5ESS® SWITCHING EQUIPMENT MODULAR FUSE FILTER UNIT CIRCUIT

CONTENTS

1. GENERAL DESCRIPTION 1
1.1 PURPOSE OF CIRCUIT 1
2. DETAILED DESCRIPTION 1

1. GENERAL DESCRIPTION

A Modular Fuse/Filter Unit (MFFU) consists of a sheet metal housing with (12) "input" feed positions at the rear of the housing and (19) "output" positions at the front of the housing.

1.1 PURPOSE OF CIRCUIT

The MFFU provides fuse protection for up to (72) output circuits per frame (cabinet) with one unit per frame.

2. DETAILED DESCRIPTION

A modular fuse/filter unit (MFFU) consists of a sheet metal housing with twelve "input" feed positions at the rear and nineteen "output" positions at the front. Each input at the rear is associated with a potential feed from a power distribution frame (PDF) and consists of a capacitor, cables, connectors, hardware and at least one output fuse block at the front. In each front position, a four place fuse block can be exchanged for a "card holder" to house alarm cards, alarm opto-isolator cards (AOI), or a TEL-JACK card.

Each capacitor assembly snaps in or out of the frame and the fuse blocks/card holders are each removable. All wiring is connectorized and the various cards unplug from the card holder.

Each input at the rear is associated with a potential feed from a power distribution facility and consists of a capacitor, cables, connectors, hardware and at least one output fuse block at the front. In each front position, a fuse block (holding up to four fuses) can be exchanged for a "card holder" to house two Alarm Cards and/or Alarm Opto-Isolator cards (AOI), or one TEL-JACK card. Each alarm card has two independent alarm circuits (groups) so the exchange is four fuses in a block vs. two or four alarm circuits. At least one of the front positions is intended to hold at least one alarm card which leaves (18) optional positions.

Each capacitor assembly snaps in or out of the frame and the fuse blocks/card holders are each removable. All wiring is connectorized and the various cards unplug from the card holder.

1. ==========

*** Fuses ***

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All 41A fuse blocks will accommodate WP-91768 Fast Acting (Normal Blow) or WP-92458 Very Fast Acting (Fast Blow) fuses. Fuse selection must comply with 5ESS power consultant recommendations and must be listed below.

ORDER	COMCODE	SPEC	RATING	TYPE
bulk	406 663 971	WP-91768-L104	0.50 Amp	fast acting
single	406 747 501	WP-91768-L104	0.50 Amp	fast acting
bulk	406 599 308	WP-92458-L2	1.25 Amp	very fast acting
single	406 747 519	WP-92458-L2	1.25 Amp	very fast acting
bulk	406 708 545	WP-91768-L107	2.00 Amp	fast acting
single	406 747 527	WP-91768-L107	2.00 Amp	fast acting
bulk	406 693 895	WP-91768-L108	3.00 Amp	fast acting
single	406 747 535	WP-91768-L108	3.00 Amp	fast acting
bulk	406 693 887	WP-91768-L110	5.00 Amp	fast acting
single	406 747 543	WP-91768-L110	5.00 Amp	fast acting
bulk	406 693 903	WP-91768-L112	7.00 Amp	fast acting
single	406 747 550	WP-91768-L112	7.00 Amp	fast acting
bulk	406 599 324	WP-92458-L11	10.0 Amp	very fast acting
single	406 747 568	WP-92458-L11	10.0 Amp	very fast acting
bulk	406 599 332	WP-92458-L12	12.0 Amp	very fast acting
single	406 747 576	WP-92458-L12	12.0 Amp	very fast acting

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* SPECIAL APPLICATION FUSES - these require approval from the *
* 5ESS power consultant and impact 5ESS Power Distribution *

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bulk	406 599 357	WP-92458-L13	15.0 AMP	very fast acting
single	406 808 469	WP-92458-L13	15.0 AMP	very fast acting
bulk	406 759 050	WP-92458-L14	20.0 AMP	very fast acting
single	406 808 477	WP-92458-L14	20.0 AMP	very fast acting

2. The MFFU has been designed for the 5ESS nominal -48 DC system voltage and conforms to ETSI voltage requirements.

3. The following circuit limitations apply:

   A. The maximum current available through each feed is limited by the capacity of the 5ESS power distribution facility but must not exceed 20 amps.

   B. A 0 to 14,000 ohm load must be present - under fault or no fault conditions - at each output of a fuse block in order to activate the block's LED and, in turn, generate an alarm signal.

   C. No more than six alarm cards can be used because of worst-case amperage limitations of the cabinet LED.

4. *********
   Feeds
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   There is room for twelve feeds in the modular fuse/filter unit (MFFU). The feed capacitor POSITIONS at the rear of the unit are numbered from 1 to 12 whether occupied or not. The feed CIRCUITS associated with the capacitor positions are numbered from 0 to 11 whether present or not.

5. A "feed" is associated with one capacitor and a power distribution facility circuit protector. There is no logical limit to the number of fuse blocks that can be wired to a feed. The practical limit is a function of the total current through the feed and space limitations in the fuse filter unit housing.

6. Feeds are built from one capacitor, one capacitor bleeder resistor, one fuse block, associated cables & connectors PLUS as many additional fuse blocks as desired - from zero to "N".

7. ****************************
   "A" & "B" BUS DESIGNATIONS
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   When the MFFU's cabinet is installed, the MFFU will clearly show:

      A. where a bus split between input FEEDS is required

      B. where a bus split between fuse BLOCKS is required

      This is accomplished with labels applied to the front and rear of the housing between the appropriate feed connectors at the rear (input) and the associated fuse blocks at the front (output).

8. ********************************
   41A Fuse Blocks & Card Holders
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   There must be at least two feeds per unit. Thus, there must be at least two fuse blocks in the front section of the unit. This leaves seventeen optional positions. Normally, at least one position in the MFFU front section is committed to a card holder. Each card holder has two card slots. The primary purpose of the card holder is to carry alarm cards but it will also accommodate an AOI card or TEL-JACK card. A holder has a capacity of one TEL-JACK card alone or a combination of one or two AOI/alarm cards. Each alarm card contains two alarm circuits.

9. The nineteen fuse block/card holder positions available at the front of the unit are numbered from 1 to 19 whether occupied or not.

10. The distance between fuse blocks is 1 1/8 inch, ie: (9) eighths. The fuse block EQL positions are stamped into the sheet metal housing. The card holder slots are plus/minus 1/4 inch - (2) eighths - from the base position of the card holder.

11. Fuses in a block are referenced from bottom to top by the letters "A" through "D". Fuses "A" & "B" at the bottom are associated with alarm-out column "0" while "C" & "D" at the top are associated with column "1".

12. The alarm-out pins are arranged in two columns of three rows. The "0" column and "1" column of pins each form a common bus because the pins in each COLUMN are electrically tied together.

13. **9824-AH Interface Card**

All connections to the various MFFU cards will pass through the 9824-AH Interface Card. The 9824-AH provides the means to remove the 9824-AD, AF, AE (Alarm, AOI, TEL_JACK) cards from the MFFU frame without disturbing their associated wiring.

14. **Alarm Card**

The alarm-out wiring from a fuse block will always terminate at a fuse alarm card (FAC). There are two independent alarm circuits (FACKTS) on each card. The card's target input/output header pins are referenced by their <EQL,pin-number>.

15. The i/o header is divided into two logical sections by a gap. The upper section is associated with UNIT LEVEL wiring and the lower section with FRAME (CABINET) LEVEL wiring. The header is arranged in two columns and twenty one rows numbered "0 - 20". The pins in each ROW are electrically tied together.

16. **Alarm Mult**

The inter-cabinet alarm mult is a simple series loop with the origin at a "no-connect (NC)" pin of an alarm card circuit and the termination at the corresponding "alarm out". The alarm wiring alternates between an output alarm pin (xxxALM) and an input test pin (TSTxxx) as it passes from card to card (cabinet to cabinet). This scheme allows testing of the wiring *AND* the alarm circuitry. It also provides the means to easily expand the wiring in growth situations.

17. ==========
Remote Applications
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An AOI card provides dual opto-isolator circuits required to interface an alarm card's two outputs in remote applications.

18. Also required in these remote applications is a means to power the alarm status units (ASU) directly from the battery plant. This will be accomplished with an ASU power distribution assembly which serves as a junction for the 16 ga wire which mults between cabinets and the smaller wire that is routed to the ASU and AOI. It is mounted external to the MFFU.

19. ==========
Diagnostics
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NOTE: WHEN ALARM CARDS ARE SEATED IN THEIR INTERFACE CONNECTORS *AND* A FUSE IS REMOVED OR CLEARED, "PHANTOM" VOLTAGES FROM THE ASSOCIATED ALARM CARD WILL BE PRESENT AT THE BACKPLANE OR OTHER POINTS IN THE FRAME. THE CARD(S) CAN BE TEMPORARILY PULLED OUT OF THEIR CARD HOLDERS JUST ENOUGH TO DISENGAGE THE PINS AND REMOVE THESE VOLTAGES IF THEY LEAD TO TROUBLESHOOTING DELAYS. BECAUSE OF INHERENT CURRENT LIMITING, THERE WILL BE NO DANGER IF THE CARDS ARE LEFT IN PLACE.

20. The AOI card was designed to also serve as a diagnostic tool when plugged into an alarm card's position. All alarm card i/o pins are replicated at the front connector of the AOI card where jumpers can be inserted or the alarm card itself can be re-inserted and made accessible. The AOI components will not interfere with the alarm card functions in this configuration but the resistors on it can be used to generate alarms through the alarm card without actually involving a fuse block. The 9824-AH interface card is common to all three MFFU cards - ALARM, AOI, and TEL-JACK. The pin assignment of the ALARM card at the interface is the basis for the diagnostic procedures. Several diagnostics are possible - such as checking the state of the ALARM card's on-board fuses.

21. ==========
Configurations
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Hardware and associated wiring can be pre-engineered in the form of fixed configurations or customized by building from primitives found in the associated J5D003-FJ drawing's list structure.

22. The number of feeds on each bus and the number of blocks per feed is selected by the user to satisfy one of two limitations:

    a. A maximum current draw at a given voltage.

    b. The need to isolate loads.

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