIONS, SEE C SECTION ENTITLED 1A1 KEY TELEPHONE SYSTEM, LAMP WINK CIRCUIT.

Fig. 7 - Common Equipment
209A or 212A KTU

TABLE C
202C/D KTU

WHERE DIFFERENT ◯ = 202C
□ = 202D
o—o INDICATES REMOVABLE STRAPS

REF DESIG	TERMINAL	LEAD DESIGNATION	
A	7	T	CO OR PBX LINE
B	8	R	
C	17	LINE RINGING	
D	18	H	
E	1 11	T	STATION
F	2 12	R	
G	5 15	L	
H	3 13	A	
J	9	AUDIBLE SIGNAL	
K	25		
L	10		
M	20	LAMP WINK	
N	19	LAMP FLASH	
P	(27) [14]	GRD	RELAY POWER SUPPLY
Y	26	BAT.	
Q	4	A1	STATION
R	6	LG	
S	(30) [16]	GRD	LAMP POWER SUPPLY
T	29	± OR LB	
U	21	HA/HA1	TIME-OUT
V	23	TO/TO1	
W	24	CO/CO1	
X	22	LK/LK1	

TABLE D
230A/B KTU

WHERE DIFFERENT ◯ = 230A
□ = 230B
o—o INDICATES REMOVABLE STRAPS

REF DESIG	TERMINAL CKT 1	CKT 2	CKT 3	CKT 4	LEAD DESIGNATION	
A	7A	7B	7C	7D	T	CO OR PBX LINE
B	8A	8B	8C	8D	R	
C	17A	17B	17C	17D	LINE RINGING	
D	18A	18B	18C	18D	H	
E	1A 11A	1B 11B	1C 11C	1D 11D	T	STATION
F	2A 12A	2B 12B	2C 12C	2D 12D	R	
G	5A 15A	5B 15B	5C 15C	5D 15D	L	
H	3A 13A	3B 13B	3C 13C	3D 13D	A	
J	9A	9B	9C	9D	AUDIBLE SIGNAL	
K	25A					
L	10A	10B	10C	10D		
M	20A	20B	20C	20D	LAMP WINK	
N	19A	19B	19C	19D	LAMP FLASH	
P	(27A) [14A]				GRD	RELAY POWER SUPPLY
Y	26A				BAT.	
Q	4A	4B	4C	4D	A1	STATION
R	6A	6B	6C	6D	LG	
S	(30A) [16A]				GRD	LAMP POWER SUPPLY
T	29A		(29A) [28A]		± OR LB	
U	21A				HA/HA1	TIME-OUT
V	23A				TO/TO1	
W	24A				CO/CO1	
X	22A				LK/LK1	

TABLE E
LINE CIRCUIT PORTION OF 238A OR 239A KTU

WHERE DIFFERENT ◯ = 238A
□ = 239A
o—o INDICATES REMOVABLE STRAPS

REF DESIG	TERMINAL ON 238A / TERMINAL ON 239A CKT 1	CKT 2	CKT 3	CKT 4	CKT 5	CKT 6	CKT 7	CKT 8	CKT 9	CKT 10	CKT 11	LEAD DESIGNATION	
A	7A	27A	7B	27B	7C	27C	7D	27D	7E	27E	7F	T	CO OR PBX LINE
B	8A	28A	8B	28B	8C	28C	8D	28D	8E	28E	8F	R	
C	17A	37A	17B	37B	17C	37C	17D	37D	17E	37E	17F	LINE RINGING	
D	(21E) [21F]	(22E) [22F]	(23E) [23F]	(24E) [24F]	(25E) [25F]	(31E) [31F]	(32E) [32F]	(33E) [33F]	(34E) [34F]	35F	36F	H	
E	1A 11A	21A 31A	1B 11B	21B 31B	1C 11C	21C 31C	1D 11D	21D 31D	1E 11E	21E 31E	1F 11F	T	STATION
F	2A 12A	22A 32A	2B 12B	22B 32B	2C 12C	22C 32C	2D 12D	22D 32D	2E 12E	22E 32E	2F 12F	R	
G	5A 15A	25A 35A	5B 15B	25B 35B	5C 15C	25C 35C	5D 15D	25D 35D	5E 15E	25E 35E	5F 15F	L	
H	3A 13A	23A 33A	3B 13B	23B 33B	3C 13C	23C 33C	3D 13D	23D 33D	3E 13E	23E 33E	3F 13F	A	
J	20A	40A	20B	40B	20C	40C	20D	40D	20E	40E	20F	AUDIBLE SIGNAL	
K	18A	38A	18B	38B	18C	38C	18D	38D	18E	38E	18F		
L	19A	39A	19B	39B	19C	39C	19D	39D	19E	39E	19F		
M	(6F) [15G]		(7F) [16G]		(8F) [17G]		(9F) [18G]		(10F) [19G]		20G	LAMP WINK	
N	(36E) [5G]		(37E) [6G]		(38E) [7G]		(39E) [8G]		(40E) [9G]		10G	LAMP FLASH	
P	9A		9B		9C		9D		9E		9F	GRD	RELAY POWER SUPPLY
Y	10A		10B		10C		10D		10E		10F	BAT.	
Q	4A 14A 24A 34A		4B 14B 24B 34B		4C 14C 24C 34C		4D 14D 24D 34D		4E 14E [24E] [34E]		4F 14F	A1	STATION
R	6A 16A 26A 36A		6B 16B 26B 36B		6C 16C 26C 36C		6D 16D 26D 36D		6E 16E [26E] [36E]		6F 16F	LG	
S	29A		29B		29C		29D		29E		29F	GRD	LAMP POWER SUPPLY
T	30A, (16F) [25G]		30B, (17F) [26G]		30C, (18F) [27G]		30D, (19F) [28G]		30E, (20F) [29G]		30F, 30G	± OR LB	
U	1G				11G				21G			HA/HA1	TIME-OUT
V	2G				12G				22G			TO/TO1	
W	3G				13G				23G			CO/CO1	
X	4G				14G				24G			LK/LK1	

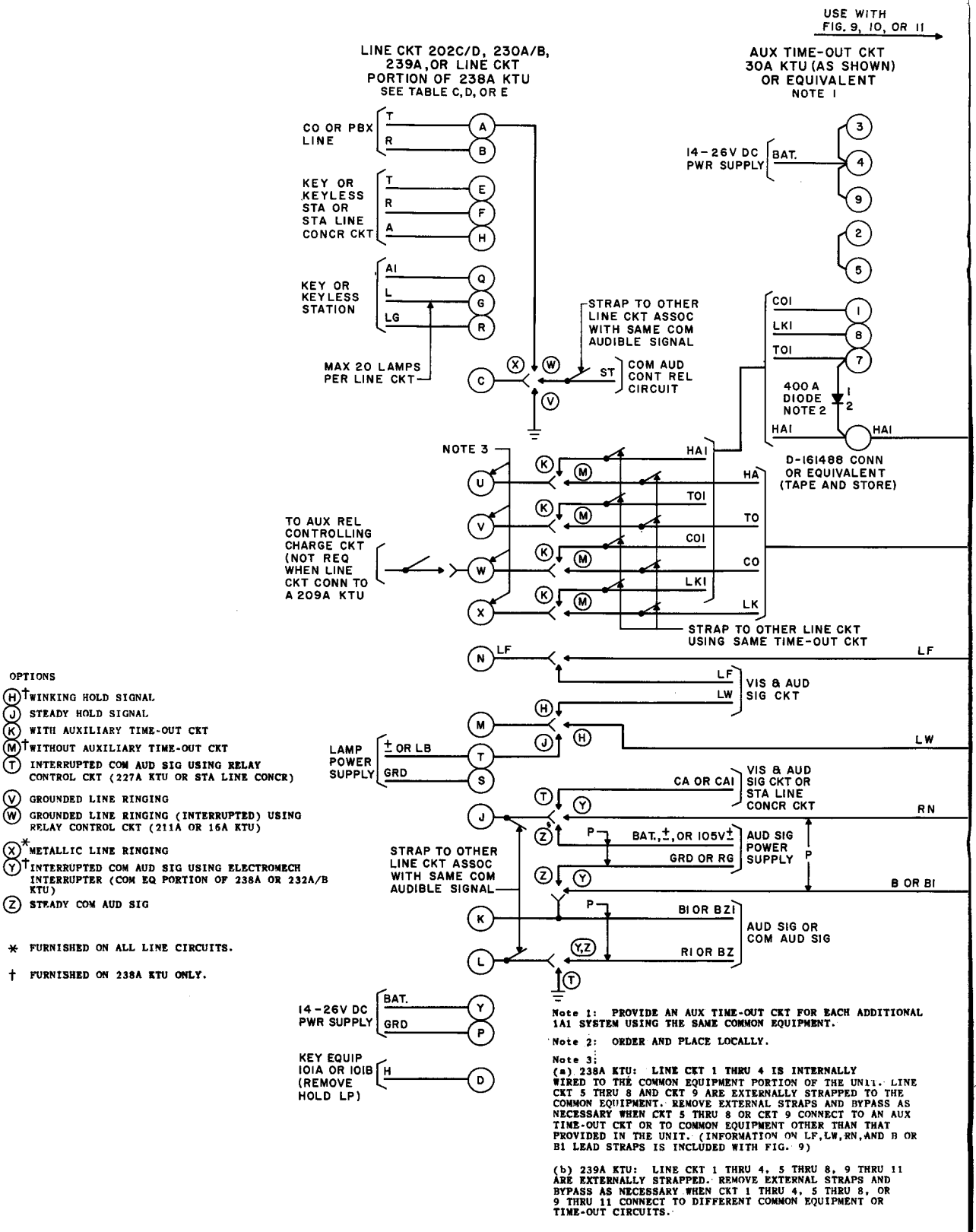


Fig. 8 - Line Circuit 202C/D, 230A/B, 238A, or 239A KTU

238A KTU:

Removable straps connect the LF, LW, RN, and B or B1 leads of the line circuits to the common equipment portion of the unit. Remove appropriate straps from individual or groups of line circuits when the reasons shown apply.

		Line Ckt Terminal	Common Equipment Terminal
LF Lead Straps			
When Providing Aux Lamp Flash Relay Ckt (L1 Leads)	Ckt 1 & 2	36E	5G
	Ckt 3 & 4	37E	6G
	* Ckt 5 & 6	38E	25G
	* Ckt 7 & 8	39E	26G
	Ckt 9	40E	36G
LW Lead Straps			
When Providing Steady Hold Lamp Feature or Aux Lamp Wink Relay Ckt (L1 Leads)	Ckt 1 & 2	6F	7G
	Ckt 3 & 4	7F	8G
	* Ckt 5 & 6	8F	27G
	* Ckt 7 & 8	9F	28G
	Ckt 9	10F	38G
RN Lead Straps (bypass as necessary)			
When Providing Z or T Option for Individual or Groups of Line Ckt	Ckt 1	20A	
	Ckt 2	40A	
	Ckt 3	20B	
	Ckt 4	40B	22F
	* Ckt 5	20C	
	* Ckt 6	40C	
	* Ckt 7	20D	
	* Ckt 8	40D	24F
	Ckt 9	20E	26F
B or B1 Lead Straps (bypass as necessary)			
When Providing Z or T Option for Individual or Groups of Line Ckt	Ckt 1	18A	
	Ckt 2	38A	
	Ckt 3	18B	
	Ckt 4	38B	21F
	* Ckt 5	18C	
	* Ckt 6	38C	
	* Ckt 7	18D	
	* Ckt 8	38D	23F
	Ckt 9	18E	25F

* When circuits 5 through 8 or circuit 9 connect to common equipment other than that provided for in the unit.

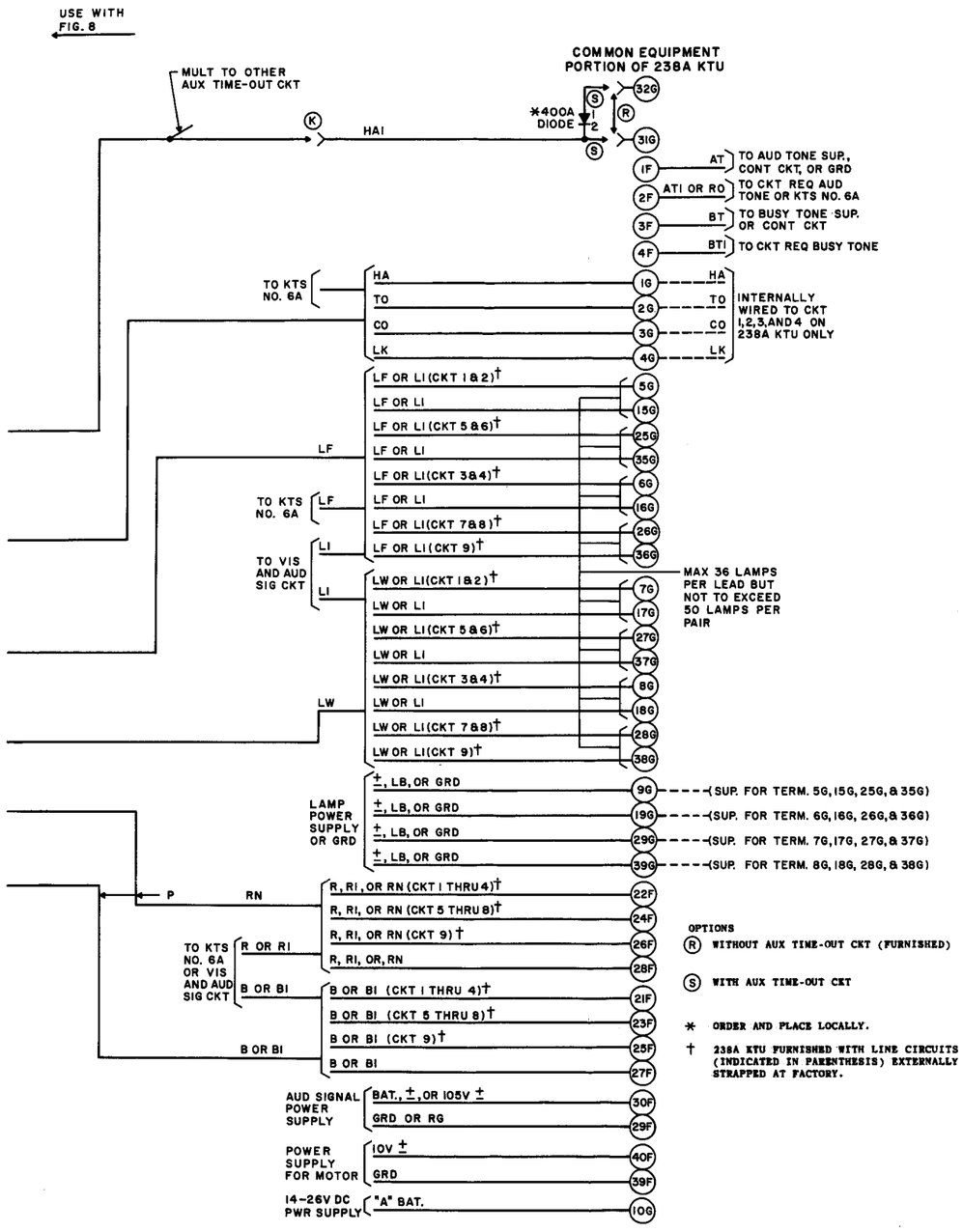


Fig. 9 - Common Equipment 238A KTU

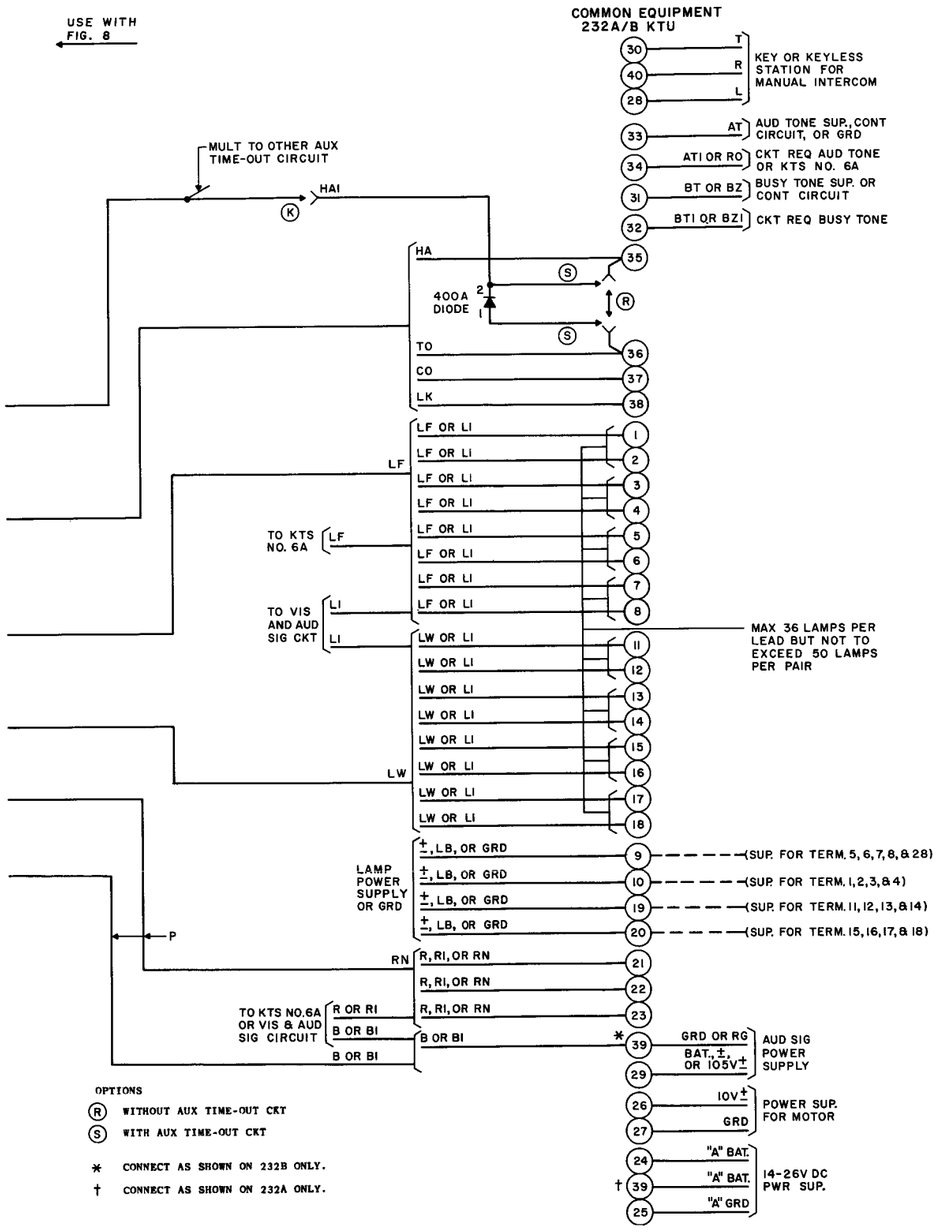


Fig. 10 - Common Equipment 232A/B KTU

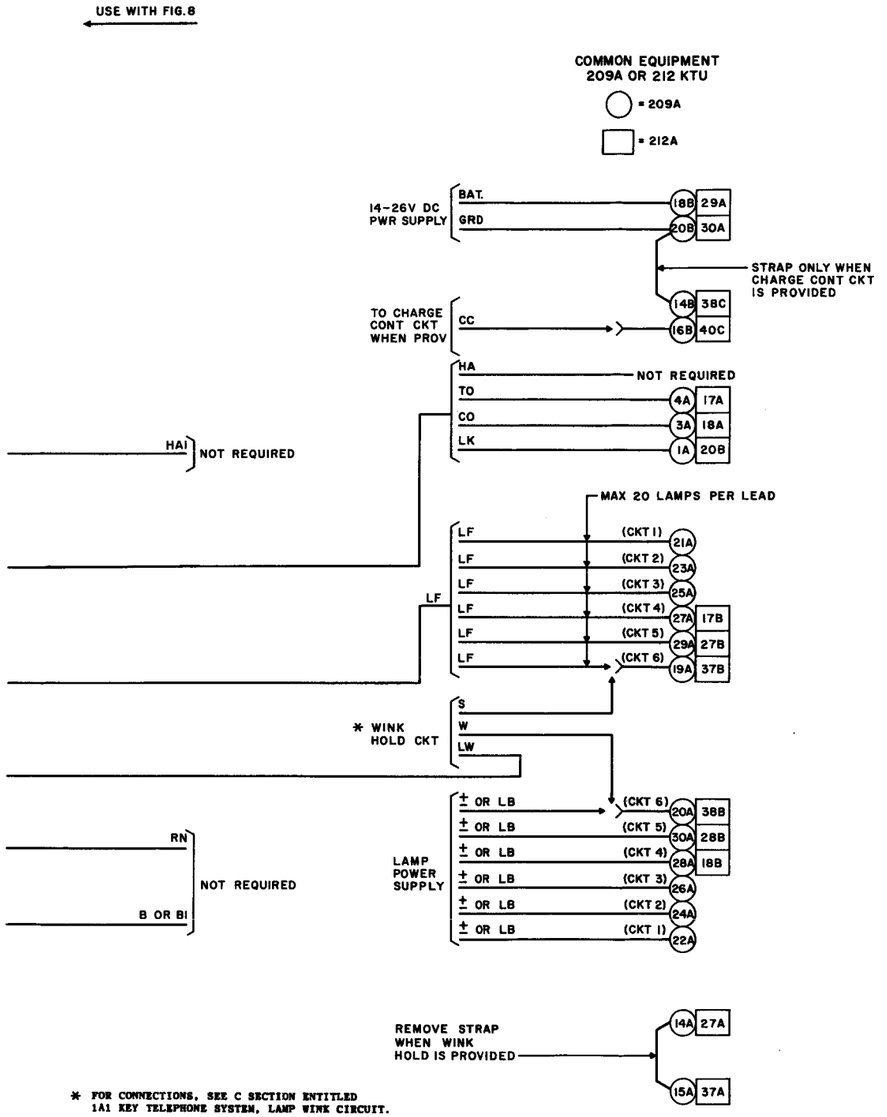


Fig. 11 - Common Equipment
209A or 212A KTU