

DIGITAL TRANSMISSION SYSTEMS

T1 AUTOMATIC STANDBY UNIT

DESCRIPTION

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1. GENERAL

1.01 This section provides a general equipment and functional description of the T1 automatic standby unit (T1ASU).

1.02 Whenever this section is reissued, the reason for reissue will be stated in this paragraph.

1.03 The T1ASU, a one-for-one protection switching device, increases the probability of having a satisfactory digital transmission path available for systems, such as the Digital Data System (DDS), which require higher than normal transmission path availability. To do this, a bridging repeater in the line terminating unit (LTU) of the T1ASU is used to establish transmission over two independent T1 lines simultaneously. These lines are monitored at the receiving end by the two line monitors of

another T1ASU. The signal from the regular line is used as an output if it is received properly. If the signal on the regular line is not satisfactory, the signal on the second or standby line is used if its line monitor indicates that it is being received properly (see Fig. 1). Each direction of transmission is handled in the same way. Thus, the T1ASU protects a T1 line by automatically switching to the standby line when the transmission quality of the regular line deteriorates, provided the transmission quality of the standby line is acceptable.

2. EQUIPMENT DESCRIPTION

A. Mounting Arrangements

2.01 The T1ASU (Fig. 2) is a shop-wired unit suitable for mounting in 23-inch bays. The equipment is arranged such that a single T1ASU will occupy 11-1/2 inches of vertical bay space and a double T1ASU will occupy 15 inches of vertical bay space. Table A shows the components needed for single and double T1ASUs.

2.02 The component equipment can be mounted individually and interwired to form a T1 automatic standby arrangement. In general application, this arrangement is not recommended.

B. T1 Line Monitor

2.03 The J98710T T1 line monitor (Section 103-493-107) is basically a signal detector and a transmission switch. The line monitor panel is rack-mounted in a 23-inch bay and has slots for an ED-3C391-30,G1 violation detector unit and a pattern detector unit (Fig. 3). The pattern detector unit can be either an ED-3C392-30,G1 or an ED-3C392-30, G2 violation rate alarm unit. The G1 unit is intended for use with DDS and will trigger the transmission switch in the line monitor when the violation rate is approximately 10^{-6} . The

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G2 unit is intended for general use with T1 lines and will trigger the transmission switch in the line monitor when the violation rate is approximately 10^{-5} . A cover plate (Fig. 4) is used with each pair of line monitors for identification purposes.

C. T1 Automatic Standby Alarm Unit

2.04 The ED-3C412-30 T1 automatic standby alarm unit (Fig. 5) contains all the alarm processing circuits and the alarm lamps for a single T1ASU. This unit plugs into the ED-3C418-30 alarm circuit shelf which is part of the T1ASU and can be mounted in a 23-inch bay in the case of the T1 automatic standby arrangement. Each shelf will accommodate two alarm units. For a single T1ASU, one T1 automatic standby alarm unit is used in the left slot, and for a double T1ASU, two alarm units are required as shown in Fig. 2.

D. Line Terminating Unit

2.05 The J98713F line terminating unit (LTU) is shown in Fig. 6 and described in Section 365-200-103. A cover plate (Fig. 4) is used on the LTU to identify the bridging repeater used with the first or second automatic standby unit. The LTU provides the basic functions of the T1 206 office repeater bay. The LTU can mount up to two 206-type bridging repeaters. The bridging repeater is used to duplicate the outgoing signal on the regular line and to apply the signal to the standby line. The LTU is 4 inches high and is mounted as part of the T1ASU. One LTU equipped with one or two 206-type bridging repeaters is required for a single or a double T1ASU, respectively.

E. Jack Strip

2.06 The jack positions and the designation marking on the jack strip are shown in Fig. 7. These jack strips are mounted as part of the T1ASU assembly.

3. FUNCTIONAL DESCRIPTION

3.01 The operational block diagram for the T1ASU for both directions of transmission is shown in Fig. 1. A double feed arrangement at the transmitting end uses a bridging repeater to generate a duplicate signal. The original and duplicate signals are applied to two independent T1 lines designated as the regular and standby lines. At the receiving end, the received signals

from both the T1 lines are wired through the office repeater bays for regeneration and are connected to the T1ASU.

3.02 The transmission switch in the regular T1 line monitor (REG MON) of the T1ASU is used to control the selection of the output signal from the two incoming signals.

3.03 The received T1 line signals are monitored on a bridged basis by the two T1 line monitors in the T1ASU for bipolar violations and pulse absence violations. Under normal operating conditions, the T1ASU output is connected from the regular T1 line input signal. If the regular line violation rate exceeds the established rate for the type of violation rate alarm unit (Table B) installed in the line monitor, and the standby line violation rate is acceptable, the T1ASU automatically switches to the standby line. The response time before switching lines when the signal deteriorates is given in Table B for the two types of violation rate alarm units.

3.04 After the regular line resumes transmitting an acceptable violation rate for the necessary recovery time (Table B), it is considered usable. If the line switch control (LSW CONT) key on the REG MON is in the release (RLS) position, the T1ASU automatically switches back to the regular line signal. If the LSW CONT key is in the HOLD position, the T1ASU will continue to use the standby line signal as the output signal until the LSW CONT key is returned to the RLS position. The LSW CONT key will normally be in the HOLD position for DDS applications. If the transmission quality of the standby line deteriorates below an acceptable violation rate, the transmission switch returns to using the regular line as an output regardless of the status of the regular line.

3.05 The T1 automatic standby alarm unit indicates failures by means of alarm lamps (Fig. 8). If either the regular or standby line fails, a minor alarm will operate. A failure of both lines will activate a major alarm. An ACO pushbutton on the T1 automatic standby alarm unit will cut off the office alarms, and will light the appropriate ACO lamps on the alarm unit. The LOCAL FUSE lamp will light when the fuse in the alarm unit fails. The external fuse (EXT FUSE) lamp will light when the power to a T1 line monitor is lost, when a monitor board is removed without first operating the monitor ACO key, or when an LTU

fuse is blown. The fuse alarm operates the minor audible alarm and cannot be cut off by the ACO pushbutton.

3.06 The LTU in the T1ASU has been adapted to bridge two 206-type bridging repeaters across the regular lines. The outputs of the bridging repeaters are used to feed the standby lines. The LTU has the capacity of feeding up to two independent T1 standby lines from two respective regular lines.

3.07 The LTU, when used in the T1ASU, will have the line terminating, powering, and manual switching features disabled by inserting dummy fuses in the MAIN and CKT fuse positions. *Because of this, the TEST SET POWER jacks on the front of the LTU must be limited to test equipment which will draw no more than 1 ampere total.*

4. MAINTENANCE

4.01 The initial tests for the T1ASU are given in Section 365-200-204, and the maintenance

and trouble-locating tests are given in Section 365-200-504.

5. DRAWINGS (NOT ATTACHED)

SD-3C089-01	Line Terminating Unit
SD-3C157-01	T1 Line Monitor
SD-3C182-01	T1 Automatic Standby
SD-3C188-01	T1 Automatic Standby Alarm
ED-3C407-3	T1 Automatic Standby Alarm Unit
ED-3C412-30	T1 Automatic Standby Alarm
ED-3C418-30	T1 Automatic Standby Alarm Unit

TABLE A

CODE	EQUIPMENT NOMENCLATURE	SINGLE T1ASU	DOUBLE T1ASU
J98710T	T1 Line Monitor	2	4
ED-3C391-30, G1	Violation Detector	2	4
ED-3C392-30, G1	Violation Rate Alarm Unit	2*	4*
ED-3C392-30, G2	Violation Rate Alarm Unit	2*	4*
ED-3C418-30	Alarm Circuit Shelf	1	1
ED-3C412-30	T1 Automatic Standby Alarm Unit	1	2
J98713F	Line Terminating Unit (LTU)	1	1
206C, R	T1 Line Bridging Repeater	1	2
231A	Jack Strip	Half Equipped	Fully Equipped

* The G1 unit is intended for use with DDS and the G2 unit is intended for general use with T1 lines.

TABLE B

	VIOLATION RATE	APPROXIMATE RESPONSE TIME	APPROXIMATE RECOVERY TIME
G1	10^{-6}	1.3 sec.	60 sec.
G2	10^{-5}	0.3 sec.	12 sec.

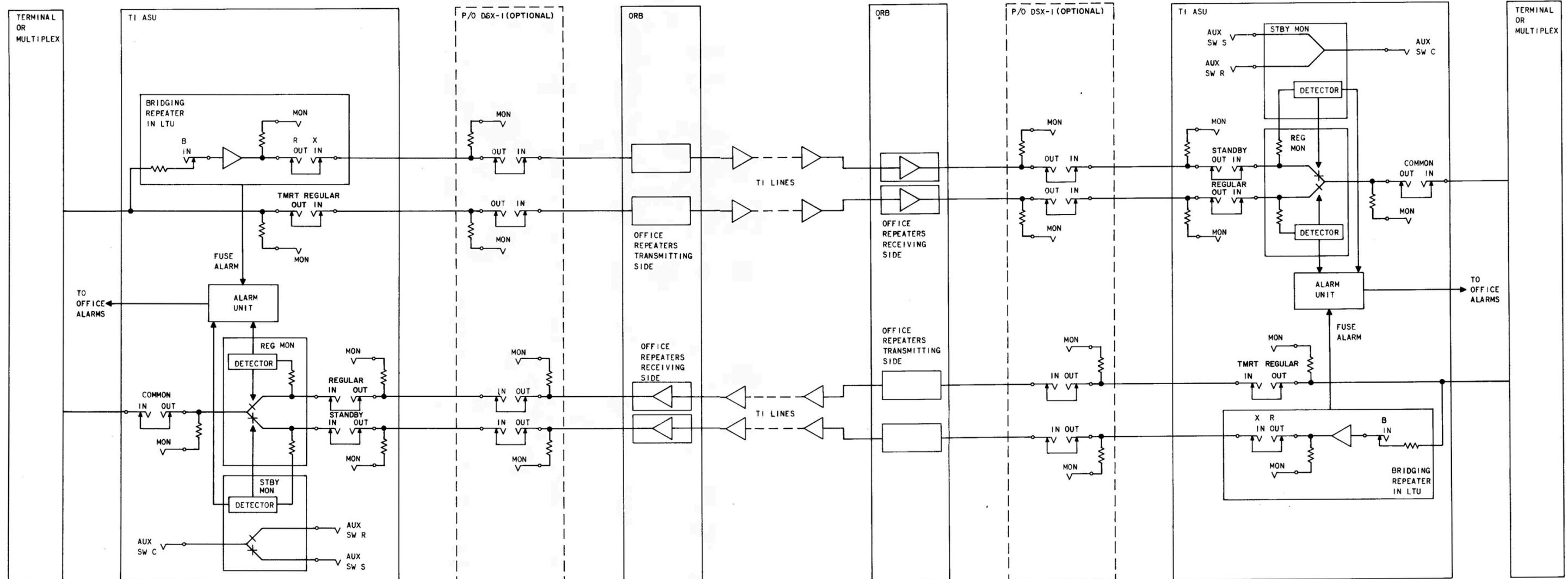


Fig. 1—TIASU in Both Directions of Transmission

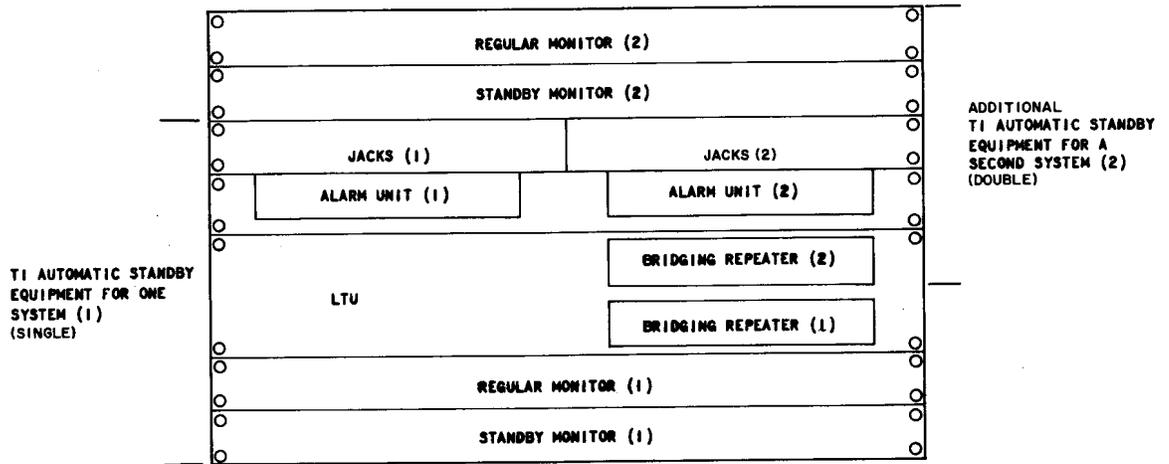
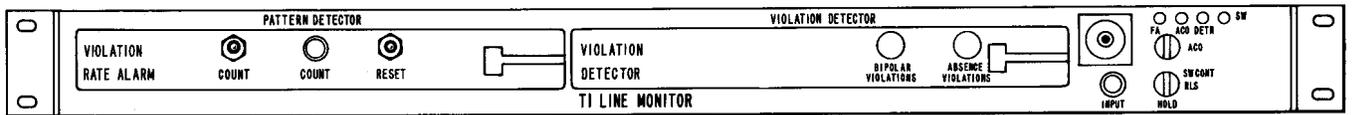


Fig. 2—TIASU



FRONT VIEW

Fig. 3—T1 Line Monitor

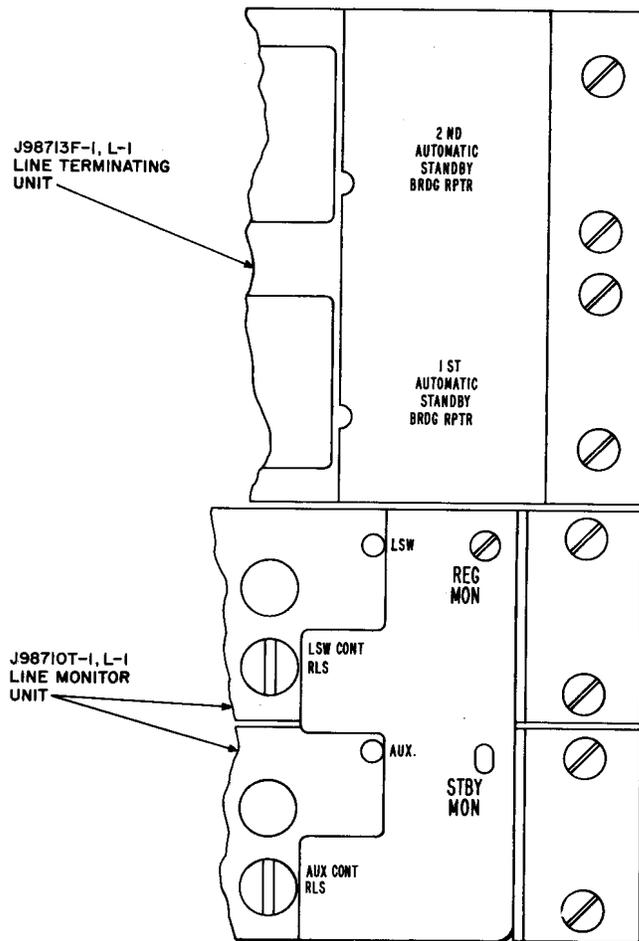


Fig. 4—TIASU Cover Plates

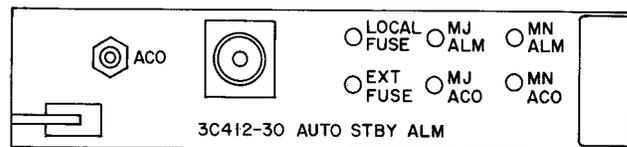


Fig. 5—T1 Automatic Standby Alarm Unit

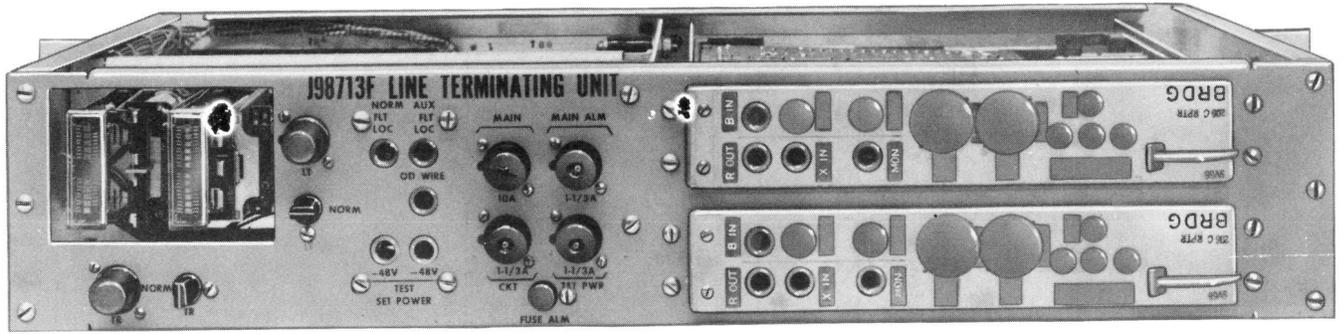


Fig. 6—Line Terminating Unit

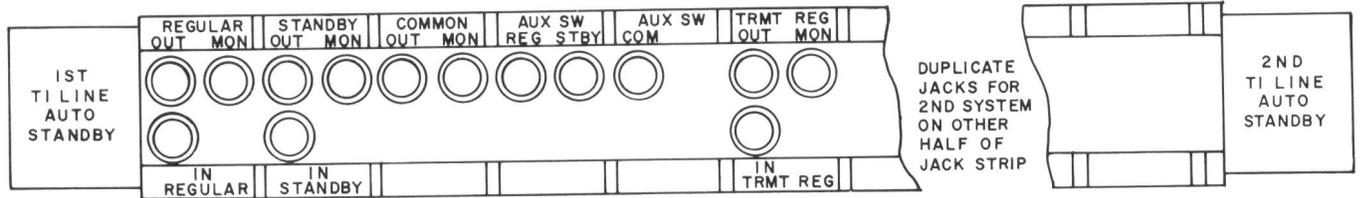


Fig. 7—Jack Strip

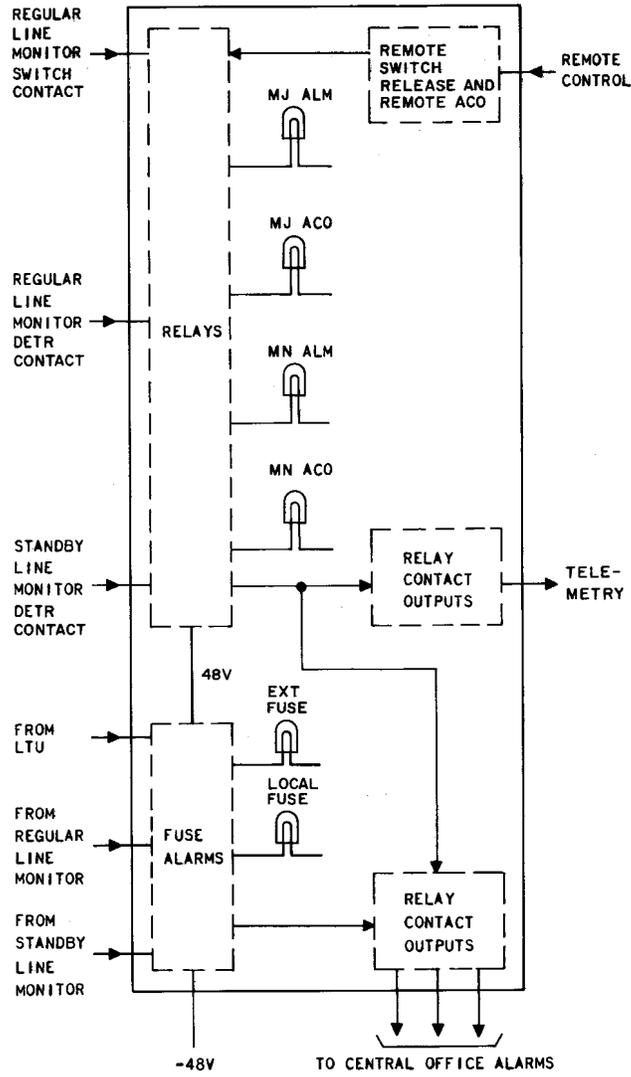


Fig. 8—Block Diagram of Alarm Unit